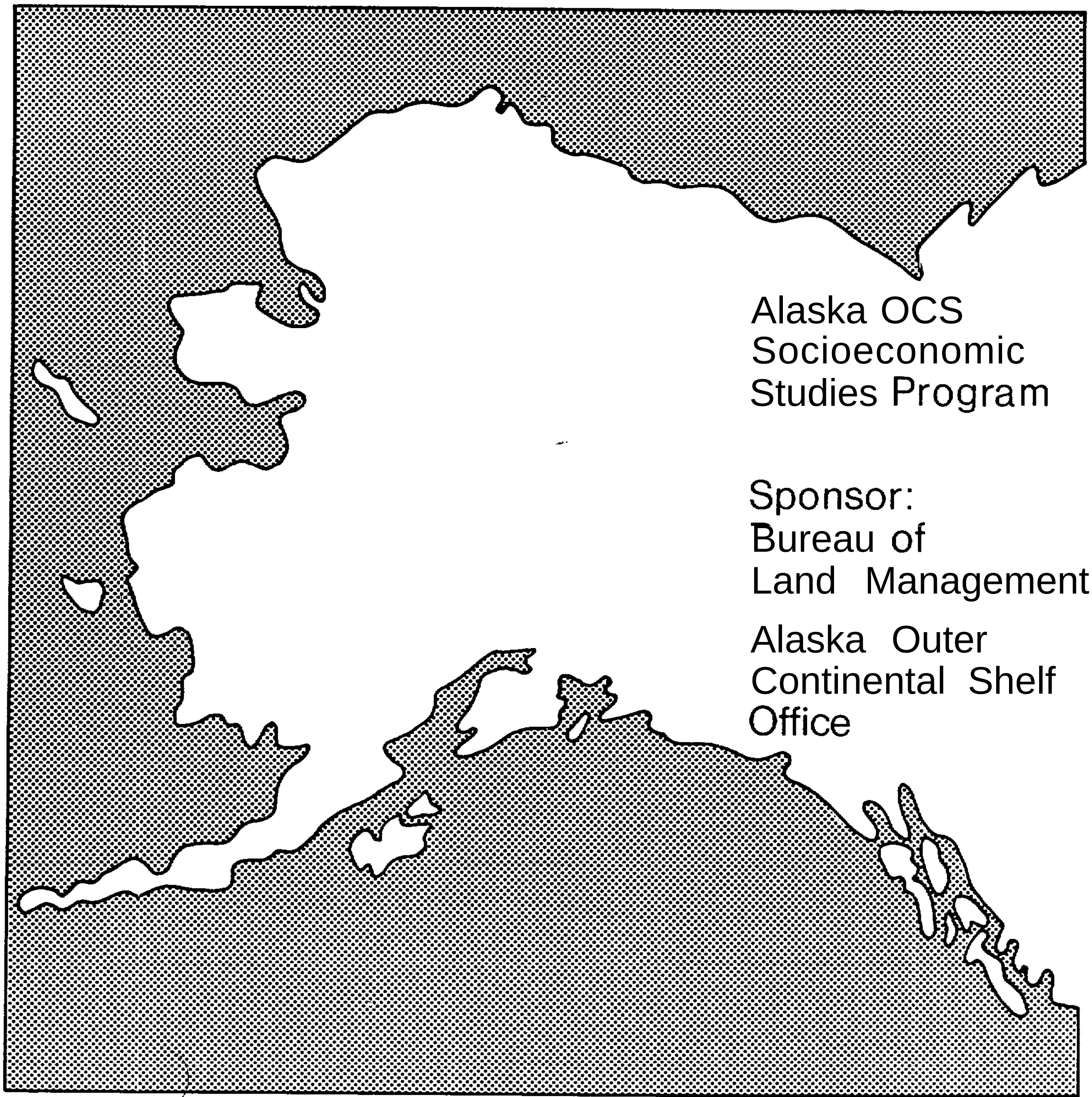
Technical Report Number 33



Northern Gulf of Alaska Petroleum Development Scenarios **Local** Socioeconomic Impacts

'The United States Department of the Interior was designated by the Outer Continental Shelf (OCS) Lands Act of 1953 to carry out the majority of the Act's provisions for administering the mineral leasing and development of offshore areas of the United States under federal jurisdiction. Within the Department, the Bureau of Land Management (BLM) has the responsibility to meet requirements of the National Environmental Policy Act of 1969 (NEPA) as well as other legislation and regulations dealing with the effects of offshore development. In Alaska, unique cultural differences and climatic conditions create a need for developing additional socioeconomic and environmental information to improve OCS decision making at all governmental levels. In fulfillment of its federal responsibilities and with an awareness of these additional information needs, the BLM has initiated several investigative programs, one of which is the Alaska OCS Socioeconomic Studies Program (SESP).

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The overall methodology is divided into three broad research components. The first component identifies an alternative set of assumptions regarding the location, the nature, and the timing of future petroleum events and related activities. In this component, the program takes into account the particular needs of the petroleum industry and projects the human, technological, economic, and environmental offshore and onshore development requirements of the regional petroleum industry.

The second component focuses on data gathering that identifies those quantifiable and qualifiable facts by which OCS-induced changes can be assessed. The critical community and regional components are identified and evaluated. Current endogenous and exogenous sources of change and functional organization among different sectors of community and regional life are analyzed. Susceptible community relationships, values, activities, and processes also are included.

The third research component focuses on an evaluation of the changes that could occur due to the potential oil and gas development. Impact evaluation concentrates on an analysis of the impacts at the statewide, regional, and local level.

In general, program products are sequentially arranged in accordance with BLM's proposed OCS lease sale schedule, so that information is timely to decisionmaking. Reports are available through the National Technical Information Service, and the BLM has a limited number of copies available through the Alaska OCS Office. Inquiries for information should be directed to: Program Coordinator (COAR), Socioeconomic Studies Program, Alaska Ocs Office, P. O. Box 1159, Anchorage, Alaska 99510.

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Alaska OCS Socioeconomic Studies Program

NORTHERN GULF OF ALASKA
PETROLEUM DEVELOPMENT SCENARIOS
LOCAL SOCIOECONOMIC IMPACTS

Prepared for

Bureau of Land Management

Alaska Outer Continental Shelf Office

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NOTICE

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Northern Gulf of Alaska
Petroleum Development Scenarios
Local Socioeconomic Impacts

Prepared by
Alaska Consultants, Inc. for Peat, Marwick, Mitchell & Co.

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INTRODUCTION

The objective of this report is to analyze how the growth and community infrastructure of Yakutat, Cordova and Seward might be affected as a consequence of proposed Northern Gulf of Alaska OCS Lease Sale #55. Figure 1 depicts the general location of the tracts being considered for Sale #55 and the locations of the three settlements in relation to the sale area. In order to assess the range of possible community impacts of the proposed lease sale over two decades, the scenario method was used to construct and compare four different growth cases, a base or non-OCS case and three distinct petroleum development cases.

To identify the significant community impacts of the different petroleum scenarios, this logical sequence of analyses was followed:

First, a baseline description of current economic, social and other pertinent community conditions (primarily public facility and service levels and municipal government operations) was completed for each community. These baseline descriptions were published as Technical Report No. 32.

Second, using techniques of economic base analysis and employment and population multipliers, local forecasts of future annual employment by economic sector and of future population were prepared for the base case without an OCS lease sale, and for each of three petroleum development scenarios. These scenarios were prescribed by Dames and Moore, based on oil and gas reserves estimates supplied by the U.S. Geological Survey. The specific forecasts of OCS-related employment used in the present study, from which indirect employment and future population estimates were derived, were adopted directly from Dames and Moore's petroleum scenarios.

Third, a set of uniform standards and assumptions was developed for forecasting, for a given population, future public service and facility requirements and local governmental revenues and expenditures to facilitate comparisons among the different communities and alternative scenarios.

Finally, the standards and assumptions were used to quantify population-related community impacts of the various scenarios for purposes of analysis.

As background for the analysis of the different scenarios, a brief explanation of the role of scenarios and the forecast methodology is provided below. A fuller explanation is given in the Appendices to this report.

Petroleum Development Scenarios

The outcome of the search for oil and gas is by nature highly speculative and it is thus impossible to advance any definitive single forecast about the community development impacts of a particular OCS lease sale.

At the time of the lease sale and, indeed, for some years after, resource estimates and corporate decisions about development schedules and production facilities must be considered tentative, pending decisive exploration results and economic analyses.

Still even preliminary and pre-lease resource data can be used statistically to calculate the likelihood of various recoverable reserve estimates. These different estimates, coupled with insight into the critical factors governing petroleum development decisions and operations, can be used to hypothesize forecasts or scenarios of how petroleum development might unfold in accord with one or another of the reserve estimates. Finally, the petroleum development scenarios provide a basis for constructing coherent, plausible accounts of potential socioeconomic impacts upon nearby communities of the proposed OCS Lease Sale to match different assumptions about ultimate reserves and development decisions.

This report characterizes the socioeconomic impacts on Yakutat, Cordova and Seward of a base case (non-OCS case) and of three different OCS petroleum development scenarios:

- Base Case. This is a forecast of how the three settlements would most likely evolve were there no OCS lease sale and is the basis for comparison with the OCS scenarios.

- 95 Percent Probability Resource Level Scenario. This is the low or exploration only scenario, corresponding to that volume of recoverable resources low enough to have a 95 percent probability of being realized.

- 5 Percent Probability Resource Level Scenario. This is the high scenario, corresponding to that volume of recoverable resources high enough to have only a 5 percent probability of being realized.

- Mean Probability Resource Level Scenario. This is a statistical mean scenario which is a mean of the high and low scenarios.

Detailed petroleum development scenarios were prepared for the Alaska OCS Office by Dames and Moore, based on oil and gas reserve estimates supplied by the U.S. Geological Survey. Table 1 lists the chief OCS-related industrial facilities and activities and associated employment assigned by Dames and Moore to each of the three communities under each of these three petroleum scenarios. Local community impacts for the most part stem from the construction, operation and staffing of these facilities. Thus, the validity of the socioeconomic scenarios necessarily depends on the realism of the petroleum scenarios. Most critical in this respect are the Dames and Moore workforce figures for construction camp and oil terminal operations, since they involve the largest share of employment.

The base or non-OCS case describes the likely course of community growth, assureing a continuation of current economic trends, that is,

TABLE 1

MAJOR ONSHORE FACILITIES ANO ACTIVITIES
BY SCENARIO AND PHASE
YAKUTAT, CORDOVA AND SEWARD

	Yakutat	Cordova	Seward
95 Percent Scenario			
1. Exploration only	temporary service base	no facilities	temporary service base
Mean Scenario			
1. Exploration	temporary, then permanent 1 arge service base	no facilities	temporary, then permanent service base
2. Development	expanded service base, oi 1 terminal construction, LNG plant construction	oil terminal construction, LNG plant construction	expanded service base, pipe-coating yard
3. Production	service base operation, oil terminal operation (250,000 bpd, 240 jobs) LNG plant operation (1 Bcfd, 42 jobs)	oil terminal operation (100,000 bpd, 160 jobs), LNG plant operation (.3 Bcfd, 28 jobs)	no facilities
5 Percent Scenario			
1. Exploration	temporary, then permanent l arge service base	no facilities	temporary, then permanent service base
2. Development	expanded service base, oi 1 terminal construction, LNG plant construction	oil terminal construction, LNG plant construction	expanded service base, pipe-coating yard
3. Product ion	large service base operation, oil terminal operation (700,000 bpd, 40B jobs), LNG plant operation (2 Bcfd, 102 jobs)	small service base operation oi l terminal operation (100,000 bpd, 272 jobs) LNG plant operation (.75 Bcfd, 68 jobs)	small service base operation

Source: Alaska Consultants, Inc. Derived from facility and OCS employment scenarios prepared by Dames and Moore.

without any further OCS-related economic activities. For the base case, a full analysis of community growth needs was prepared, focusing on the critical elements of community infrastructure: housing and residential land supply; public utilities (water supply; sewage systems; power; solid waste disposal; telephone); public safety; health and social services; education and recreation. Emphasis was given to those services and facilities needs customarily the responsibility of local government. A forecast was also prepared for the fiscal impact of growth on local governmental revenues and expenditures.

The base case forecasts and analyses were then used as the benchmark for assessing the incremental significance of the impact forecasts prepared for each of the three OCS cases. The analyses of the petroleum scenarios stresses the noteworthy departures from base case conditions.

Methods of Forecasting

EMPLOYMENT AND POPULATION

The method employed to forecast future employment and population was the economic base method, outlined in detail in the Appendices to this report. Briefly explained, this method divides all local economic activities into two categories: exporting or basic industries which bring money into the locality by exporting locally produced goods and services; and non-exporting or service industries which produce goods and services for local consumption. Then, current employment is tabulated by economic sector and grouped as basic or service employment. Next, the recent trends and future prospects for each basic economic sector are analyzed and future levels of basic employment are forecast for each year. Finally, suitable ratios or multipliers relating basic employment to service or indirect employment are applied to basic employment projections to yield overall employment forecasts by sector. The suitable ratios vary from locality to locality, depending upon specific features of the local economy.

The employment forecasts are then used to project future population by applying an appropriate ratio of local employment to local population. The ratio proper to a given locality can be derived empirically, with adjustments as needed to account for any future factors that might alter it. This employment/population ratio will vary with the social composition of the local population, particularly with its age structure and labor force participation rate, and with the vitality of the local economy.

The local employment forecasts for the base case were derived in a straightforward way from existing economic data. However, the calculation of total local employment forecasts for the OCS scenarios was more complicated.

The petroleum development scenarios prepared by Dames and Moore summarize at a regional level the basic employment for a whole array of offshore industries. However, this regional summary was not immediately usable for community level forecasts. A number of intermediate steps were required to obtain community employment forecasts.

First, regional OCS employment was disaggregate and jobs were assigned to particular localities.

Second, certain unusual traits of the workforce in the offshore industries were examined in order to interpret the numerical data in terms meaningful for economic base analysis. For example, among other factors, account was taken of personnel rotation policies, shift lengths, seasonality, round-the-clock operations, worker turnover and transiency, resident hire, and community/construction camp residency patterns as these factors affect different job categories, before an assessment was made of the quantitative impact of regional OCS-related employment on a given locale's overall employment, population and community infrastructure. The special assumptions and methods adopted herein to disaggregate and allocate OCS-related employment and the step-by-step results are recounted in the Appendices to this report.

Third, to calculate indirect employment a series of assumptions were made assigning appropriate employment multipliers to different basic job categories.

Fourth, the total indirect employment was distributed to various economic sectors in a proportion selected as descriptive of the economic structure toward which the relatively immature economies of Alaska's smaller coastal communities would tend under the economic stimulus of OCS industries.

The end product of these operations was a series of annual employment forecasts by economic sector for each locality for each OCS scenario, and a parallel population forecast.

COMMUNITY INFRASTRUCTURE AND FINANCES

A set of uniform standards was developed for forecasting local public facility and service demands and local revenues and expenditures, usually on a per capita basis. Quantitative standards were developed for the following items of community infrastructure: housing demand by type of unit; residential land use; water system capacity; domestic sewage treatment capacity; electric generating capacity; disposable solid wastes; telephone system capacity; police officers; jail facilities; fire stations; hospitals; school enrollment and classroom needs; and recreational facilities.

The utility requirements of specific OCS industrial facilities such as service bases, pipecoating yards, construction camps and oil and LNG terminals, were estimated separately from community needs. Depending on the scenario and locality, various of these facilities may be wholly isolated from the settlement, or connected by road or in close proximity to the settled area. As a rule, it was presumed that large industrial enterprises would find it more timely, economical and reliable to develop their own primary or backup utility systems, unless existing excess local capacity was readily available for their use. In those scenarios where industrial utilities may be a pertinent community development issue, their impact on community utility systems is evaluated.

These standards were then applied to the population forecasts to generate for each community for the basic non-OCS case and for the OCS scenarios the forecast of public service and facility needs.

This use of uniform standards uniformly applied has the advantages of simplicity, of minimizing local biases and of yielding easily compared forecasts of impacts upon individual communities under the different scenarios. Conversely, the methodology has the disadvantage of slighting local features that may importantly influence the shape that impacts take. As a result, the methodology may occasionally generate unrealistic impact forecasts. Whenever the uniform standards produced a forecast at odds with common sense or known local constraints, that was noted and an alternative forecast and the reasons for it were presented.

The revenue and expenditure forecasts require some special qualifications for their proper use and understanding. The fiscal forecasts simply carry forward into the future the local revenue patterns and expenditure practices that prevailed before the forecast period, adjusted for population growth (as determined by the economic base analysis) and for inflation at an annual rate of 6 percent. In terms of purchasing power, local property tax revenues were kept at a constant per capita level, except for the addition of revenue from new OCS-related industrial property which is taxed at the prevailing local rate, subject to the limits of State law.

The general fund and school district expenditure forecasts assume that each local governing unit will maintain its present level, variety and quality of services at its present per capita costs. On the whole, this is a debated assumption, though it is not easy to pinpoint when and where exceptions to it may occur. Finally, the forecast of funds surplus to operating expenditures and available for capital improvements, debt service or other purposes is obtained by subtracting expenditures from revenues.

The fiscal forecasts also do not take into account the possible changes in local tax policies (i.e., adoption of a sales tax by Seward) or in local governmental operations (i.e., reorganization of Cordova Public Utilities) or State tax policies (i.e., revision of the statutes governing local taxation of oil and gas property) or many other factors that could radically upset the fiscal balance. While it is granted that factors of this sort may well alter fiscal relationships, they are not for that reason alone germane to the fiscal analysis of growth impacts stemming from the OCS Lease Sale.

Again, it should be emphasized that this methodology has limited validity for predicting the services and facilities that will actually be provided in the future or for predicting actual expenditure and revenue patterns. For example, since the methodology imposes common standards for public service levels and assumes a continuation of current local fiscal practices, it can not account for local decisions to alter the assumed pattern of services or the pattern of taxation and expenditures. Nevertheless, the methodology does provide comparisons, within the framework of the assumptions, suggestive of the trend of growth impacts on the settlements under study and that is the point of these OCS scenarios.

4

PROJECTIONS OF GROWTH - BASE CASE

Yakutat

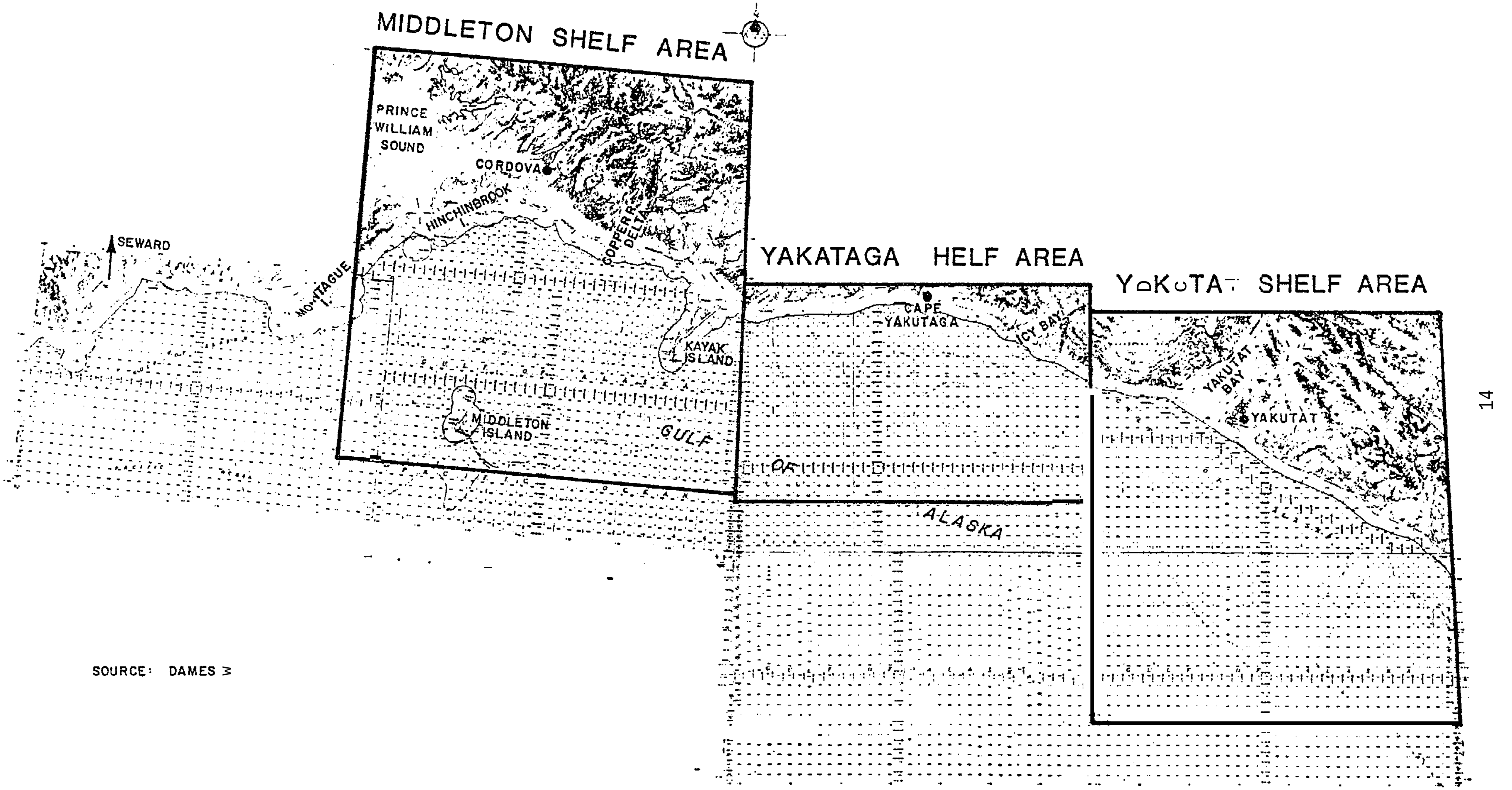
COMMUNITY FORECASTS

Significant Factors Affecting Growth

In the current decade, Yakutat has rebounded vigorously from its post-War economic and population decline. This new trend can be accounted for by a number of factors. Chiefly, it is a result of generally better economic conditions, especially in the fishing and fish processing sectors and significantly better living conditions through improved housing conditions and public facilities. Yakutat has been able to retain or attract back a larger share of its indigenous population as well as some new residents. This basic trend is expected to persist under the assumptions of the non-OCS case through the forecast period.

The forecast of Yakutat's future employment and population is based on certain assumptions about the dynamic factors influencing economic and demographic change. These assumptions are described below.

The base case forecast is broadly premised on the assumption that there will be no radical change in the structure of Yakutat's local economy and that recent trends will, more or less, continue into the foreseeable future. The overall trend is expected to be slow, steady growth,



SOURCE: DAMES ≥

FIGURE 1
LOCATION OF STUDY AREA

interrupted by spurts of growth as new employment opportunities stimulated by a developing bottomfishing industry are realized.

The growth elements in Yakutat's economy are seen to be a continued expansion of the community's traditional industries, namely fishing and fish processing, logging and tourism. Optimum use of Yakutat's traditional fisheries resources is seen as the principal factor in community growth with some addition of high unit value bottomfish.

Other resource-based industries (mining and agriculture) are expected to remain, as today, minor sources of local employment. These sectors now account for less than a dozen jobs.

Substantial employment growth is forecast in the service and trade sectors of Yakutat's economy, as the local economy matures and consolidates to supply locally a wider range of commerical services and to accommodate visitor traffic. This continues a trend that has been underway for some time.

The transportation sector is expected to grow at a faster rate than the overall economy. This supposition is based in part, on greater activity in the fish processing industry, in part on a steadily rising level of outdoor recreational and tourist activities centered at Yakutat.

Contract construction industry employment will fluctuate more widely than any other aspect of the economy, rising sharply during periods when processing plant construction and related growth takes place, and falling off to a lower level between those periods.

Government will remain a major employer throughout the forecast period, although its share of total employment is expected to decline as the role of the private economy strengthens.

Again, consistent with past trends, the ratio of total population to employment is expected to show a measurable decline over the forecast period. This is linked to such factors as: rising labor force participation rates, particularly successful entry of more women into the labor market; smaller family size and declining birth rates; a shift in population composition, with a reduced proportion of children and a relatively larger adult population; and increased employment opportunities. 4
As a result of these similarly trending factors, population is forecast to grow at a somewhat slower rate than employment during the forecast period.

Future Employment

The base case employment forecast for Yakutat area reflects continued development of Yakutat's traditional industries, namely fishing and fish processing, and tourism and recreation, for an increase from 264 jobs in 1978 to 519 jobs in 2000 (see Table 2). This represents a cumulative increase of 255 jobs or 97 percent. The bulk of new employment is concentrated in the sectors of manufacturing, trade, government and

TABLE 2

FORECAST OF EMPLOYMENT AND POPULATION
YAKUTAT AREA
NON-OCS CASE
1978 - 2000

INDUSTRY CLASSIFICATION/YEAR	1978	1979	1980	981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	104	116	116	13	116	136	137	132	132	132	137	134	166	158	157	162	169	179	186	174	179	179	181
Agriculture, Forestry and Fisheries	(38)	(40)	(44)	(46)	(48)	(48)	(50)	(50)	(50)	(50)	(50)	(50)	(52)	(54)	(56)	(56)	(58)	(58)	(60)	(60)	(62)	(62)	(62)
Mining	(4)	(2)	(2)	(2)	(3)	(3)	(2)	(2)	(2)	(4)	(4)	(4)	(4)	(4)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Manufacturing	(32)	(34)	(50)	(50)	(50)	(60)	(60)	(60)	(60)	(60)	(65)	(65)	(70)	(70)	(75)	(80)	(85)	(90)	(90)	(90)	(93)	(93)	(93)
Contract Construction	(30)	(40)	(20)	(15)	(15)	(25)	(25)	(20)	(20)	(18)	(18)	(15)	(40)	(30)	(20)	(20)	(20)	(25)	(30)	(18)	(18)	(18)	(20)
DISTRIBUTIVE INDUSTRIES	78	87	95	99	105	112	120	133	140	153	155	159	163	177	186	191	193	199	200	200	206	206	208
Transportat i on, Communications and Public Utilities	(20)	(22)	(24)	(26)	(28)	(30)	(35)	(40)	(40)	(40)	(40)	(40)	(40)	(46)	(46)	(48)	(48)	(50)	(50)	(50)	(52)	(52)	(52)
Trade	(32)	(33)	(35)	(37)	(39)	(42)	(42)	(46)	(50)	(52)	(54)	(56)	(58)	(64)	(70)	(72)	(72)	(75)	(75)	(75)	(77)	(77)	(77)
Finance, Insurance and Real Estate	(5	(6)	(6)	(6)	(6)	(6	(7	9)	(lo)	(lo)	(10)	(11	(13)	(13	(13)	(13)	(14)	(14)	(15)	(15)	(15)	(15)	(15)
Service	(21	(26)	(30)	(30)	(32)	(34;	(36	38)	(40)	(51)	(51)	(52	(52)	(54	(57)	(58)	(59)	(60)	(60)	(60)	(62)	(62)	(64)
GOVERNMENT	82	85	90	90	90	95	95	100	100	102	104	104	110	115	120	120	122	123	125	127	130	130	130
TOTAL EMPLOYMENT	264	288	301	302	311	343	352	365	372	387	396	397	439	4 SO	463	473	484	501	511	501	515	515	519
RAT IO OF POPULATION TO EMPLOYMENT	2.15	2.00	2.01	2.00	2.00	1.85	1.80	1.75	1.75	1.75	1.75	1.75	1.70	1.70	1.70	1.75	1.75	1.75	1.75	1.80	1.80	1.80	1.80
TOTAL POPULATION - YAKUTAT AREA	567	576	604	604	622	634	634	639	651	677	693	695	746	765	787	828	847	877	894	902	927	927	934
CITY OF YAKUTAT	406	411	425	425	434	440	440	443	449	462	470	471	497	507	518	539	549	564	573	577	590	590	594

Source: Alaska Consul tants, Inc.

services which together account for more than three-quarters of all anticipated growth.

This most probable forecast does not anticipate large scale entry into deep sea fishing and fish processing. It is rather a forecast wherein Yakutat residents are assumed to divert their land, labor, capital and entrepreneurial talents toward the development of existing resources which are now being produced or which have been produced in the past. It is also anticipated that the village corporation formed under the Alaska Native Claims Settlement Act, the Yak-Tat Kwaan, Inc., will play a major role in local development.

Assumptions for Basic Employment

- Fishing and Seafood Processing. Yakutat is the only community within the expansive fisheries area which extends from Cape Suckling to Cape Fairweather. However, a large share of the fisheries product harvested here is either not caught by local fishermen or is not processed at Yakutat or both. Therefore, growth in fishing employment in Yakutat depends upon new resident entry into fishing, a lengthened fishing season (generally attained through fishing for other species), additions to the local fishing fleet and increased deliveries to the Yakutat plants from transient vessels fishing offshore from Yakutat.

It is assumed that a technologically advanced seafood processing plant will be constructed to replace the Yakutat Cold Storage plant destroyed by fire on May 13, 1977. An engineering/economic cost/benefit study is in progress to designate the most suitable long-term general cargo and fishing dock sites or multi-use site for the plant location.

B

The new plant is assumed to result in additions to the resident fleet during the tanner and Dungeness crab seasons and function as a port of call for an increased number of trollers, resulting in more local seafood processing. In addition, Yakutat is assumed to attract the landing of more product from transient vessels fishing this area.

The long-term yield of salmon from the set set fishery is forecast to increase modestly here due in part to the 200 mile offshore limit imposed by the United States to limit the fishing of foreign vessels on the continental shelf and treaties further limiting salmon catches beyond the 200 mile limit. The effect of these increases is not seen as increasing the number of set net fishermen (agriculture, forestry and fisheries). It is, however, seen as increasing their disposable income. On the other hand, increased employment in fish processing and handling (manufacturing) is seen as increasing slightly.

The offshore salmon troll fishery has recently increased in importance in the Yakutat area and Yakutat has acted as a port 9
of call for several trollers. With improved docking and the addition of processing facilities at Yakutat, this fishery will increase number of fish delivered at Yakutat, necessitating a small increase in fish processing employment (manufacturing).

Tanner crab landings in Yakutat are also, forecast to increase during the planning period. This fishery is a recent addition in the offshore Yakutat area with the first substantial catches being taken during 1973. Yakutat now serves as home port for a crabber. Despite recent declines in tanner crab catches due in large part to the imposition of a minimum legal size limit for male crabs in 1976, the Department of Fish and Game views the future of the tanner crab fishery in this area as good. With dock and plant improvements in Yakutat, some seasonal additions to the Yakutat crab fleet are assumed, thereby resulting in a modest increase in fishing employment (agriculture, forestry and fisheries), while increased landings from resident and transient vessels are assumed to result in a modest growth in seafood processing employment (manufacturing).

Although the demand for Dungeness crab from Alaska has suffered drastic yearly fluctuations based upon the level of catches and satisfaction of the market by West Coast fishermen and processors, the demand in the long-term for this species is forecast to increase and remain at a reasonably high level. The West Coast is the principal market for Dungeness crab. However, it is reasoned that as other Alaskan shellfish such a king and tanner crab reach a position of optimum yield that new markets will be created for this excellent product. The increased demand is foreseen to be sufficient to justify the prices required for Alaska fishermen and processors to catch and process more of this product. It is assumed that increased landings of Dungeness crab will be made at Yakutat. Therefore, there will be some increase in employment handling and processing this product.

With significant deep sea fishing forecast for the Gulf of Alaska, the future of the halibut fishery is at best uncertain. However, any loss of halibut landings in Yakutat are seen to be replaced by landings of high unit value groundfish such as sablefish. In any case, the effects of these landings on employment will be minimal.

Other fisheries resources such as red and brown king crab, shrimp, scallops and razor clams will contribute to a lesser extent to the Yakutat fishing and fish processing industry.

In summary, recent federal laws and treaties providing for improved fisheries resource management, Plus improved Alaska Department of Fish and Game management gained through greater experience, is assumed to result in a more dependable and larger harvest of fisheries resources over the long range forecasting period.

With improvements in dock and fisheries plants assumed to result in increased fishing and fish landings at Yakutat, a modest growth in basic employment can be expected in fishing (agriculture, forestry and fisheries) and fish processing (manufacturing) and lesser increases in basic employment in transportation, trade, services and government. Most of the growth in fish processing is expected to take place in the early years upon completion of the rebuilding of the seafood processing plant. Thereafter, only small incremental increases in food processing employment are foreseen.

- Logging and Wood Products. The present absence of logging and wood processing in the Yakutat area is not due to a lack of quantities of timber limiting harvesting on a sustained yeild basis. The principal factors contributing to the current absence of this industry here are related to uncertainties of land ownership and land status. However, these factors are assumed to be resolved in the near future with the conveyance of lands to the Yak-Tat Kwaan, Inc. (and possibly also to the Sealaska Corporation] and the classification of remaining federal lands under the Alaska Native Claims Settlement Act. The solution is assumed to make available lands for timber harvesting. However, despite the availability of substantial quantities of timber, it is forecast that only a modest, seasonal round logging operation will be initially undertaken during 1983. Logging is forecast to increase throughout the planning period, with a small mill to provide primary processing to be constructed during 1990-1991.

- Tourism and Recreation. Most tourists come in the Yakutat area to take advantage of the area's exceptional hunting and fishing opportunities. Occasionally, mountain climbing groups use Yakutat as a base camp while others are simply interested in the scenery or of the town's Tlingit heritage.

  In the future with creation of the Wrangell-St. Elias National Park and the Glacier Bay National Park, it is assumed that greater numbers of tourists will visit Yakutat as a gateway into sections of these parks. However, although the increases in visitor traffic during the summer may be relatively large, tourism in Yakutat will remain highly seasonal. Thus, annual average basic employment, principally in the service but also the trade and transportation sectors, will be relatively small.

- Government. Only a modest amount of growth is foreseen in basic employment in the government sector. Despite gains in federal jobs resulting from new employment with the Park

Service and increases in Forest Service personnel, the closure of the U.S. Coast Guard's Ocean Cape Loran station in December 1979 will in large part cancel these gains. Forecast increases in State and federal employment will essentially be in response to services demanded due to local population growth. Most of this will be secondary employment and there will be economies of scale involved in providing the services demanded.

In summary, growth in basic employment will result ma· nly from utilization of the natural resources of lands and waters of the Yakutat area. Although the growth may not be great in the absence of OCS development, it will be diversified and it will be long-term growth. Furthermore, there will be a diversity within growth sectors. For example, there will be a reasonable fisheries mix where once salmon along sustained this industry.

In the principal sectors, employment growth in agriculture, forestry and fisheries is forecast to average approximately 2 percent per year based almost exclusively on an increase in fishing. Manufacturing employment is forecast to increase at an average of approximately 5 percent per year based upon growth in seafood processing and logging and wood products activities. Heavy initial increases are forecasted to result in seafood processing employment upon completion of the new processing plant, while later increase will result from the resumption of logging and the construction of a small mill around 1990-1991. Of course, growth in these sectors is assumed to be accompanied by growth in basic employment in the transportation sector and also in contract construction during plant construction.

An average growth rate in excess of 5 percent per year is forecast for the service sector due to increased basic employment in tourism and recreation services. This basic industry is assumed to contribute to a similar rate of growth in basic employment in the trade and transportation sectors.

Assumptions for Secondary (or Service) Employment. Since the existence of service employment is dependent upon expenditures of the basic sector, service employment can be derived roughly from basic employment through the use of a multiplier to elicit total employment. Total employment minus basic employment equals service employment.

The employment count by Alaska Consultants, Inc. during 1977 totaled 257 employees. Estimates of basic and service employees were 153 and 104 respectively. The multiplier derived was 1.68. Admittedly, this multiplier is reasonably high for a small, relatively isolated community. However, no attempt was made to trace intergovernmental transfer payments. Thus, some employment in local government which would have been basic employment was in fact classified as secondary employment. Therefore, the multiplier is somewhat overstated.

However, it is assumed that factors such as the increase in disposable incomes accruing to set net fishermen through increases in the number of fish harvested and a viable well paying logging industry will tend toward this reasonably high multiplier.

Service employment is then distributed using the tabulation of annual average full time service employment by sector derived in 1977 as a guide. Adjustments are made based upon observations of other similarly situated communities with similar population and rates of growth.

Half of the yearly population increase in the Yakutat area is assumed to reside within the City of Yakutat and half outside its present corporate boundaries. Thus, the population in the City of Yakutat is forecast to increase from 406 in 1978 to 594 in 2000, or by only 46 percent.

Future Population

Separate population growth forecasts were developed for the City of Yakutat and the surrounding settled area outside the City. For specific public services and utilities, forecasts were prepared for the City's jurisdiction or for the entire settled area, as appropriate to the function. For example, the City of Yakutat School District serves both the City of Yakutat schoolchildren and, under contract with the State of Alaska, all other schoolchildren in the area; therefore, the forecast for educational needs is on an areawide basis. On the other hand, since it is not likely that the City water and sewer system will be extended to serve non-City residents, those utility forecasts are compiled for the City area only.

Growth in basic employment in seasonal fisheries and seasonal logging activities, coupled with a declining birth rate among local residents and a higher labor force participation rate, is forecast to result in a lower ratio of employment to population in the Yakutat area in the future, especially during the periods of most rapid growth in these basic industries (including plant construction). Thus, the ratio declines from a high of 2.15 in 1978 to a low of 1.70 during the 1990-1992 period. Thereafter, a gradual increase is assumed as some seasonal employees become permanent Yakutat residents.

Although the Base Case forecast results in a reasonably low population growth rate of approximately 2.5 percent per year when averaged throughout the forecast period, the population of the Yakutat area will increase by approximately 65 percent by the year 2000, increasing from 567 to 934 persons.

In recent years, growth has taken place both within the City's boundaries and in the surrounding unincorporated area. The forecast assumes that new residential development and population growth will be about evenly divided between the City itself and the unincorporated vicinity. Estimated population by 2000 is 594 for the City and 340 for the unincorporated area.

The trend toward smaller family size corresponding with lower birth rates will be reflected in a declining proportion of children in the school enrollment years. For forecast purposes, the ratio of school enrollment to total population is assumed to decline by 1 percent annually from the 1978 figure of 28 percent until it reaches 20 percent and remains stable thereafter.

IMPACT ASSESSMENT

Social Impacts

The future outlook for Yakutat under the base case is for slow, steady population growth accruing partly from natural population increase and partly from in-migration. This base case also projects the continuation and expansion of the town's traditional economic base, emphasizing the fisheries and fish processing industry. The forecast growth should call for only small increments of change in the community's infrastructure. In sum, growth in itself does not stand out as a momentous factor for social or economic change and such change as does occur would likely be attributable to other causes.

Impacts on Community Infrastructure

Housing and Residential Land. It is anticipated that over the period of the forecast, there will be a demand for 144 new housing units to accommodate population growth in the Yakutat area in the non-OCS case (see Table 3). About two-thirds (or 96 units) of the demand will be for single family or duplex housing units, with the remainder divided among multifamily (16 units) and trailer (32 units) housing units respectively.

The base case forecast of housing requirements at Yakutat assumes that the existing group housing at the Coast Guard's Ocean Cape Loran station will be phased out of use after 1979 but that otherwise the pattern of housing types according to the three categories of single family and duplex, multi-family and trailers will continue as at present. The Yakutat forecast also assumes that family size will continue to shrink in the next few years until it stabilizes at the level of three persons per dwelling.

Since the forecast addresses only the demand for new dwellings for additional residents, it does not include housing constructed to replace or maintain the existing housing stock.

It is estimated that about 13.4 hectares (30 acres) of land will be developed for residential use in the Yakutat area to provide homesites for new residences by 2000 (see Table 4). No major problems of land availability are foreseen.

Utilities. In general, demand for the various housing-related utilities is expected to grow commensurate with population growth and the adopted standards.

The review of existing utilities indicates that most of the physical systems were improved or expanded in the past few years in anticipation of the growth expected to occur in connection with the Northeast Gulf of Alaska OCS Sale #35 held in May 1976. In fact, exploration in the prime lease tracts was unrewarded and exploration efforts were closed down by 1978.

As a result, Yakutat's utilities, except the power system, are now generally well equipped to absorb the moderate population growth forecast through 2000 under the non-OCS case.

- Water. Maintenance of an adequate water supply does not appear to be a problem in the non-OCS case. The City system presently relies upon two wells which are more than adequate for current needs. Furthermore, its current capital improvements 4 program proposes to supplement the two existing wells with an intertie to two wells which were drilled onsite to supply the industrial needs of the marine service base. According to ARCO spokesmen, this additional source can be relied upon to yield up to 1,362.6 kiloliters (360,000 gallons) per day, which alone exceeds present total City consumption and the total demand for domestic and industrial consumption forecasted to be demanded of the City system by 2000 (see Table 5).

  Recent and soon to be installed improvements to upgrade the water distribution system will complete service to all residences in town. Further additions to be distribution system will be designed primarily to deliver water service to newly developed residential areas in town in the course of meeting additional population growth.

- Sewage Treatment. During the forecast period for the non-OCS case, it is expected that there will be no need for a major upgrading in the City of Yakutat's sewage treatment system.

This expectation depends on certain specific assumptions here noted. The sewer lines and treatment system will continue to serve residential growth within the City's current boundaries but the collector system will not be extended to serve the settled areas outside the City. Seafood processing plants and any other industrial facilities that produce industrial wastes will continue, as at present, to maintain their own sewage and waste treatment plants.

The two decade forecast envisions that the required peak capacity for daily domestic sewage treatment will increase by about 87.1 kiloliters (23,000 gallons) over the forecast period (see Table 6). In comparison, the present treatment plant has a design capacity of 113.1 kiloliters (30,000 gallons) per day and has handled overload volumes of 132.5 to 151.4 kiloliters (35,000 to 40,000 gallons) per day during winter cold snaps when residential taps were left running to prevent line freeze-ups. In view of the fact that actual domestic water consumption and wastewater levels generally fall well below the "standard" level, the relatively slow growth represented by the non-OCS base case will not seriously exceed the capacity of the existing system even without major plant expansion.

It is not expected that major additions to the City's sewage collection lines will need to be installed beyond extending sewer lines to new residential subdivisions developed adjacent to already settled areas within the City's boundaries.

Electric Power. In recent years, power consumption has been increasing in Yakutat in per capita as well as absolute terms. The privately owned power company, Yakutat Power, Inc., has been steadily upgrading the transmission system. However, the plant's generating capacity is at present barely adequate and the operator is reportedly considering acquiring a 1200 kilowatt generating unit to meet anticipated demand. Furthermore, two of the power plant's four generating units were installed in 1966 and will likely become more costly to operate and maintain in good repair in years to come.

The forecast projects that electric power demand in the Yakutat area will almost double between 1978 and 2000 (see Table 7). According to the standard adopted for power consumption, installed generating capacity should rise from an estimated 1,418 kilowatts in 1978 to 2,802 kilowatts by 2000 in the base case. This compares with a present peak power (or name plate) capacity of 2,025 kilowatts and a firm power capacity peak power capacity minus the largest generating unit of 1,225 kilowatts.

The overall picture, then, is that Yakutat's power system can be expected to add substantial generating capacity to serve anticipated growth and, possibly, to replace aging generators and to add some distribution lines. If the operator completes the purchase now under consideration of a 1,200 kilowatt generator, capacity will be adequate for the short term, but it would be reasonable to assume additional plant capacity will be demanded within another decade.

- Solid Waste Disposal. Within the City, collection and disposal of solid waste is handled by a private contractor. Unfortunately, there are no reliable figures on the tonnage or volume of solid waste currently being disposed of at Yakutat. Fortunately, in the judgment of the Alaska Department of Environmental Conservation, the landfill site near town now being used is both well situated and well adapted to expansion to meet the foreseeable needs of the Yakutat area under the base case.

Estimates of disposable solid wastes were calculated, employing standards based on waste disposal records and trends for the Municipality of Anchorage (see Table 8). Actually, it is plausible that Yakutat residents would produce relatively lower volumes of solid wastes than would residents of a more urban and commercially developed city like Anchorage. In any case, the environmentally satisfactory disposal of solid wastes does not appear to pose a problem.

- Communications. Southeast Alaska Telephone Company provides telephone service at Yakutat. In 1978, the company improved its facilities, including installation of a new exchange that can handle 400 telephone lines and can be readily expanded to accommodate additional lines if added capacity is needed.

  As of summer 1978, there were 192 telephone lines in operation, a ratio of about one line per dwelling. According to the base case forecast (which assumed that the ratio of telephones to dwellings will eventually rise to 1.4), there will be a demand for435 telephone lines by 2000 (see Table 9). The existing capacity of 400 lines will not be fully used until 1995. By that time, it is likely the advances in telecommunications technology will have made much of the present system obsolete in any case. Therefore, given the present system capacity and its easy expandability, it appears that Yakutat is basically as well equipped as it can be to maintain adequate telephone service for the non-OCS case.

Public Safety.

- Police. At present, police protection in the Yakutat area is provided by a State Trooper. Though the City did employ a part-time city policeman for a time until 1977, the City does not now retain a police officer. There does not seem to be any urgent need to hire another city police officer to supplement the State Trooper.

Yakutat has traditionally experienced a low rate of criminal activity, with the majority of offenses being alcohol-related.

By the standard of one public safety officer per 500 residents, a single officer should therefore be adequate for the immediate future, perhaps supplemented by restoration of a part-time city police officer.

However, as the Yakutat area approaches the population of about 750 forecasted by 1990, it is likely that there will be a demand for an additional full-time city officer or State Trooper to maintain a standard level of service then and through the rest of the forecast period.

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Law enforcement facilities are currently limited to the State Trooper's office at the airport. The City does not have any jail facilities and tentative plans to renovate the fire hall to include office space for the city policeman and four jail cells were indefinitely postponed when the expectation of rapid growth due to petroleum exploration and development subsided.

Still by the standard cited by the Alaska Department of Public Safety, the Yakutat area is below par in the provision of law enforcement facilities. That standard calls for one jail cell per 500 residents but with a minimum of 3 cells per facility.

By that standard Yakutat's present population warrants a three cell jail. Such a facility would be adequate to serve the additional residents forecast for the base case.

- Fire Protection. With recent improvements to the City fire hall and the addition of a new fire truck in the fall of 1978, the City of Yakutat is adequately equipped to provide fire protection services. Maintenance of the FAA fire fighting equipment at the airport, together with the City's present fire fighting capability, should be satisfactory through the forecast period.

Health and Social Services. At present, Yakutat is supplied with a level of health care and social services which meets the standards for a town of its size. While it does not appear that Yakutat will grow sufficiently to warrant a resident physician or dentist or hospital facility by 2000, the need for a full-time resident public health nurse will become pressing. The City health clinic now includes two beds among its facilities. A third and fourth bed are likely to be demanded by about 1990 and 2000 respectively to maintain adequate capacity.

While the present lack of a resident social worker at Yakutat is partly compensated for by counseling provided through the alcoholism program, a full-time professional social worker will become increasingly demanded and is likely to be added to the community's health resources in the near future.

Education. The City of Yakutat School District operates the elementary and secondary school system which serves the entire Yakutat area (both City residents and the area outside the City). A new high school was constructed in 1973. Still, the school system remained seriously overtaxed, since about the same time, the State Fire Marshal condemned the old City elementary school forcing a shift of most elementary students to the new high school classrooms. This situation of a shared facility persisted until the 1978-79 school year, when a new elementary school was completed adjacent to the high school. With the opening of the new elementary school, all Yakutat area school children have the benefit of modern school facilities with capacity adequate for present and foreseeable future needs.

Enrollment in the school system has grown at a slower rate during the past five years than overall population growth. This lag in enrollment is due largely to a steady long-term decline in birth rates and consequently in the proportion of residents in the school ages. The forecast methodology assumes that students as a proportion of the total population at Yakutat will continue to decline at the rate of one percent annually from the 1977/78 ratio of 28 percent until it reaches 20 percent, then to remain at 20 percent.

As summarized in Table 10, the school enrollment forecast for the base case is for declining enrollments for nearly a decade, followed by a rise to current enrollment levels by around 1990 and by a steady, moderate rise thereafter. At no time, under the premises of the non-OCS base case does the enrollment burden surpass the capacity of the new elementary or high school facility. Therefore, it is not expected that Yakutat will have to make major capital improvements in its educational facilities for the forecast period.

Recreation. Existing and programmed recreational facilities appear adequate for Yakutat's base case needs. The community now enjoys two gymnasiums and a swimming pool attached to the school facilities, plus a number of neighborhood outdoor playgrounds and picnic areas. Additional projects listed in the current capital improvements program included additional neighborhood playgrounds, picnic areas, conversion of the old city hall to a community recreation center and trail improvements. These improvements would provide a superior array of formal recreational facilities for a town of Yakutat's size.

Outdoor recreational activities such as hunting, fishing, boating and hiking are also very popular with Yakutat residents and should continue to enrich the recreational opportunities available to them.

Local Government Finances. Yakutat primarily draws its general fund revenues from local sources. Property taxes account for 39 percent of revenues, sales taxes for 14 percent and miscellaneous other sources for 22 percent. (Included in the latter category are license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.) Intergovernmental revenues amount to about 25 percent of total general fund revenues.

Using the assumptions explained in the appendix, Yakutat's general fund revenues are calculated, under the base case, to increase nearly sixfold, from an estimated $336,000 in fiscal 1977/78 to $1,882,000 by 2000. The bulk (75 percent) of these revenues will derive from local sources.

School district revenues are expected to grow at a similar rate, from about $645,000 in FY 1978 to about $2,857,000 by 2000 (see Table 11). As is now the case, the State of Alaska is assumed to contribute nearly all (96 percent) school district revenues, with the remaining share split between local and federal governments.

The base case forecast of general fund operating expenditures (see Table 12) explicitly assumes that the City will continue to provide more or less the same range and quality of public services now offered, at the same per capita cost. Thus, the operating budget basically varies with population growth adjusted for inflation. Over the forecast period, the operating budget grows at about the same sixfold rate that revenues grow.

Yakutat has historically been successful in obtaining federal and state grants to defray the cost of capital projects. As a result, the City of Yakutat does not at present have any long-term indebtedness. Comparison of forecasted revenues and operating expenditures indicates that Yakutat will have a modest revenue surplus (about 15 percent of revenues) available for capital improvements or debt service (see Table 13). Since Yakutat has succeeded in upgrading its community facilities to meet current and near future needs, it appears that the City will be able to maintain its standard of services and facilities within the framework of its present fiscal policies.

CAUSE/EFFECT OF IMPACTS

Growth impacts on Yakutat in the base case arise largely from the improved economic viability of the fish and fish processing industry. It is thought that better income opportunities and better living conditions will help offset historically high rates of emigration, and attract some in-migration as well.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

The City of Yakutat is generally well equipped to absorb growth on the scale forecast, with the exception of the privately operated power system where an upgrading in generating capacity is likely to be demanded. The City does have a limited property tax base and this may become a development constraint if it becomes necessary to use local fiscal resources to install utility services to new residential areas. Under the base case, conservation of the traditional Tlingit cultural identity and heritage would remain a matter of vital concern to a large part of the community.

SUMMARY OF IMPACTS

The relatively modest impacts on Yakutat's infrastructure foreseen for the non-OCS case seem well within the capability of the City to handle in light of the advances that it has accomplished in housing and community development over the past decade.

TABLE 3

FORECAST OF NET CHANGE IN HOUSING DEMAND
NON-OCS CASE
YAKUTAT AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	2	3	2	0	1
1979	9	6	4	1	1
1980	28	16	10	2	4
1981	0	3	2	0	1
1982	18	9	6	1	2
1983	12	7	5	1	1
1984	0	0	0	0	0
1985	5	1	1	0	0
1986	12	5	3	0	2
1987	26	8	5	1	2
1988	16	6	4	1	1
1989	2	1	1	0	0
1990	51	17	12	2	3
1991	19	6	4	1	1
1992	22	7	4	1	2
1993	41	14	10	1	3
1994	19	6	4	1	1
1995	30	10	7	1	2
1996	17	6	4	1	1
1997	8	3	2	0	1
1998	25	8	5	1	2
1999	0	0	0	0	0
2000	7	2	1	0	1
TOTALS	369	144	96	16	32

Source: Alaska Consultants, Inc.

TABLE 4

ESTIMATED DEMAND FOR RESIDENTIAL LAND
BASE CASE
YAKUTAT AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	16	2.9	1.1	4.0
Multifamily & Trailer	9	0.8	0.3	1.1
1981-85				
Single Family	14	2.5	1.0	3.5
Multifamily & Trailer	6	0.5	0.2	0.7
1986-90				
Single Family	25	4.5	1.8	6.3
Multifamily & Trailer	12	1.1	0.4	1.5
1991-95				
Single Family	29	5.2	2.0	7.2
Multifamily & Trailer	14	1.3	0.5	1.8
1996-2000				
Single Family	12	2.2	0.9	3.1
Multifamily & Trailer	7	0.6	0.2	0.8
TOTAL	144	21.6	8.4	30.0

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 5

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
BASE CASE
CITY OF YAKUTAT
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	51	181	231
1979	52	181	233
1980	53	188	241
1981	53	188	241
1982	54	192	246
1983	55	195	250
1984	55	195	250
1985	55	197	252
1986	56	199	255
1987	58	204	262
1988	58	209	267
1989	58	209	267
1990	62	220	282
1991	63	225	288
1992	65	229	294
1993	68	238	306
1994	68	244	312
1995	71	249	320
1996	72	253	325
1997	72	256	328
1998	74	261	335
1999	74	261	335
2000	74	263	337

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 6

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
NON-OCS CASE
CITY OF YAKUTAT
1978 - 2000

Year	Daily Treatment Capacity 1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	51	6.4
1979	52	6.5
1980	53	6.6
1981	53	6.6
1982	54	6.8
1983	55	6.9
1984	55	6.9
1985	55	6.9
1986	56	7.0
1987	58	7.3
1988	58	7.3
1989	58	7.3
1990	62	7.8
1991	63	7.9
1992	65	8.1
1993	68	8.5
1994	68	8.5
1995	71	8.9
1996	72	9.0
1997	72	9.0
1998	74	9.3
1999	74	9.3
2000	74	9.3

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain numbers of liters per minute.

Source: Alaska Consultants, Inc.

B

TABLE 7

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
NON-OCS CASE
YAKUTAT AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	1,418
1979	1,469
1980	1,570
1981	1,601
1982	1,679
1983	1,744
1984	1,775
1985	1,821
1986	1,888
1987	1,997
1988	2,079
1989	2,085
1990	2,238
1991	2,295
1992	2,361
1993	2,484
1994	2,541
1995	2,631
1996	2,682
1997	2,706
1998	2,781
1999	2,781
2000	2,802

Source: Alaska Consultants, Inc.

TABLE 8

ESTIMATED DISPOSABLE SOLID WASTES
BASE CASE
YAKUTAT AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	560	3,420
1979	590	3,550
1980	630	3,790
1981	640	3,870
1982	670	4,060
1983	700	4,220
1984	710	4,310
1985	730	4,430
1986	750	4,560
1987	790	4,790
1988	820	4,950
1989	830	5,010
1990	900	5,440
1991	920	5,570
1992	950	5,730
1993	1,000	6,030
1994	1,020	6,170
1995	1,050	6,390
1996	1,070	6,510
1997	1,080	6,570
1998	1,110	6,750
1999	1,110	6,750
2000	1,120	6,810

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

B

Source: Alaska Consultants, Inc.

TABLE 9

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
NON-OCS CASE
YAKUTAT AREA
1978 - 2000

ear	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
978	1.25	183	229	3
979	1.26	189	238	9
980	1.27	205	260	22
981	7.28	208	266	6
982	1.29	217	280	14
983	1.30	224	291	11
1984	1.31	224	293	2
1985	1.32	225	297	4
1986	1.33	230	306	9
1987	1.34	238	319	13
1988	1.35	244	329	10
1989	1.36	245	333	4
1990	1.37	262	359	26
1991	1.38	268	370	11
1992	1.39	275	382	12
1993	1.40	289	405	23
1994	1.40	295	413	8
1995	1.40	305	427	14
1996	1.40	311	435	8
1997	1.40	314	440	5
1998	1.40	322	451	11
1999	1.40	322	451	0
2000	1.40	324	454	3

Source: Alaska Consultants, Inc.

TABLE 10

SCHOOL ENROLLMENT FORECAST
NON-OCS CASE
YAKUTAT AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	92	61	153
1979	90	60	150
1980	91	60	151
1981	87	58	145
1982	86	57	143
1983	83	56	139
1984	80	53	133
1985	77	51	128
1986	78	52	130
1987	81	54	135
1988	83	56	139
1989	83	56	139
1990	89	60	149
1991	92	61	153
1992	94	63	157
1993	100	66	166
1994	101	68	169
1995	105	70	175
1996	107	72	179
1997	108	72	180
1998	111	74	185
1999	111	74	185
2000	112	75	187

Source: Alaska Consultants, Inc.

TABLE 11

FORECAST OF YAKUTAT SCHOOL DISTRICT REVENUES
BASE CASE
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	153	$13	$ 623	$13	$ 649
1979	150	13	647	13	673
1980	151	14	691	14	719
1981	145	15	703	15	733
1982	143	15	735	15	765
1983	139	16	757	16	789
1984	133	16	768	16	800
1985	128	16	783	16	815
1986	130	18	843	18	879
1987	135	19	928	19	966
1988	139	21	1,013	21	1,055
1989	139	22	1,074	22	1,118
1990	149	25	1,220	25	1,270
1991	153	28	1,328	28	1,384
1992	157	30	1,445	30	1,505
1993	166	34	1,619	34	1,687
1994	169	36	1,747	36	1,819
1995	175	40	1,918	40	1,998
1996	179	43	2,080	43	2,166
1997	180	46	2,217	46	2,309
1998	185	50	2,415	50	2,515
1999	185	53	2,560	53	2,666
2000	187	57	2,743	57	2,857

Source: Alaska Consultants, Inc.

TABLE 12

GENERAL FUND
REVENUE FORECAST
BASE CASE
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$139	$50	$88	$80	$ 357
1979	149	54	95	85	383
1980	164	59	104	94	421
1981	174	62	110	100	446
1982	188	67	119	108	482
1983	202	72	128	116	518
1984	214	77	136	123	550
1985	228	82	145	131	586
1986	245	88	155	140	628
1987	268	96	170	153	687
1988	289	104	183	165	741
1989	307	110	194	175	786
1990	343	123	217	196	879
1991	371	133	235	212	951
1992	402	144	254	230	1,030
1993	443	159	281	254	1,137
1994	478	172	303	274	1,227
1995	521	187	330	298	1,336
1996	561	201	355	321	1,438
1997	599	215	379	343	1,536
1998	649	233	411	371	1,664
1999	688	247	436	394	1,765
2000	734	263	465	420	1,882

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 13

FORECAST OF REVENUES AND OPERATING EXPENDITURES
NON-OCS CASE
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Availabl for Capit Improvement
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$139	$ 218	$ 357	$ 289	$13	$ 302	$ 55
1979	149	234	383	310	13	323	60
1980	164	257	421	340	14	354	67
1981	174	272	446	360	15	375	71
1982	188	294	482	390	15	405	77
1983	202	316	518	419	16	435	83
1984	214	336	550	444	16	460	90
1985	228	358	586	474	16	490	
1986	245	383	628	509	18	527	1;!
1987	268	419	687	556	19	575	112
1988	289	452	741	599	21	620	121
1989	307	479	786	636	22	658	128
1990	343	539	879	712	25	737	142
1991	371	580	951	770	28	798	153
1992	402	628	1,030	834	30	864	166
1993	443	694	1,137	920	34	954	183
1994	478	749	1,227	993	36	1,029	198
1995	521	815	1,336	1,081	40	1,121	215
1996	561	877	1,438	1,164	43	1,207	231
1997	599	937	1,536	1,243	46	1,289	247
1998	649	1,015	1,664	1,347	50	1,397	267
1999	688	1,077	1,765	1,428	53	1,481	284
2000	734	1,148	1,882	1,524	57	1,581	301

4

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues

Source: Alaska Consultants, Inc.

4

Cordova

COMMUNITY FORECASTS

Significant Factors Affecting Growth

At present, the fishing and manufacturing (mainly fish processing) industries, together with government serve as the mainstay of Cordova's economy. These three economic sectors currently provide almost three-fourths of all employment in the area. The employment forecast assumes that these sectors will continue to be the dominant sources of employment, but will grow at a slower rate than the economy as a whole. Still, about half of the new jobs through 2000 are projected to arise in these sectors.

An improved salmon fishery is suggested by initial success of the Prince William Sound Aquiculture Corporation's hatchery and the State of Alaska's program to develop additional hatcheries and by newly adopted limitations of foreign salmon fishing operations within the 200 mile limit. Additionally, modest growth in the tanner and Dungeness crab fisheries, clamming and other minor fisheries is presumed.

The economic situation of the fishing and fish processing industry at Cordova will presumably benefit from improved fisheries management programs. Better scientific understanding and further management experience will contribute to a more dependable high-level harvest of the region's diverse fishery resources. This will foster more efficient use of capital equipment and labor and should enhance the economic return to fishermen and the fish processing industry.

The fastest growth rates in Cordova's economy are assumed to occur in the trade and service sectors. This growth stems in part from a continuing gradual shift toward a more services-oriented economy, with an increasingly diverse array of commercial services and trade being provided locally. Growth in trade and services will also be supported by an assumed increase in outdoor recreation and tourism partly related to Cordova's role as gateway to a newly established Wrangell-St. Elias National Park and completion of the Copper River Highway before the end of this century.

In the governmental sector, only routine growth is expected, with two notable exceptions. First, construction of a U.S. Coast Guard helicopter air station at Cordova, now scheduled for completion in the early 1980's, will add about 50 Coast Guard employees to Cordova's economic base. Second, it is assumed that part of the staff for management of the Wrangell-St. Elias National Park will be stationed at Cordova.

The remaining economic sectors (transportation, communications and public utilities; finance, insurance and real estate; contract construction; and mining) compose an essential but relatively small part, less than 10 percent of local employment. The forecast is for these activities to maintain a constant small share of Cordova's employment.

Future Employment

The base case employment forecast for the Cordova area reflects the continued expansion of existing industries for an increase of about 780 jobs or 56 percent over the 1978 level of 1,381 jobs to 2,161 by 2000 (see Table 14). This is equivalent to an annual growth rate of about 2 percent over the forecast period, a somewhat slower growth rate than is attributed to Yakutat or Seward. New employment is spread fairly evenly over the economic sectors of trade, services, fishing and government, with each sector accounting for about 150 jobs or, together, about 80 percent of all employment increase.

The industries forecast to sustain greater employment and population are fishing and seafood processing and tourism and recreation. In support of the marine aspects of these industries and the offshore activities, growth in U.S. Coast Guard activities in this area is also projected. The most probable forecast does not anticipate large scale entry into bottomfishing and bottomfish processing in the Cordova area. However, it does envision an overall increase in catch levels and product processed here as well as additions to the Prince William Sound hatchery capacity producing as successfully as the initial efforts.

Assumptions for Basic Employment

0 Fishing and Seafood Processing. Gradual growth is forecast to take place in the fishing and fish processing industry. The

overall increase is foreseen to be based upon modest increases in a variety of species. Although there are some economies of scale involved in catching and processing seafood products, it is assumed that resident employment in this industry will increase due in large part to a lengthened fishing season resulting in growth of the resident fleet and a longer period of intensive plant operation.

The salmon yield is forecast to undergo a modest increase as a result of the 200 mile offshore limit imposed by the United States, the recently agreed upon U.S./Japan treaty further limiting Japanese salmon catches beyond the 200 mile limit, and growth in production from Prince William Sound hatcheries. It is forecast that the initial successes of the Prince William Sound Aquiculture Corporation hatchery at the old San Juan cannery site will be repeated in the future and that the State's commitment through the Salmon Hatchery Enhancement Program will result in numerous hatchery additions in Prince William Sound.

The tanner crab fishery is forecast to increase at a modest rate through 1980 as increased knowledge of this species enables regulatory authorities to permit catches approaching the optimum yield.

The clam fishery, with its abundant resources in this area, is forecast to surpass previous levels in becoming a major Cordova fishery. However, it is assumed that the needed certification of beach areas prior to harvesting for human consumption plus operational and marketing considerations will delay large scale operation for at least ten years.

Although the demand for Dungeness crab has fluctuated drastically in response to the level of catches along the Pacific Northwest and California coasts, the demand for Dungeness crab is forecast to increase over the long term and remain at a reasonably high level within the planning period. It is reasoned that the market for this excellent seafood product will expand sufficiently to result in prices high enough to encourage Alaska fishermen and processors to catch and process this product on a sustained yield basis.

Overall improved management of Alaska fishery resources gained through increased knowledge and experience is assumed. This increased management capability is assumed to result in a more dependable and increased harvest of fishery resources of the Cordova area. Furthermore, it is assumed that the fishery of the Cordova area will continue to be highly diversified which will serve to increase or lengthen the terms of employment beyond the peak summer salmon fishing season. Therefore, a modest increase in average year-round, basic employment will be experienced without substantial increases during the peak salmon runs.

- Tourism and Recreation. Increased ease of access of the Cordova area, coupled with population growth in Southcentral Alaska and a growth in visitor traffic to this area, are forecast to result in substantial basic tourism and recreation-related employment in the Cordova area.

  Completion of the Copper River Highway linking Cordova to Chitina and the major highways to Anchorage, Fairbanks and the Lower 48 is assumed during the forecast period. This will make Cordova more accessible, particularly to Anchorage area residents, for boating and winter sport fishing pursuits. The result is forecast to be increased visitation throughout the year but peaking during the summer tourist season.

  It is also assumed that the proposed Wrangell-St. Elias National Park will be established and that Cordova will function as a gateway to this park. The result is forecasted to be increased tourism, especially during the summer months.

- Government. A number of government activities supporting basic government employment are assumed to increase during the forecast period. In the short run, U.S. Coast Guard employment will increase. It is assumed that construction of a Coast

Guard hangar at Cordova Airport will take place during 1979. Although this first phase of a Cordova helicopter air station will create little impact, some construction employment will result and occasional helicopter assignments to Cordova are envisioned. Phase two, scheduled for 1981, is projected to involve two or three medium range helicopters being stationed in Cordova and result in an estimated 50 additional Coast Guard personnel and approximately 100 dependents in the community.

As a result of the creation of the Wrangell-St. Elias National Park, it is assumed that part of the administrative and regulatory functions associated with this park will be located in the Cordova area. It is also assumed that the Youth and Adult Conservation Corps (YACC) camp at Mile 27 of the Copper River Highway will continue in its present form or under similar legislative authority throughout the forecast period.

In summary, growth in basic employment is forecast to result principally from more intensive utilization of the natural resources of the lands and waters of the Cordova area. Fishing and seafood processing will continue to be the dominant basic industry, although its growth is forecast to increase at a rate of only 1.5 percent per year. On the other hand, basic employment supported by tourism, particularly in the trade and service sectors, is seen as increasing in the neighborhood of 4 percent per year.

In the principal employment sectors, growth in agriculture, forestry and fisheries is forecasted to increase at a rate of 1.5 percent per year, based almost exclusively on increased fishing employment. Manufacturing employment, primarily seafood processing, is also projected to grow at 1.5 percent per year throughout the forecast period, keeping pace with the increases in product from larger fish catches. The principal sectors forecast to grow as a result of fishing and fish processing are trade and services. Trade 's forecast to increase at a rate of 3 percent per year from the base year through 1990 and at 4 percent per year thereafter. And the service sector, which includes employment in lodging facilities among others, is projected to increase at a rate of 4 percent per year from 1978 through 1990 and at 6 percent per year thereafter.

Since much of the transportation supporting increased facilities and employment resulting from tourism and recreation is assumed to be surface transportation, employment in this sector is forecast to increase by only 2 percent per year throughout the planning period.

Government employment estimates account for increases in Coast Guard and Park Service employment assumed through 1981, thereafter employment in this sector is forecast to grow at a rate of only 1 percent per year. The relatively small long term rate of increase in the government sector is based upon economies of scale in this already comprehensive and well staffed sector which made up one-quarter of total average annual full-time employment here in 1978.

Of course, growth in these sectors is assumed to be accompanied by growth in contract construction, finance, insurance and real estate, and mining, with the latter assumed to be exclusively gravel mining for construction-related purposes. Employment in contract construction is estimated to increase at 2 percent per year, while finance, insurance and real estate is projected at 1.5 percent per year. Growth in mining is negligible throughout the forecast period.

Assumptions for Secondary (or Service) Employment. Since the existence of service employment depends upon expenditures of the basic sector, service employment can be roughly derived from basic employment through the use of a multiplier to elicit total employment. The employment count conducted in the Cordova area in 1978 by Alaska Consultants, Inc. totaled 1,381 employees. Estimates of basic and secondary employment were 940 and 441 respectively. Thus, the multiplier derived was 1.47. This is a reasonably low multiplier. However, it is not unusual in a community heavily dominated by the fishing and seafood processing industry. Furthermore, this low multiplier is exacerbated by the Anchorage urban market's convenience for the purchase of goods and services. However, it is assumed that development of the trade and service sectors in accommodating visitors and the internal growth of these sectors within the community will tend toward a slightly higher multiplier.

Secondary employment is then distributed using the tabulation of annual average full-time employment by sector derived in 1978 as a guide. Adjustments are made based upon observations of other similarly situated communities with similar populations and rates of growth.

Future Population

The age distribution of Cordova's population is relatively well balanced, without a disproportionate number of younger or older residents. This will tend to inhibit wide fluctuations in the ratio of population to employment, in the ratio of school enrollment to population and in birth rates. Also, the economic growth forecast for Cordova under the non-OCS case is assumed to exhibit a steady progression of current trends, with no sudden shifts which would alter existing workforce/population relationships. Thus, through the forecast period, Cordova's population/employment ratio is assumed to maintain the 1978 base year figure of 2.0. School enrollment/population ratios are also presumed to persist at present day levels.

Although the base case forecast without OCS development results in a reasonably low growth rate of slightly over 2 percent per year during the forecast period, the population of the Cordova area will increase from 2,762 in 1978 to 4,322 in 2000, or by 56 percent.

For purposes of making fiscal forecasts and projections of probable demands on public services and facilities, future population has been allocated, part to the City of Cordova and part to the unincorporated road-connected area around Cordova. On the assumption that the future geographic distribution of Cordova area residents would follow present patterns, about 80 percent of the additional population, or 1,271 new residents, have been allocated to the City of Cordova and the remainder, an estimated 289 persons, to the unincorporated area.

TABLE 14

FORECAST OF EMPLOYMENT AND POPULATION
CORDOVA AREA
NON-OCS CASE
1978- 2000

INDUSTRY CLASSIFICATION/YEAR	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	699	721	722	732	743	753	765	777	790	802	B16	828	841	854	867	880	893	907	920	935	949	963	979
Agriculture, Forestry and Fisheries	(400)	(406)	(412)	(418)	(424)	(43o)	(436)	(443)	(450)	(457)	(464)	(471)	(478)	(485)	(492)	(499)	(506)	(514)	(522)	(530)	(538)	(546)	(554)
Mining	(o)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(7)	(7)	(8)
Manufacturing	(277)	(281)	(285)	(289)	(293)	(297)	(301)	(306)	(311)	(316)	(321)	(326)	(331)	(336)	(341)	(346)	(351)	(356)	(361)	(366)	(371)	(377)	(383)
Contract Construction	(22)	(32)	(23)	(23)	(24)	(24)	(25)	(25)	(26)	(26)	(27)	(27)	(28)	(28)	(29)	(30)	(30)	(31)	(31)	(32)	(33)	(33)	(34)
DISTRIBUTIVE INDUSTRIES	336	345	355	365	376	387	397	407	418	431	443	456	468	486	506	525	546	567	590	615	639	665	693
Transportation, Communications and Public Utilities	72)	(73)	(74)	(75)	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)	(90)	(91	(92)	(93)	(94)
Trade	146)	(150)	(155)	(160)	(165)	(170)	(175)	(180)	(185)	(191)	(197)	(203)	(209)	(217)	(226)	(235)	(244)	(254)	(264)	(275)	(286)	(297)	(309)
Finance, Insurance and Real Estate	(33)	(34)	(34)	(34)	(35)	(36)	(36)	(36)	(37)	(38)	(38)	(39)	(39)	(40)	(41)	(41)	(42)	(42)	(43)	(44)	(44)	(45)	(46)
Service	(85)	(88)	(92)	(96)	(100)	(104)	(108)	(112)	(116)	(121)	(126)	(131)	(136)	(144)	(153)	(162)	(172)	(182)	(193)	(205)	(217)	(230)	(244)
GOVERNMENT	346	356	359	404	408	412	416	420	424	428	432	436	440	444	448	452	457	462	467	472	477	482	489
TOTAL EMPLOYMENT	1,381	,422	1,436	1,501	1,527	1,552	1,578	1,604	1,632	1,661	1,691	1,720	1,749	1,784	1,821	1,857	1,896	1,936	1,977	2,022	2,065	2,110	2,161
RATIO OF POPULATION TO EMPLOYMENT	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL POPULATION - CORDOVA AREA	2,762	2,844	2,872	3>002	3,054	3,104	3,156	3,208	3,264	3>322	3,382	3,440	3,498	3.568	3,642	3,714	3,794	3,872	3,954	4,044	4,130	4,220	4,322
CITY OF CORDOVA	2,250	2,317	2,340	2,446	2,488	2.529	2,571	2,613	2,659	2,706	2,755	2,802	2,850	2,907	2,967	3,026	3,091	3,154	3,221	3,294	3,364	3.438	3,521

Source: Alaska Consultants, Inc.

IMPACT ASSESSMENT

Social Impacts

The premises of the base case do not imply any major shifts in the economic or social structure of Cordova. The community should be able to absorb projected growth without any exceptional growth stresses. Most important to the character of the community, the present-day dominance of the fishing and fish processing industries is assumed to endure under the base case. Expected completion of the Copper River Highway will provide overland access to Cordova and establishment of the proposed Wrangell-St. Elias National Park will increase the volume of short-term visitors to the Cordova area. Still, the fishing and fish processing industry is assumed to endure as the mainstay of the local economy and the central feature of the town's social character.

Impacts on Community Infrastructure

Housing and Residential Land. The forecast projects that a net increase of 520 additional housing units will be demanded to shelter anticipated population growth (see Table 15). If the traditional mix of housing types prevails, about half the new units would be single family dwellings and half would be multifamily dwellings or trailers. Such development would result in nearly 36 hectares (80 acres) of undeveloped land being converted to residential use (see Table 16). However, it is to be noted that adverse topographic and drainage conditions and inefficient land subdivision patterns seriously limit the supply of land available for development at Cordova. The community's comprehensive plan recommends, and economic factors may in the future impose, higher density patterns and more multifamily dwellings than Cordova has thus far been accustomed to.

Utilities. Cordova's basic utilities are satisfactory for current needs. However, it appears that certain improvements will become necessary to keep pace with projected growth. Water and power distribution and sewage collection systems will have to be installed for new residential areas. A trend to more compact settlement patterns may help promote more cost-efficient utilities. There will be a demand for a major public works project to increase the water supply and also for an upgrading of the power and waste treatment systems.

- **Water.** Cordova has experienced intermittent problems in water supply and distribution in recent years. These problems, coupled with the steady increases in domestic and industrial water consumption forecast under the base case, argue that the City should count on certain water system improvements.

  Cordova draws its water supply partly from surface sources and partly from wells. Cordova is susceptible to water shortages, particularly during cold weather when surface sources reduce their flow. Continued expansion of the tanner crabbing and processing industry coincidental with the reduced wintertime water supplies will accentuate the difficulty of ensuring an adequate year-round water supply for residential and industrial users.

Fishing and fish processing are central to Cordova's economic vitality and a reliable water supply is central to the operation of fish processing plants. Consequently, Cordova is doubly dependent upon a satisfactory water system for its long-term economic health as well as community health in general.

The base case forecast anticipates that water consumption will increase by about 60 percent over the forecast period (see Table 17). The estimates of domestic water consumption are basedon the standard of per capita use of 473.1 liters (125 gallons) per day. Industrial water use is assumed to maintain a constant ratio to domestic use. Based on a ratio derived from Cordova's most recent Water and Sewer Study, industrial consumption was calculated at 3.5 times domestic use.

There are three areas in which the water system is likely to need upgrading in order to meet the City's demands under the base case.

The first area is the development of additional water sources. Under the base case, standard calculations indicate that the City can expect a level of water use about 60 percent above current consumption levels. However, at peak processing periods, industrial water consumption may be two to three times above normal use. Therefore, it may be advisable for the City to anticipate a water supply capacity two to three times current use by the year 2000.

The second area is the development of additional water storage capacity as insurance against possible shortages during periods of reduced wintertime runoff and peak water use.

The third area is the extension of the City water distribution system to serve new residential development. Observance of the relatively high residential density patterns recommended in Cordova's comprehensive plan may help contain the cost of these improvements. Continued upgrading of the distribution system, particularly some of the mains serving industrial water users, is also anticipated.

o Sewer. Over the past few years, Cordova's sewer system has been extended into many previously unserved residential areas. Now, nearly all (750 of 800) connections to the water distribution system are also served by the sewage collection system.

The waste treatment plant handles only domestic sewage. Its design capacity of 2,649.5 kiloliters (700,000 gallons) per day would be sufficient to treat present and foreseeable sewage loads (see Table 18), were it not for massive water infiltration into the sewer system. Cordova's heavy precipitation, poor natural drainage and impermeable substratum have in the past resulted in water infiltration flows reportedly up to ten times the sewage flow, with consequent overflow loads upon the waste treatment plant. Repairs to the leaky sanitary sewer system and improvements to the storm sewer system have somewhat corrected this problem. However, further improvements to bring the water infiltration flows within tolerable limits are anticipated since otherwise a superfluous expansion of treatment plant capacity may be necessary despite the fact that it is nominally adequate to handle the sewage flow.

Electric Power. In 1978, the power utility of Cordova Public Utilities was reorganized as Cordova Electric Cooperative, Inc. The new organization is eligible to borrow funds from the Rural Electrification Administration, a fortunate circumstance since the utility has embarked on a needed program to expand capacity and upgrade the distribution system.

Diesel generators are the power source. The power plant adjacent to Eyak Lake houses four diesel units with a combined name plate capacity of 5,950 kwor an estimated actual capacity of 4,850 kw. A fifth diesel unit rated at 2,500 kw was scheduled to come on line in late 1978, The utility also owns 2 obsolescent generators that are probably not economic to rehabilitate.

Recent trends in power use at Cordova show a sharp rate of increase, about 14 percent annually, largely due to a switch to year-round operations by fish processing plants. This trend toward greater power usage is expected to continue, leading to a doubling of required capacity by 2000 under the base case (see Table 19). As the existing plant is barely adequate for present needs, a significant expansion in generating capacity can be expected over the next two decades. In fact, until the new 2,500 kw unit was on line, Cordova's firm power capacity had fallen below peak power demands.

Presently planned improvements include a new 2,650 kw diesel unit around 1980 and, possibly, also a 3,500 kw unit. If these new units are installed on schedule, then Cordova should be equipped with adequate firm power capacity for the forecast period.

Rising fuel costs have made diesel units a relatively costly power source. There has been interest in potential hydropower sites in the Cordova vicinity particularly at Power Creek, but to date none have proven economically feasible to develop. Possibly, within the forecast period a dual purpose hydropower project may become a feasible substitute for diesel generators as Cordova's basic power source and an additional water source.

- Solid Waste Disposal. The volume of disposable solid wastes in the Cordova area is projected to double by 2000 under the base case. Based on a standard derived from the Municipality of Anchorage, disposable solid wastes will be about 4,716.6 metric tons (5,200 tons) or 24,084.9 cubic meters (31,500 cubic yards) annually by 2000 (see Table 20).

  The City has already recognized a need to designate and develop a new sanitary landfill site as the capacity of the present site by Odiak Slough will be exhausted in two more years. However, there are no good landfill sites in the immediate vicinity of the settled area, so the City may have to resort to a site at some distance from town which would inflate the cost of operating the disposal service.

- Communications. The Cordova telephone utility, like the electric utility, has been transferred to ownership and management by a new REA Cooperative, Cordova Telephone Cooperative, Inc. The cooperative took over a telephone exchange, installed in 1976, with a capacity to serve 1,200 users. According to the forecast (see Table 21), this capacity should be adequate for the base case through about 1990. Thereafter, additional capacity (about 400 lines by 2000) could be expected to serve new customers.

In the meantime, the cooperative is aiming at a five-year improvements program, to cost $2.5 million, to upgrade various components of the system.

Public Safety.

- Police. The existing City police staffing and jail facilities are about adequate for the City's current law enforcement needs. However, Cordova can expect about three additional police officers and three more jail cells over the base case forecast period to maintain the standard level of services.

- Fire Protection. Cordova's volunteer fire department is housed in the new City Hall building and its fire protection facilities should be adequate for the forecast period.

Health and Social Services. The Cordova Community Hospital has 22 beds, 14 of which are reserved for general care. Current hospital occupancy rates average around 25 percent and hospital capacity appears adequate through the end of the forecast. However, the hospital building, dating from 1955, may soon need to be replaced because of obsolescence. Reportedly, the facility's design is not well adapted to present day requirements. The Cordova Comprehensive Plan recommended that a new hospital be built sometime in the 1980's to accommodate about 30 beds, which would satisfy the expected demand under the base case.

Cordova's health and social service needs are also attended by a private medical clinic, a community health center, and a nursing home facility which offer medical, mental health and alcoholism programs. If these programs are maintained, then Cordova's health and social services should be adequate through the forecast period.

Education. While both the elementary and secondary school systems are forecast to experience a 50 percent increase in enrollment (see Table 22), the existing facilities in both cases have ample capacity to handle additional students. Possibly, one or two more classroom units will be demanded for each system toward the close of the forecast period to maintain standard facilities.

However, it should be noted that Cordova traditionally has been willing to support above average school facilities with relatively low student/teacher and student/classroom ratios. If Cordova sought to maintain its customary high standards, another six elementary classrooms and another 13 secondary classrooms are expected to be demanded.

Recreation. Cordova is presently equipped with an excellent mixture of formal recreational facilities well suited to local climatic conditions. Outdoor activities such as fishing, boating and hunting are also popular and easily enjoyed. In all, Cordova's recreational opportunities are probably superior to those available in any Alaska community of similar size and are well above the minimum standards. These existing facilities, supplemented with the improvements proposed in Cordova's comprehensive plan, should more than adequately serve the base case population.

Local Government Finances. The general fund revenue profile for the City of Cordova shows that the City obtains about 25 percent of its revenue from property taxes, 13 percent from sales taxes and 27 percent from other local sources. (Included in the latter category are license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues). Better than a third (36 percent) of Cordova's revenue is in the form of intergovernmental transfers. The City's revenues are expected to grow sixfold during the forecast period, assuming that the revenue framework continues without major changes. Discounted for inflation at 6 percent annually, this represents an effective increase of about 55 percent in revenues.

Cordova makes a relatively large local contribution to the cost of operating the local school district. About 11 percent of school district revenues are locally raised with almost all the rest coming from the State of Alaska (see Table 23).

In FY 1977/78, Cordova's general fund operating expenditures amounted to $560 per capita or a total of about $1,261,000. The forecast envisions City operating expenditures growing to $7,112,000 by 2000 (see Table 24).

A comparison of Cordova's revenue and expenditure forecasts under the base case indicates that the City has a small margin of surplus revenues, less than 6 percent, that can be used for debt service or capital improvements (see Table 25). In view of existing pressing needs for additional water supply and storage capacity and other capital facility requirements, it appears that Cordova may find it difficult to maintain its present level of services and its revenue structure intact if it is to meet anticipated capital program demands of the next few years.

CAUSE/EFFECT OF IMPACTS

A number of factors are seen to contribute to Cordova's growth over the forecast: some expansion and diversification in the fisheries and related industries; construction of new Coast Guard facilities; scheduled completion of the Copper River Highway making Cordova a gateway to the proposed Wrangell-St. Elias National Park. Cumulatively, these additions to Cordova's economic base should help the settlement support limited further population growth.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

Over recent years, Cordova has managed to provide a superior level of educational, health, recreational and other amenities for a town of its size. Continued growth may make it hard for Cordova to maintain the high level of these services within its limited tax base. On the other hand, there have been problems with the management and overall coordination of the various public utilities. The recent reorganization of the utilities systems was aimed at achieving better managerial control and a sounder financial footing for the power and telephone utilities. New residential growth will naturally make new demands on the utilities systems. Water and power supply stand out as two potential problem utilities.

SUMMARY OF IMPACTS

The growth impacts forecast for Cordova under the non-OCS case are essentially incremental in nature. Growth is not on a scale orof a type that seems in itself likely to alter the basic character of the community.

TABLE 15

FORECAST OF NET CHANGE IN HOUSING DEMAND
NON-OCS CASE
CORDOVA AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	82	27	14	8	5
1980		10	5	3	2
1981	1 %	43	22	12	9
1982	52	17	9	5	3
1983	50	17	9	5	3
1984	52	17	9	5	3
1985	52	78	9	5	4
1986	56	19	10	5	4
1987	58	19	10	5	4
1988	60	20	10	6	4
1989	58	19	10	5	4
1990	58	19	10	5	4
1991	70	23	12	6	5
1992	74	25	13	7	5
1993	72	24	12	7	5
1994	80	27	14	8	5
1995	78	26	13	8	5
1996	82	27	14	8	5
1997	90	30	15	9	6
1998	90	30	15	9	6
1999		29	15	8	6
2000	1:!	34	17	10	7
TOTALS	1,560	520	267	149	104

Source: Alaska Consultants, Inc.

TABLE 16

ESTIMATED DEMAND FOR RESIDENTIAL LAND
BASE CASE
CORDOVA AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	19	2.7	1.1	3.8
Multifamily & Trailer	18	1.3	0.5	1.8
1981-85				
Single Family	58	8.4	3.3	11.7
Multifamily & Trailer	54	3.9	1.5	5.4
1986-90				
Single Family	50	7.2	2.8	10.0
Multifamily & Trailer	46	3.3	1.3	4.6
1991-95				
Single Family	64	9.2	3.6	12.8
Multifamily & Trailer	61	4.4	1.7	6.1
1996-2000				
Single Family	76	10.9	4.2	15.1
Multifamily & Trailer	74	5.3	2.1	7.4
TOTAL	520	56.6	22.1	78.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 17

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
BASE CASE
CITY OF CORDOVA
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	281	984	1,265
1979	290	1,014	1,304
1980	292	1,024	1,316
1981	306	1,070	1,376
1982	311	1,088	1,399
1983	316	1,106	1,422
1984	321	1,125	1,446
1985	327	1,143	1,470
1986	332	1,163	1,495
1987	338	1,184	1,522
1988	344	1,205	1,549
1989	350	1,226	1,576
1990	356	1,247	1,603
1991	363	1,272	1,635
1992	371	1,298	1,669
1993	378	1,324	1,702
1994	386	1,352	1,738
1995	394	1,380	1,774
1996	403	1,409	1,812
1997	412	1,441	1,853
1998	420	1,472	1,892
1999	430	1,504	1,934
2000	440	1,540	1,980

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 18

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
NON-OCS CASE
CITY OF CORDOVA
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	281	35.1
1979	290	36.2
1980	292	36.5
1981	306	38.2
1982	311	38.9
1983	316	39.5
1984	321	40.1
1985	327	40.9
1986	332	41.5
1987	338	42.3
1988	344	43.0
1989	350	43.8
1990	356	44.5
1991	363	45.4
1992	371	46.4
1993	378	47.3
1994	386	48.2
1995	394	49.2
1996	403	50.4
1997	412	51.5
1998	420	52.5
1999	430	53.8
2000	440	55.0

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 19

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
NON-OCS CASE
CORDOVA AREA
1978- 2000

Year	Estimated Capacity Requirements in kw's
1978	6,905
1979	7,252
1980	7,467
1981	7,955
1982	8,246
1983	8,536
1984	8,837
1985	9,143
1986	9,466
1987	9,800
1988	10,146
1989	10,320
1990	10,494
1991	10,704
1992	10,926
1993	11,142
1994	11,382
1995	11,616
1996	11,862
1997	12,132
1998	12,390
1999	12,660
2000	12,966

Source: Alaska Consultants, Inc.

TABLE 20

ESTIMATED DISPOSABLE SOLID WASTES
BASE CASE
CORDOVA AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,750	16,700
1979	2,890	17,500
1980	2,980	18,000
1981	3,170	19,200
1982	3,290	20,000
1983	3,410	20,700
1984	3,540	21,500
1985	3,670	22,200
1986	3,770	22,900
1987	3,880	23,500
1988	3,990	24,200
1989	4,090	24,800
1990	4,210	25,500
1991	4,290	26,000
1992	4,380	26,500
1993	4,470	27,000
1994	4,560	27,600
1995	4,660	28,200
1996	4,750	28,800
1997	4,860	29,500
1998	4,960	30,100
1999	5,070	30,700
2000	5,200	31,500

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 21

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
NON-OCS CASE
CORDOVA AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	585	731	--
1979	1.26	612	771	40
1980	1.27	622	790	19
1981	1.28	665	851	61
1982	1.29	682	880	29
1983	1.30	699	909	29
1984	1.31	716	938	29
1985	1.32	734	969	31
1986	1.33	753	1,001	32
1987	1.34	772	1,034	33
1988	1.35	792	1,069	35
1989	1.36	811	1,103	34
1990	1.37	830	1,137	34
1991	1.38	853	1,177	40
1992	1.39	878	1,220	43
1993	1.40	902	1,263	43
1994	1.40	929	1,301	38
1995	1.40	955	1,337	36
1996	1.40	982	1,375	38
1997	1.40	1,012	1,417	42
1998	1.40	1,041	1,457	40
1999	1.40	1,071	1,499	42
2000	1.40	1,105	1,547	48

Source: Alaska Consultants, Inc.

TABLE 22

SCHOOL ENROLLMENT FORECAST
NON-OCS CASE
CORDOVA AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	331	221	552
1979	341	228	569
1980	345	229	574
1981	360	240	600
1982	366	245	611
1983	372	249	621
1984	379	252	631
1985	385	257	642
1986	392	261	653
1987	399	265	664
1988	406	270	676
1989	413	275	688
1990	420	280	700
1991	428	286	714
1992	437	291	728
1993	446	297	743
1994	455	304	759
1995	465	309	774
1996	474	317	791
1997	485	324	809
1998	496	330	826
1999	506	338	844
2000	519	345	864

Source: Alaska Consultants, Inc.

TABLE 23

FORECAST OF CORDOVA SCHOOL DISTRICT REVENUES
BASE CASE
CITY OF CORDOVA
1978 - 2000
(in 1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	552	$ 205	$1,638	$25	$1,868
1979	569	224	1,789	27	2,040
1980	574	239	1,913	29	2,181
1981	600	265	2,119	32	2,416
1982	611	286	2,289	35	2,610
1983	621	308	2,466	37	2,811
1984	631	332	2,655	40	3,027
1985	642	358	2,863	43	3,264
1986	653	386	3,088	47	3,521
1987	664	416	3,327	50	3,793
1988	676	449	3,591	54	4,094
1989	688	484	3,874	59	4,417
1990	700	522	4,178	63	4,763
1991	714	565	4,518	68	5,151
1992	728	610	4,883	74	5,567
1993	743	660	5,282	80	6,022
1994	759	715	5,720	87	6,522
1995	774	773	6,183	94	7,050
1996	791	837	6,697	101	7,635
1997	809	908	7,262	110	8,280
1998	826	982	7,859	119	8,960
1999	844	1,064	8,512	129	9,705
2000	864	1,111	8,887	135	10,133

Source: Alaska Consultants, Inc.

TABLE 24

GENERAL FUND
REVENUE FORECAST
BASE CASE
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 381	$ 191	$ 545	$ 403	$1,520
1979	415	208	595	404	1,658
1980	445	223	637	471	1,776
1981	493	247	705	521	1,966
1982	531	266	760	562	2,119
1983	572	287	820	606	2,285
1984	617	309	883	653	2,462
1985	665	333	952	704	2,654
1986	717	359	1,026	759	2,861
1987	773	388	1,107	819	3,087
1988	834	418	1,195	883	3',330
1989	900	451	1,288	952	3,591
1990	970	486	1,389	1,027	3,872
1991	1,049	526	1,501	1,110	4,186
1992	1,135	569	1,625	1,201	4,530
1993	1,226	615	1,756	1,298	4,895
1994	1,328	666	1,901	1,406	5,301
1995	1,437	720	2,057	1,521	5,735
1996	1,555	780	2,227	1,646	6,208
1997	1,686	845	2,414	1,784	6,729
1998	1,825	915	2,613	1,932	7,285
1999	1,977	991	2,830	2,092	7,890
2000	2,146	1,076	3,072	2,271	8,565

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 25

FORECAST OF REVENUES AND OPERATING EXPENDITURES
NON-OCS CASE
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Availa[illegible] for Capit Improvement
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$ 381	$1,139	$1,520	$1,261	$ 205	$1,466	$ 5[illegible]
1979	415	1,243	1,658	1,376	224	1,600	58
1980	445	1,331	1,776	1,474	239	1,713	63
1981	493	1,473	1,966	1,633	265	1,898	68
1982	531	1,588	2,119	1,761	286	2,047	72
1983	572	1,713	2,285	1,896	308	2,204	81
1984	617	1,845	2,462	2,045	332	2,377	8[illegible]
1985	665	1,989	2,654	2,203	358	2,561	93
1986	717	2,144	2,861	2,376	386	2,762	99
1987	773	2,314	3,087	2,563	416	2,979	108
1988	834	2,496	3,330	2,766	449	3,215	115
1989	900	2,691	3,591	2,981	484	3,465	126
1990	970	2,902	3,872	3,213	522	3,735	13[illegible]
1991	1,049	3,137	4,186	3,475	565	4,040	146
1992	1,135	3,395	4,530	3,760	610	4,370	160
1993	1,226	3,669	4,895	4,065	660	4,725	170
1994	1,328	3,973	5,301	4,400	715	5,115	186
1995	1,437	4,298	5,735	4,761	773	5,534	201
1996	1,555	4,653	6,208	5,154	837	5,991	21[illegible]
1997	1,686	5,043	6,729	5,587	908	6,495	234
1998	1,825	5,460	7,285	6,048	982	7,030	255
1999	1,977	5,913	7,890	6,551	1,064	7,615	275
2000	2,146	6,419	8,565	7,112	1,111	8,223	342

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

Seward

COMMUNITY FORECASTS

Significant Factors Affecting Growth

Under the non-OCS case, the Seward area is forecast to exhibit steady economic growth stimulated primarily by expansion in two sectors of Seward's economic base: first, long-term growth in the Seward-based fisheries, particularly bottomfishing, and related manufacturing activities in fish processing; second, steady growth in basic employment in trade and services, reflecting expansion in tourism and recreational industries serving the Anchorage area and other non-local residents.

Optimism about the long-term prospects for the fisheries and fish processing industries is based on Seward's advantageous competitive position as a base for entry into and successful economic exploitation of the deep-sea fisheries resources of the Gulf of Alaska. Seward is within convenient fishing range of both the Yakutat and Kodiak fishing grounds. Seward, unlike other coastal communities in the region, possesses waterborne transportation facilities which can readily accommodate comparatively large quantities of processed bottomfish. Bottomfish processing relies upon a relatively unskilled workforce which Seward can, in part, provide, with easy access to the larger labor market in the Anchorage area. Lastly, major fish processors with plants in Seward have experience in processing Alaska bottomfish and have expressed interest in expanding operations in this area.

In contrast to the prospects of the deep-sea fishery, the traditional fishing and fish processing industry in Seward is expected to decline slightly. The commercial catch will be limited by increased competition from sport fishermen as population in the Anchorage area increases. Also, the build-up of bottomfishing and bottomfish processing capacity will lead at times to production conflicts disrupt ve to the traditiona commercial fishing industry.

The contribution of tourism and recreation to Seward’s economic base is presumed to grow in step with the following trends and new factors. Seward’s attractiveness for tourism and recreational visits will be enhanced by the proposed establishment of the Kenai Fjords National Park which will complement the existing commercial boating facilities, outdoor recreational opportunities and the marine highway system. Anchorage area population growth will generate rising demand for recreational and tourist facilities throughout Southcentral Alaska. Seward will share in meeting these demands. Seward will also share in the general increase in additional tourism and recreational business attracted to Alaska in years to come.

As a consequence, employment in the trade and service sector of Seward’s economy is expected to assume increasing importance, especially in the second half of the forecast period. This growth would be consistent with other expectations about Seward’s economy under base case conditions. Expansion in tourism and recreational industries should be reflected heav ly in additional jobs in the trade and service sector. Over future years, the pattern of Seward's economy should exhibit increasingly the basic shift to a more service oriented economy that has long characterized the nation's economy. As Seward's economy matures and the range of commercial and business services that are locally provided diversifies, the service and trade component of the local economy will become steadily larger.

Among the other categories of employment, transportation, communications and public utilities and contract construction are presumed to maintain a fairly constant proportion of overall employment. Government will remain a major employer; however, while government employment is projected to grow, its rate of growth will be outpaced by expansion in the private sector.

Finally, forestry and mining industries, which at present play a minor role in Seward's economy, will in all likelihood continue as small scale employers.

In reference to the employment and population forecasts that follow, it should be noted that the most reliable series data concerning employment and population in the Seward area has been collected by the U.S. Census Bureau and the Alaska Department of Labor for the Seward Census Division, which comprises the settlements of Hope, Moose Pass and people living near but outside Seward's city limits, as well as a small rural population dispersed along the Seward Highway. These sources are supplemented by a special census of population completed in the summer of 1978 by the U.S.

Census Bureau at the request of the Kenai Peninsula Borough and by a count of employment in the Seward area done by Alaska Consultants, Inc., also in summer 1978.

The employment forecast was calculated for the Seward Census Division, but as the Seward area totals better than three-fourths of the Census Division population and an even larger share of its employment, it was thought that use of Census Division estimates would nonmaterially distort employment trends. For purposes of projecting population growth under the non-OCS base case, it was assumed that the geographic distribution of employment and population between the Cityof Seward, the Seward fringe area and the remainder of the Census Division would hold to the current pattern. This assumption is supported by the empirical observation that the ratio of employment and population in Seward compared to the rest of the Census Division has been relatively stable for the past couple of decades.

Future Employment

Overall employment in the Seward Census Division is estimated to grow by 105 percent during the forecast period, from 1,117 jobs in 1978 to 2,293 jobs in 2000. The bulk of this employment increase, perhaps 80 percent, will occur in the Seward vicinity.

Employment in the categories of agriculture, forestry, and fishing (mainly fishing) and manufacturing (mainly fish processing) is expected to grow by over 150 percent from 221 jobs in 1978 to 568 jobs in 2000. Job growth will also be strong in the trade and services sectors which together are forecast to grow by 125 percent from 404 jobs in 1978 to an estimated 908 by 2000. Government, the most important single employment sector, is projected to grow more slowly than the economy as a whole, shrinking from about one-third down to about one-quarter of the total workforce.

Assumptions for Basic Employment

- Fishing and Fish Processing. Successful exploitation 'f groundfish resources in the Gulf of Alaska resulting in substantial increases in basic employment in fishing and seafood processing employment is forecast to take place in the Seward area during the forecast period. Seward's location is expected to enable vessels fishing for bottomfish to be within convenient range of both the Yakutat and Kodiak grounds. And, unlike many coastal communities, existing waterborne transportation facilities at Seward can easily accommodate comparatively large quantities of processed bottomfish. Also, the fact that bottomfish processing requires a large relatively unskilled labor force is seen to place a comparatively large port such as Seward with convenient access to the larger Anchorage labor market in a reasonably advantageous position.

The major processors located in Seward have some experience in processing Alaska bottomfish and have expressed an interest in expanding in this area.

On the other hand, traditional fishing and fish processing activities are forecast to decline sharply with increased pressure over the long run from sports fishermen plus an expanded processing capacity in other fisheries areas.

Therefore, in all except banner years, it is anticipated that large quantities of fish will not be brought to Seward for processing as they have in the past.

Also, concentrated efforts forecast in bottomfish processing are foreseen to result in production conflicts with traditional fisheries resources.

On balance, employment in agricu' ture, forestry and fisheries and manufacturing is forecast to increase significantly over the life of the forecast due to ' ncreases in the fishing and fish processing industry.

- Tourism and Recreation. Population growth and ncreases in visitor traffic forecast to take place in Southcentral Alaska, especially in the Anchorage urban area, are assumed to result in an increased demand for facilities, goods and services associated with the tourism and recreation industry. Seward's competitive position in attracting its share of Southcentral Alaska visitor traffic is foreseen as being enhanced by the addition of the Kenai Fjords National Park to complement existing boating, fishing, hiking and camping opportunities plus sightseeing experiences provided by the State marine highway system ferry M/V Tustumena.

In summary, tourism and recreation-related traffic to Seward is projected to substantially increase basic employment in the community's trade and service sectors and, to a lesser extent, also in its transportation sector.

- <u>Logging and Wood Products</u>. Seward's logging and wood products industry is seen as maintaining its present level of activity in the future and retaining its basic employment at current 1 evels. The loss of some forest lands through reclassification and conflicts with other industries such as fishing and fish processing and tourism and recreation is expected to inhibit the growth of the logging and wood products industry in this area. Furthermore, although some timber lands are being conveyed to Native corporations under the terms of the Alaska Native Claims Settlement Act, primary processing requirements do not apply to these lands and timber from them may thus be round logged and exported. Therefore, despite the capacity of the Seward mill to produce more product, the additional timber is not foreseen to be available and no basic employment increase is thus projected.

- Transportation. Seward’s economy, which was traditionally heavily based in transportation activities, has been undergoing a period of change and adjustment. The basic portion of the local transportation industry is foreseen as remaining relatively stable. Further erosion of basic employment in cargo handling for the Anchorage and Interior markets is seen as being offset by increased basic employment required to handle products exported from the seafood plants and the transportation required to accommodate visitor traffic. On balance, a small increase in basic employment in the transportation, communication and public utilities sector is projected over the forecast period.

- Institutional Activities. Foremost among Seward’s institutional activities are the Wesleyan Nursing Home and the Seward Skill Center. Of lesser import are the Universityof Alaska’s Institute of Marine Science, the Youth and Adult Conservation Corps (YACC) and the U.S. Army and Air Force recreation camps. Basic employment in these institutional activities is divided between the servive and government sectors. Over the life of the forecast, institutional employment in Seward is seen to remain constant with declines in some institutions being offset by gains in others.

In summary, increases in basic employment at Seward are forecast to result primarily from growth in the fishing and seafood processing industry and the tourism and recreation industry. However, growth in the fishing and fish processing industry is not seen as being uniform. The catching and processing of bottomfish is forecast to provide the growth in the fisheries industry while traditional fisheries are seen as declining in the long term. On the other hand, employment in the tourism and recreation industry, where growth has been exhibited in the trade and service sectors, is projected to increase at an accelerated rate.

Growth in agriculture, forestry and fisheries employment is forecast at a rate of 4 percent per year, based almost exclusively on increases in fishing. Employment in this sector is projected to. increase at 1 percent per year through 1982. From 1983 to 1990, the forecast is based upon the addition of trawlers and longliners for bottomfishing and from 1991 to 2000, only a 1 percent per year increase is foreseen.

Manufacturing employment, much of it fisheries-related, is forecast to remain constant from 1978 to 1981. A decline is encountered in 1982 based upon plant reconstruction in preparation for bottomfish processing. The equivalent of full operation by one line is represented in 1983 and, in 1984, two lines are represented. During the 1985 to 1998 period, increases in employment are represented by the operation of two lines for sixteen hours per day and, in 1990, four lines are estimated to be operating for sixteen hours per day. From 1991 to 2000, an increase in basic employment of 1 percent per year is foreseen to accommodate the addition of high unit value bottomfish processing.

The trade and service sectors are forecast to increase at an annual average of 1 percent per year from 1978 to 1982. From 1983 to 1990, a 3 percent rate of annual increase is assumed and, from 1991 to 2000, a 5 percent annual growth in trade employment is forecast. During this latter period, service employment in the service sector is projected to increase at a rate of 6 percent per year. Seward's existing trade and service sector is seen as being well developed with some excess capacity to absorb increases in trade and service activity with only small resulting increases in employment. However, during the latter stages of the forecast period, it is envisioned that substantial additions must be made to keep pace with the demands of the tourism and recreation industry.

A moderate annual increase of 3 percent through the forecast period is assumed for employment in transportation, communication and public utilities. In Seward, this sector is dominated by transportation activities and much of the employment increase associated with these activities will be seasonal surface transportation where the impact will be recorded in other sectors such as trade.

Employment in mining and contract construction is forecast to undergo a substantial increase. However, the numerical increase in mining, which includes only sand and gravel extraction in this area, will be small. Contract construction, on the other hand, is forecast to increase by almost 5 percent per year over the planning period.

Employment in the finance, insurance and real estate sector is projected to increase at 3 percent per year from 1978 to 1990 and at 5 percent per year thereafter to accommodate growth generated principally by the fishing and seafood processing and the tourism and recreation industries.

Employment in government is generally foreseen to decrease relative to other activities since some economies of scale are assumed to result. Government employment is projected to increase by approximately 2 percent per year over the life of the forecast.

Assumptions for Secondary (or Service) Employment. Since the existence of service employment depends upon expenditures of the basic sector, service employment can be roughly derived from basic employment through the use of a multiplier to elicit total employment. Total employment minus basic employment equals service employment.

A 1978 count of employment in Seward conducted by Alaska Consultants, Inc. recorded 1,117 employees. Estimates of basic and service employment were 651 and 466 respectively. Thus, the multiplier derived was 1.72. This multiplier may be somewhat high in the base year since no basic construction activity was then taking place and no attempt was made to trace intergovernmental transfer payments. As a result, some employment which would normally be classified as basic was instead classed as service.

Service employment is then distributed using the 1978 tabulation of annual average full-time service employment by sector as a guide. Adjustments were made based upon observations of other similarly situated communities with comparable populations and rates of growth.

Future Population

The Seward Census Division has an unusually high ratio of population to employment, currently about three persons per job. This probably stems from a combination of factors, particularly the relatively depressed state of the local economy, with uncommonly high unemployment and low labor force participation rates for urban Alaska. It is expected that the projected improved employment base will bring about an adjustment in the population/employment ratio to a more typical 2.5 figure (see Table 26).

Differently put, population will grow more slowly than employment, by about 70 percent over the forecast period. The projected population growth was allocated to the City of Seward, the Seward fringe area and the rest of the census division in the same proportion as prevailed in 1978. Seward grows from 1,956 residents in 1978 to 3,305 by 2000 while the fringe area adjacent to Seward grows from 644 to 1,088 residents.

For some time, Seward's population composition has been weighted toward the older age groups. This should shift toward a more balanced age distribution in response to improved local employment opportunities.

TABLE 26

FORECAST OF EMPLOYMENT AND POPULATION
SEWARD AREA
NON-OCS CASE
1978 - 2000

1NDUSTR% CLASSIFICATION/YEAR	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
COMMODITY PRODUCING INDUSTRIES	242	247	254	255	256	278	324	387	392	398	407	486
Agriculture, Forestry and Fisheries	(100)	(101)	(102)	(103)	(104)	(120)	(140)	(152)	(156)	(160)	(168)	(184)
Mining	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(5)
Manufacturing	(121)	(121)	(121)	(121)	(100)	(125)	(150)	(200)	(200)	(200)	(200)	(252)
Contract Construction	(18)	(22)	(28)	(28)	(48)	(29)	(30)	(31)	(32)	(33)	(34)	(45)
DISTRIBUTIVE INDUSTRIES	487	493	498	505	512	526	542	559	575	592	608	628
Transportation, Communications and Public Utilities	(63)	(64)	(65)	(67)	(69)	(71)	(73)	(75)	(77)	(79	(81)	(83)
Trade	(230)	(232)	(234)	(236)	(238)	(245)	(252)	(260)	(268)	(276	(283)	(293)
Finance, Insurance and Real Estate	(20)	(21)	(21)	(22)	(23)	(23)	(24)	(25)	(25)	(26	(27)	(28)
Service	(174)	(176)	(178)	(180)	(182)	(187)	(193)	(199)	(205)	(211	(217)	(224)
GOVERNMENT	388	396	404	412	420	428	437	446	455	464	472	482
TOTAL EMPLOYMENT	1,117	1,136	1,156	1,172	1,188	1,232	1,303	1,392	1,422	1,454	1,487	1,596
RATIO OF POPULATION TO EMPLOYMENT	3.03	3.00	3.00	3.00	3.00	2.95	2.90	2.85	2.80	2.75	2.70	2.65
TOTAL POPULATION - SEWARD CENSUS DIVISION	3,392	3>408	3,468	3,516	3,564	3,634	3,779	3,967	3,982	3,998	4,015	4,229
CITY OF SEWARD	1,956	1,965	2,000	2,028	2,055	2,096	2,179	2,288	2,296	2,305	2,315	2,439
SEWARO FRINGE	644	647	658	668	677	690	717	753	756	759	762	803

1NDUSTR% CLASSIFICATION/YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	559	566	572	578	585	591	597	604	610	616	623
Agriculture, Forestry and Fisheries	(204)	(216)	(218)	(220)	(222)	(224)	(226)	(228)	(230)	(232)	(234)
Mining	(5)	6)	(6)	(6)	(7)	(7)	(7)	(8)	(8)	(8)	(9)
Manufacturing	(304)	307)	(310)	(313)	(316)	(319)	(322)	(325)	(328)	(331)	(334)
Contract Construction	(46)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)
DISTRIBUTIVE INDUSTRIES	647	680	716	754	793	834	877	922	969	1,018	1,070
Transportation, Communications and Public Utilities	(85)	(88)	(91)	(94)	(97)	(100)	(103)	(106	(109)	(112)	(115)
Trade	(302)	(317)	(333)	(350)	(368)	(386)	(405)	(425	(446)	(468)	(491)
Finance, Insurance and Real Estate	(29)	(30)	(32)	(34)	(35)	(37)	(39)	(41	(43)	(45)	(47)
Service	(231)	(245)	(260)	(276)	(293)	(311)	(330)	(350	(371)	(393)	(417)
GOVERNMENT	492	502	512	522	532	543	554	565	576	588	600
TOTAL EMPLOYMENT	1,698	1,748	1.800	1,854	1,910	1,968	2,028	2,091	2,155	2,222	2,293
RATIO OF POPULATION TO EMPLOYMENT	2.60	2.55.	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
TOTAL POPULATION - SEWARD CENSUS DIVISION	4,415	4,457	4,500	4,635	4,775	4,920	5,070	5,228	5,388	5,555	5,732
CITY OF SEWARD	2.546	2,570	2,595	2,673	2,753	2,837	2,924	3,015	3,107	3,203	3,305
SEWARO FRINGE	838	846	854	880	907	934	963	993	1,023	1,055	1,088

Source: Alaska Consultants, Inc.

IMPACT ASSESSMENT

Social Impacts

The population and economic growth forecast for Seward in the base case essentially represents an extension into the future of recent trends and therefore may generally be regarded as neutral in terms of social impact. In as much as the forecast economic growth is viewed as an advance for Seward's relatively stagnant economy of past years, then this growth might be cited as a positive impact.

Impacts on Community Infrastructure

Housing and Residential Land. The housing forecast estimates that there will be a net increase of 682 dwellings demanded in the Seward area by 2000 to house additional residents (see Table 27). If historic patterns hold true, about two-thirds of the increase will be accounted for by single family homes and nearly all the rest by multifamily units, with few trailers. The corresponding forecast in demand for residential land estimates that about 51 hectares (114 acres) will have to be developed for new residences (see Table 28). However, it should be noted that buildable tracts are scarce in Seward due to constraints of topography and flooding and other natural hazards. Also, Seward's standing housing stock is quite aged. It is plausible that the land supply problem may in part be relieved by redevelopment of deteriorated housing areas at higher densities than have prevailed in the past.

Utilities. With recent and presently programmed improvements, Seward's basic utilities will be in much improved order. Apart from the need to extend distribution lines as new residential areas are developed, the City's major utility projects concern installation of a wastewater treatment facility and a series of necessary actions to upgrade the generating capacity and reliability of its power system.

- Water. Seward's water system was thoroughly studied and a 4-stage program of improvements recommended in the 1975 Comprehensive Water System Plan. The City adopted the plan and is now implementing stages one and two essentially according to the plan.

  Stage One and Stage Two improvements include water source development and storage projects and upgrading and expansion of the distribution system, including service to the Jesse Lee Heights subdivision.

  When these various improvements, now partially installed, are completed, the City's water system will be basically well prepared to meet the water supply demands of the growth forecast under the non-OCS case (see Table 29), even without implementation of the long-range recommendations of Stages Three and Four of the Comprehensive Plan.

Possibly, some additions to the distribution system will be demanded in later years of the forecast period to serve new residential areas or the needs of an expanded fish processing industry.

Sewer. The major deficiency in Seward's sewage collection and treatment system is the lack of any treatment facility. At present, untreated sewage is illegally discharged through four submarine outfalls into Resurrection Bay. The City is proposing to correct this deficiency by constructing a primary treatment facility at Lowell Point and seeking a waiver of secondary treatment requirements as may be allowed under 1977 amendments to the Federal Water Pollution Control Act.

If Seward obtains the waiver and constructs the proposed primary treatment facility, then it should have adequate wastewater treatment capability through the period of the non-OCS case forecast (see Table 30).

The sewage collection system also has defects. An estimated 40 percent of the wastewater volume accrues from bleeding water of taps in cold weather to inhibit line freeze-ups and from excessive water infiltration. While these defects, left uncorrected, inflate the capacity requirements (and costs) of both water supply and wastewater treatment facilities, the proposed improvements should have adequate capacity to tolerate them.

As population grows and industry expands, there will be a demand for some incremental extensions of the sewage collection system to service newly developed residential areas and industrial facilities.

Electric Power. The cost and unreliability of Seward's power system has been a perennial problem for local residents. The City utility distributes power purchased in bulk from Chugach Electric Association. The transmission system delivering power from Moose Pass, where the utility's service area begins, to Seward is inadequate to meet the demands placed upon the system. Firm delivered power capacity is about 2,600 kw while peak demand had reached 3,400 kw by 1978. The City owns three diesel generators with a combined capacity of 5,500 kw, which are used as needed to supplement the supply of purchased power. At times of peak power consumption, operation of the standby generators is essential to meet the City's power needs.

Under any growth circumstances, the City's power system is inefficient, inadequate in capacity and insufficiently reliable to meet present and near future demands. The City fully recognizes this problem and has recently initiated a number of projects and studies aimed at correcting immediate problems. Two new substations are scheduled for construction in 1979 which, together with improvements now being engineered to modern ze the transmission and distribution systems, should bring those features of the system up to standard. The problem of power supply is being addressed by a study of the feasibility of hydropower generation in Lowell Canyon. Alternatively, the City may find it preferable to purchase additional power from Chugach Electric Association or to upgrade and expand its diesel generating capability. If the various improvements now being designed are installed on schedule, the City will have by 1984 to reach peak power capacity of 10,000 kw.

For the longer term, a review of the estimated power demand through the year 2000 (see Table 31) indicates that further system improvements, especially to the basic power supply, will be demanded to maintain a reliable system with adequate reserve capacity. By 1990, the estimated capacity requirements will again be nearing the peak power capacity that will be achieved at the conclusion of the current program of improvements.

- Solid Waste Disposal. Solid waste disposal operations do not appear likely to present any difficult or costly problems to the City during the forecast period. Within the City, solid waste is collected by a subcontractor to the City. The sanitary landfill site located at the north edge of the City is operated by a subcontractor to the Borough.

At the current rate of use (0.6 hectares or 1.5 acres per year), the unused part of the 16.2 hectare (40 acre) landfill site has a remaining useful life estimated at more than 20 years (see Table 32). While the population growth anticipated for the forecast period will accelerate the rate of landfill, the existing site should be adequate nearly to the end of the forecast period.

- Communications. General Telephone Company of Alaska provides telephone service to Seward and vicinity. Unlike the water and sewer utilities, the telephone system appears capable of expansion to serve new demand under the base case with only a modest investment in additional trunk line capacity which can be readily augmented as proves necessary (see Table 33).

Public Safety

- Police. It is estimated that Seward will experience a demand for two additional police officers and two additional jail cells due to town growth by 2000. Also, the City's present police station and jail was constructed in 1965 and may become obsolescent and have to be replaced before the end of the forecast period.

- Fire Protection. While the growth forecast will not by itself justify upgrading the size of the City's fire protection facilities, the fire station, built in 1964, may be in need of replacement before the forecast period concludes.

Health and Social Services. The City-owned Seward General Hospital has 29 general hospital care beds which have had an occupancy rate of less than 20 percent. The hospital's capacity is more than adequate for its service area (all the way to Cooper Landing) through the forecast period.

The hospital's remaining useful life has been estimated at 15 years. Its physical design is poorly adapted to accommodate laboratory and other ancillary functions and this is contributing to its obsolescence. As a consequence, the hospital may have to be replaced or undergo major remodeling within a decade or so.

Education. Seward, unlike Yakutat or Cordova, is not directly responsible for financing and administering a local school district. Instead, the Kenai Peninsula Borough School District delivers educational services, operating an elementary and a secondary school at Seward to serve schoolchildren in the Seward area.

The school system is funded mainly through State contributions, but partly through Borough revenues raised on an areawide basis. Consequently, the City of Seward does not have its own educational budget or school facilities.

Nevertheless, the City of Seward has a clear interest in the quality of the educational program provided by the Borough School District. Therefore, future enrollment trends in the Seward area schools were estimated to determine what improvements may prove necessary in future years.

The school enrollment forecast envisions relatively slow and steady growth for the duration of the base case forecast (see Table 34). Net growth in enrollment is about 70 percent, to about 527 elementary students and 284 secondary students by 2000.

A review of the present capacity and condition of the school facilities at Seward indicates that Seward is well equipped to accommodate such expansion. The elementary school was built in 1969, refurbished in 1978 and can accommodate 500 students. The new high school was opened in 1978 and, with a capacity of 300 students, should be adequate for the duration. Both schools are in excellent condition and should have a useful life of 30 more years.

Recreation. Seward possesses a variety of major recreational facilities such as a swimming pool, gymnasiums, tennis courts and ball fields that compare well with standards for a town of its size. Certain of the City's recreational facilities are heavily used by visitors as well as local residents. This dual use is advantageous except where it results in overuse of an undersized facility as is the case with the small boat harbor. The boat harbor is an important recreational asset for Seward's own residents as well as an economic asset for its tourism and recreational industry. Despite recent expansion in berthing spaces, it is clear that further improvements are necessary to satisfy current as well as future demands. Seward also appears to be deficient in its provision of neighborhood parks and playgrounds and several of these smaller recreational improvements are likely to be demanded to serve new residential areas.

Local Government Finances. There are two features which distinguish the City of Seward's fiscal situation from that of Yakutat and Cordova. First, Seward does not levy a municipal sales tax. Second, the City is not directly responsible for supporting and operating a local school district, a function which is instead administered by the Kenai Peninsula Borough.

Property taxes (35 percent) and a miscellaneous array (42 percent) of fees and other income account for the locally-raised share of Seward's general fund revenues. (Included in the latter category are license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues). Intergovernmental transfers from the State and federal governments contribute the remaining 23 percent. Seward, unlike most Alaskan municipalities, does not assess a local sales tax and so has no revenue from that source.

Over the period of the forecast, general fund revenues are estimated to increase by more than six times, from about $1,539,000 in FY 1977/78 to about $9,372,000 by 2000 (see Table 36).

Since the Kenai Peninsula Borough School District operates the Seward area elementary and secondary school systems, Seward's actual budget does not show revenues or expenditures for that function. However, an estimate was made of the cost to the Borough of providing educational services to the Seward area. Based on Seward's proportionate share of school district enrollment, an equal share of the Borough School District's locally raised revenues was allocated to the Seward area. By this method, it was estimated that Seward's local share of revenues and expenditures for the school district was about $485,000 in FY 1977/78 and would rise thereafter at the same rate as other expenses and revenues (see Table 35). In actuality, because the Borough's industrial property tax base is heavily concentrated in the North Kenai-Nikiski area, Seward's contribution to school district revenues through the Borough-wide property tax assessment is likely less than estimated.

A relatively small proportion (about 7 percent) of Seward's projected revenues are in excess of general fund expenditures and available for additional debt service, capital improvements or other purposes (see Table 37). Furthermore, Seward has a relatively high ratio (5.3 percent) of general obligation bonded indebtedness to assessed valuation and the debt ratio rises to about 7.2 percent if Seward's pro-rated share of the Kenai Peninsula Borough's debt is included.

Seward is facing a number of major capital projects for water, sewer and power utilities in the near future, at a time when its debt ratio is higher than average and its per capita valuation below the Statewide average. This suggests that Seward may face fiscal difficulties in meeting future capital facility needs within its existing fiscal framework, even under the base case. Unless the City is able to f nance new facilities largely with State and federal grant funds, tmay find it fiscally necessary to defer some projects or to develop additional non-property tax revenue sources such as a sales tax.

CAUSE/EFFECT OF IMPACTS

The base case forecast anticipates an improvement in Seward's fortunes, based on expansion in diverse economic sectors. The fisheries and fish processing industry are predicted to thrive. Tourism and recreational industries are expected to grow and to engender a healthier trade and services sector.

Better work prospects should attract newcomers to Seward, with the result that in-migration rather than natural increase would account for most population increase. Still, the population is forecast to grow more slowly than new employment, partly due to a reduction in Seward's chronically high unemployment rate and a rise in the labor force participation rate.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

Most of Seward's developmental problems are due to the post-earthquake decade of economic retrenchment, during which the 'town lost jobs and residents. New public works were deferred for more prosperous times as the City struggled with the dilemma of a diminished property tax base and high tax rates to fund municipal programs.

After 1964, there accumulated a backlog of community development needs, upon which the City has begun to make inroads in the last couple of years. Plans and projects are underway to secure the town's water and power supply and to install wastewater treatment facilities. In the future, expanded marine facilities will be demanded for the recreational boating industry. Population growth will stimulate new residential construction, including some replacement of Seward's relatively aged existing housing stock.

SUMMARY

In contrast to its recent economic sluggishness, the picture for Seward's future economy is positive, forecasting a doubling in employment by 2000. This upturn should be accompanied by an improvement in the City's fiscal circumstances and offers an opportunity to continue a long-term program to upgrade basic public utilities and services.

TABLE 27

FORECAST OF NET CHANGE IN HOUSING DEMAND
NON-OCS CASE
SEWARD AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	12	5	3	1	1
1980	46	17	11	5	1
1981	37	14	9	4	1
1982	37	14	9	4	1
1983	54	20	13	6	1
1984	110	42	29	12	1
1985	145	55	37	16	2
1986	11	4	3	1	0
1987	12	5	3	1	1
1988	13	5	3	1	1
1989	165	63	42	18	3
1990	142	54	36	15	3
1991	32	12	8	3	1
1992		13	9	4	0
1993	1;;	40	27	11	2
1994	107	41	27	12	2
1995	111	42	28	12	2
1996	116	44	29	13	2
1997	121	46	31	13	2
1998	122	46	31	13	2
1999	128	49	33	.14	2
2000	135	51	34	15	2
TOTALS	1,793	682	455	194	33

Source: Alaska Consultants, Inc.

TABLE 28

ESTIMATED DEMAND FOR RESIDENTIAL LAND
BASE CASE
SEWARD AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	14	2.0	0.8	2.8
Multifamily & Trailer	8	0.6	0.2	0.8
1981-85				
Single Family	97	14.0	5.4	19.4
Multifamily & Trailer	48	3.5	1.3	4.8
1986-90				
Single Family	87	12.5	4.9	17.4
Multifamily & Trailer	44	3.2	1.2	4.4
1991-95				
Single Family	99	14.3	5.5	19.8
Multifamily & Trailer	49	3.5	1.4	4.9
1996-2000				
Single Family	158	22.8	8.8	31.6
Multifamily & Trailer	78	5.6	2.2	7.8
TOTAL	682	82.0	31.7	113.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, inc.

TABLE 29

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
BASE CASE
CITY OF SEWARD
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	245	1,369	1,614
1979	246	1,375	1,621
1980	250	1,400	1,650
1981	254	1,419	1,673
1982	257	1,438	1,695
1983	'262	1,467	1,729
1984	272	1,526	1,798
1985	286	1,602	1,888
1986	287	1,607	1,894
1987	288	1,614	1,902
1988	289	1,621	1,910
1989	305	1,707	2,012
1990	318	1,782	2,100
1991	321	1,799	2,120
1992	324	1,817	2,141
1993	334	1,871	2,205
7994	344	1,927	2,271
1995	355	1,986	2,341
1996	366	2,046	2,412
1997	377	2,110	2,487
1998	388	2,175	2,563
1999	400	2,242	2,642
2000	413	2,314	2,727

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 30

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
NON-OCS CASE
CITY OF SEWARD
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	245	30.6
1979	246	30.8
1980	250	31.3
1981	254	31.8
1982	257	32.1
1983	262	32.7
1984	272	34.0
1985	286	35.8
1986	287	35.9
1987	288	36.0
1988	289	36.1
1989	305	38.1
1990	318	39.8
1991	321	40.1
1992	324	40.5
1993	334	41.7
1994	344	43.0
1995	355	44.4
1996	366	45.8
1997	377	47.1
1998	388	48.5
1999	400	50.0
2000	413	51.6

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 31

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
NON-OCS CASE
SEWARD AREA
1978- 2000

Year	Estimated Capacity Requirements in kw's
1978	6,500
1979	6,601
1980	6,911
1981	7,142
1982	7,376
1983	7,662
1984	8,109
1985	8,667
1986	8,851
1987	9,039
1988	9,231
1989	9,726
1990	10,152
1991	10,248
1992	10,347
1993	10,659
1994	10,980
1995	11,313
1996	11,661
1997	12,024
1998	12,390
1999	12,774
2000	13,179

Source: Alaska Consultants, Inc.

TABLE 32

ESTIMATED DISPOSABLE SOLID WASTES
BASE CASE
SEWARD AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,590	15,700
1979	2,650	16,100
1980	2,750	16,700
1981	2,840	17,200
1982	2,930	17,800
1983	3,070	18,600
1984	3,250	19,700
1985	3,470	21,100
1986	3,520	21,300
1987	3,590	21,800
1988	3,640	22,000
1989	3,860	23,400
1990	4,060	24,600
1991	4,100	24,900
1992	4,140	25,100
1993	4,270	25,900
1994	4,400	26,600
1995	4,530	27,400
1996	4,670	28,300
1997	4,810	29,200
1998	4,960	30,100
1999	5,110	31,000
2000	5,280	32,000

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 33

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
NON-OCS CASE
SEWARD AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	745	931	--
1979	1.26	748	942	11
1980	1.27	761	966	24
1981	1.28	772	988	22
1982	1.29	783	1,010	22
1983	1.30	798	1,037	27
1984	1.31	830	1,087	50
1985	1.32	872	1,151	64
1986	1.33	875	1,164	13
1987	1.34	879	1,178	14
1988	1.35	883	1,192	14
1989	1.36	930	1,265	73
1990	1.37	971	1,330	65
1991	1.38	980	1,352	22
1992	1.39	990	1,376	24
1993	1.40	1,019	1,427	51
1994	1.40	1,050	1,470	43
1995	1.40	1,082	1,515	45
1996	1.40	1,115	1,561	46
1997	1.40	1,149	1,609	48
1998	1.40	1,184	1,658	49
1999	1.40	1,221	1,709	51
2000	1.40	1,259	1,763	54

Source: Alaska Consultants, Inc.

TABLE 34

SCHOOL ENROLLMENT FORECAST
NON-OCS CASE
SEWARD AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	312	168	480
1979	313	169	482
1980	319	172	491
1981	323	175	498
1982	328	176	504
1983	334	180	514
1984	348	187	535
1985	365	196	561
1986	366	197	563
1987	368	198	566
1988	369	199	568
1989	389	209	598
1990	406	219	625
1991	410	221	631
1992	414	223	637
1993	426	230	656
1994	439	237	676
1995	453	243	696
1996	466	251	717
1997	481	259	740
1998	496	266	762
1999	511	275	786
2000	527	284	811

Source: Alaska Consultants, Inc.

TABLE 35

FORECAST OF SEWARD SCHOOL DISTRICT REVENUES
BASE CASE
CITY OF SEWARD a/
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$ 515	$1,157	$28	$1,700
1979	482	548	1,231	30	1,809
1980	491	591	1,329	32	1,952
1981	498	636	1,429	35	2,100
1982	504	682	1,533	37	2,252
1983	514	737	1,657	40	2,434
1984	535	814	1,828	44	2,686
1985	561	904	2,032	49	2,985
1986	563	962	2,162	52	3,176
1987	566	1,025	2,303	56	3,384
1988	568	1,090	2,450	59	3,599
1989	598	1,217	2,735	66	4,018
1990	625	1,348	3,030	73	4,451
1991	631	1,443	3,243	79	4,765
1992	637	1,544	3,470	84	5,098
1993	656	1,685	3,788	92	5,565
1994	676	1,841	4,137	100	6,078
1995	696	2,009	4,515	110	6,634
1996	717	2,194	4,930	120	7,244
1997	740	2,400	5,394	131	7,925
1998	762	2,620	5,888	143	8,651
1999	786	2,864	6,437	156	9,457
2000	811	3,014	6,774	164	9,952

a/ The City of Seward does not raise any direct revenues for school purposes. The Kenai Peninsula Borough funds and operates a boroughwide school system. This table presents Seward's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes.

Source: Alaska Consultants, Inc.

TABLE 36

GENERAL FUND
REVENUE FORECAST
BASE CASE
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 536	N/A	$ 354	$ 649	$1,539
1979	571	N/A	377	691	1,639
1980	616	N/A	407	745	1,768
1981	662	N/A	437	801	1,900
1982	711	N/A	470	860	2,041
1983	769	N/A	508	930	2,207
1984	848	N/A	560	1,025	2,433
1985	943	N/A	623	1,141	2,707
1986	1,003	N/A	662	1,214	2,879
1987	1,068	N/A	705	1,292	3,065
1988	1,137	N/A	751	1,375	3,263
1989	1,269	N/A	838	1,535	3,642
1990	1,405	N/A	927	1,699	4,031
1991	1,503	N/A	992	1,818	4,313
1992	1,609	N/A	1,062	1,946	4,617
1993	1,756	N/A	1,159	2,124	5,039
1994	1,918	N/A	1,266	2,320	5,504
1995	2,095	N/A	1,383	2,534	6,012
1996	2,289	N/A	1,511	2,768	6,568
1997	2,501	N/A	1,650	3,025	7,176
1998	2,732	N/A	1,804	3,305	7,841
1999	2,987	N/A	1,971	3,612	8,570
2000	3,266	N/A	2,156	3,950	9,372

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 37

FORECAST OF REVENUES AND OPERATING EXPENDITURES
NON-OCS CASE
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvement
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total b/ b/	
1978	$ 536	$1,003	$1,539	$1,432	$ 515	$1,947	$ 107
1979	571	1,068	1,639	1,525	548	2,073	114
1980	616	1,152	1,768	1,646	591	2,237	122
1981	662	1,238	1,900	1,768	636	2,404	132
1982	711	1,330	2,041	1,900	682	2,582	141
1983	769	1,438	2,207	2,053	737	2,790	154
1984	848	1,585	2,433	2,264	814	3,078	169
1985	943	1,764	2,707	2,519	904	3,423	188
1986	1,003	1,876	2,879	2,680	962	3,642	199
1987	1,068	1,997	3,065	2,852	1,025	3,877	213
1988	1,137	2,126	3,263	3,036	1,090	4,126	227
1989	1,269	2,373	3,642	3,389	1,217	4,606	253
1990	1,405	2,626	4,031	3,751	1,348	5,099	280
1991	1,503	2,810	4,313	4,041	1,443	5,484	272
1992	1,609	3,008	4,617	4,296	1,544	5,840	321
1993	1,756	3,283	5,039	4,691	1,685	6,376	348
1994	1,918	3,586	5,504	5,122	1,841	6,963	382
1995	2,095	3,917	6,012	5,594	2,009	7,603	418
1996	2,289	4,279	6,568	6,111	2,194	8,305	457
1997	2,501	4,675	7,176	6,680	2,400	9,080	496
1998	2,732	5,109	7,841	7,296	2,620	9,916	545
1999	2,987	5,583	8,470	7,975	2,864	10,839	595
2000	3,266	6,106	9,372	8,722	3,014	11,736	650

a/ Includes intergovernmental revenues and miscellaneous other revenues.

b/ The City of Seward does not make any direct expenditures for school support. The Kenai Peninsula Borough funds and operates a boroughwide school system. The figure for school support represents Seward's projected pro rata share of the Kenai Peninsula Borough's school expenditures but is not actually to be included in the City's budget.

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - 95 PERCENT SCENARIO

Introduction

The 95 percent scenario assumes that the proposed Northern Gulf of Alaska lease sale scheduled for 1980 will be followed by an unsuccessful exploration phase terminating after four years of effort. This scenario concludes after exploration and does not progress to the subsequent phases of petroleum development (see Table 38).

Under this scenario, the stimulus to employment and population growth and related impacts on community infrastructure at Yakutat are short-term and modest, but still of momentarily passing interest due to that town's small population base. However, at Cordova and Seward, impacts are fleeting and negligible in scale and worth only a brief mention (see Table 39).

Following the shutdown of exploration, community conditions return to the patterns expected to prevail under the Base Case. In sum, the 95 percent scenario has no lasting impact on the infrastructure of the three coastal communities. In this regard, the scenario resembles the actual course of events after earlier Lease Sale #39.

TABLE 38

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD, CORDOVA AND YAKUTAT
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Cordova	Yakutat
EXPLORATION			
Survey			
Offshore			
Geophysical and Geological Surveying [area of operation]	Not Applicable	Survey vessels conducting geophysical and geological surveys on the Middleton and Yakataga Shelves outside the Cordova coastal area.	Survey vessels conducting geophysical and geological surveys on the Yakutat Shelf outside the Yakutat coastal area.
Onshore			
Service 8ase	Temporary service base providing resupply, communications and a point for crew rotation for vessels surveying the Mi ddl eton, Yakataga and Yakutat Shelves.	Not Applicable	Not Applicable
Rigs			
Offshore			
Exploration Well Drilling [area of operation]	Not Applicable	Rigs drilling exploration wel 1s on Middleton and Yakataga Shelves outside the Cordova coastal area.	Rigs drilling exploration wells on the Yakutat Shelf outside the Yakutat coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Middleton and Yakataga Shelves.	Not Applicable	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Yakutat Shelf.
Onshore			
Service Base	Shore base supplying rigs and boats on Middleton and Yakataga Shelves with tubular materials, fuel, water, mud, cement, food and other cargo.	Not Applicable	Shore base supplying rigs and boats on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, and other cargo.
Air Transportation	Not Applicable	Helicopter service from Cordova Airport transporting offshore personnel and smal 1 volume, light weight freight to and from rigs on the Middleton and Yakataga Shelves.	Helicopter service from Yakutat Airport transporting offshore personnel and smal 1 volume, light weight freight to and from rigs on the Yakutat Shelf.

Source: Alaska Consultants, Inc. Derived from faci 1 i ty and OCS employment scenarios prepared by Dames and Moore.

TABLE 39

AVERAGE ANNUAL RATE OF EMPLOYMENT GROWTH
BASE CASE AND OCS SCENARIOS
YAKUTAT, CORDOVA AND SEWARD
1978 - 2000

	Base Case	95 Percent Scenario	Mean Scenario	5 Percent Scenario
Yakutat	3%	3%	7%	9%
Cordova	2%	2%	3%	3%
Seward	3%	3%	3%	3%

Source: Alaska Consultants, Inc.

TABLE 40

COMPARATIVE CHANGE IN ESTIMATED MAN YEARS OF EMPLOYMENT
YAKUTAT, CORDOVA AND SEWARD OCS SCENARIOS
1981 2000

	Base Case Total Man Years of Employment	95 Percent Scenario Net Increase	95 Percent Scenario Percent Increase	Mean Scenario Net Increase	Mean Scenario Percent Increase	5 Percent Scenario Net Increase	5 Percent Scenario Percent Increase
Yakutat	8,596	109	1.0	10,868	126	26,526	308
Cordova	3[illegible],844	31	less than 0.1	5,533	15	9,603	20
Seward	34,03	86	less than 0.3	1,608	5	3,043	9

Source: Alaska Consultants, Inc.

Yakutat

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The Yakutat-based exploration effort spans a four-year period, peaking in the opening year of exploration, 1981, and dwindling each year thereafter until exploration is abandoned after 1984. All direct employment stemming from the offshore industry is in the transportation sector, divided between the operations of the marine service base and helicopter services located at Yakutat. These operations, in turn, stimulate a small amount of indirect employment.

At the conclusion of exploration, employment reverts to the patterns forecast under the non-OCS baseline scenario.

Future Employment

In 1981, the peak impact year, OCS-related direct and indirect employment at Yakutat amounts to 52 jobs or about 15 percent of the total estimated employment for that year. The OCS-related employment decreases each of the next three years. This employment impact resembles in pattern but slightly exceeds in scale that experienced at Yakutat during the exploration effort after OCS Sale #39. Table 41 summarizes the annual employment and population impacts forecast to arise from the second

Northeast Gulf of Alaska lease sale. Table 40, which places the lease sale in a twenty-year workforce perspective, indicates that this OCS-related employment will account for about 1 percent of the estimated man-years of employment at Yakutat between 1981-2000 (see also Tables 42 and 43).

Future Population

The demographic impacts on Yakutat parallel the employment effects. Population grows by about 15 percent (or 104 people) at the start of exploration, then tapers down by 1985 to the baseline level predicted under the non-OCS scenario. Thus, there is no lasting effect on long-term population trends attributable to the 95 percent scenario.

Table 41 presents the year-by-year account of OCS-related population growth and Figure 2 illustrates graphically the relative scale of OCS growth in comparison to the non-OCS case.

IMPACT ASSESSMENT

The primary impacts of the 95 percent scenario upon Yakutat will be socio-political rather than upon the community infrastructure.

In terms of demand for public facilities and services, the impact merely advances the pace of community growth by a few years. As Yakutat is, at present, adequately equipped to provide public facilities and services for the forecast population, it does not appear that the 95 percent scenario will place any untoward burden upon the community infrastructure.

Tables 44 to 54 present quantitative estimates of various infrastructural impacts. The transient and modest nature of these impacts makes detailed analysis of each impact category unnecessary.

However, the socio-political impact of the lease sale on Yakutat is prospectively a major issue, for it is only in retrospect that the fruitless outcome of the exploration effort will become apparent. Through the initial period of exploration, it will remain unclear whether Yakutat will experience a shallow boom-bust cycle or the full-scale sustained development and production cycle that ensues under the Mean and 5 percent scenarios. Consequently, community anxiety may become quite acute as the community feels pressure to act, to prepare for an outcome which could range from "business as usual" to sudden, unprecedented growth and expansion. While the suspense prevails, there are few material improvements that the City or community can initiate to cope with extremely rapid growth without also risking the mistake of prematurely committing itself and its resources to projects that may prove unneeded.

FIGURE 2

Yakutat Area
Employment & Resident Population
Base Case & Petroleum Scenarios
1930 - 2000

LEGEND

Base Case
95% Probability Scenario
Mean Probability Scenario
5% Probability Scenario

Source: Alaska Consultants, Inc.

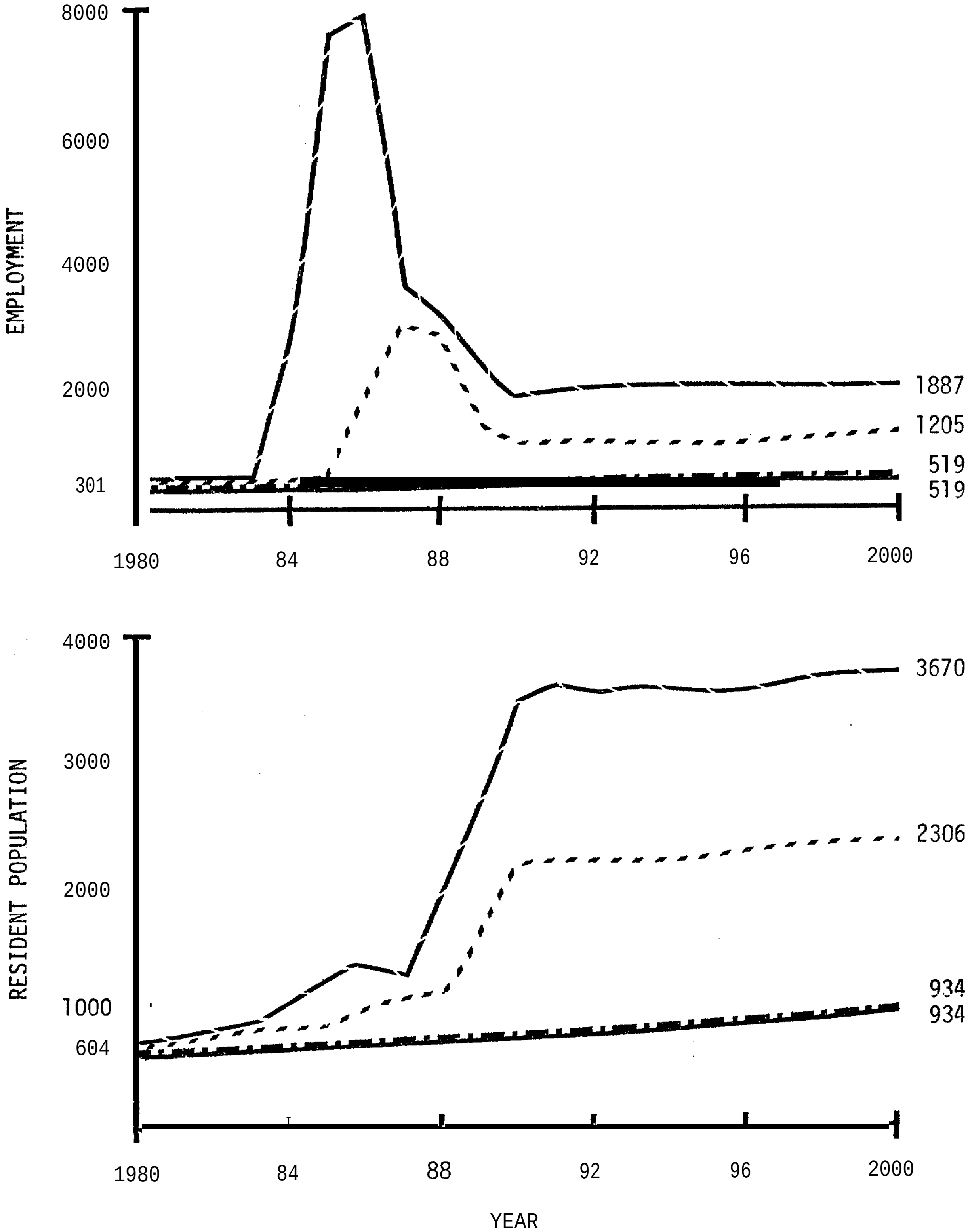


TABLE 41

FORECAST OF EMPLOYMENT AND POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
YAKUTAT AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	115	117	137	137																
Agriculture, Forestry and Fisheries	(46)	(48)	(48)	(50)																
Mining	(2)	(3)	(3)	(2)																
Manufacturing	(51)	(50)	(60)	(60)																
Contract Construction	(16)	(16)	(26)	(25)																
DISTRIBUTIVE INDUSTRIES	145	136	128	124																
Transportation, Communications and Public Utilities	(66)	(55)	(44)	(38)																
Trade	(40)	(41)	(43)	(43)																
Finance, Insurance and Real Estate	(7)	(6)	(6)	(7)																
Service	(32)	(34)	(35)	(36)																
GOVERNMENT	94	93	96	95																
TOTAL EMPLOYMENT	354	346	361	356																
TOTAL POPULATION - YAKUTAT CITY	498	483	465	446																
YAKUTAT AREA	708	692	670	642																

1985 - 2000 is same as Non-OCS Case

Source: Alaska Consultants, Inc.

TABLE 42

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO EXPLORATION ONLY
NORTHERN GULF OF ALASKA - YAKUTAT AREA
1981-2000

Year	Service Base	Helicopter Service: Exploration	Helicopter Service: Development	Helicopter Service: Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
1981	24	15										39
1982	16	10										26
1983	8	5										13
1984	2	1										3
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 43

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA - YAKUTAT
1981 - 2000

Year	Survey	Rigs	Platforms		Supply/Anchor/Tug Boats			Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
			Development Drilling	Operations	Exploration	Development	Production			
1981		168			78					246
1982		112			52					164
1983		56			26					82
1984		18			8					26
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 44

FORECAST OF NET CHANGE IN HOUSING DEMAND
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	2	3	2	0	1
1979	9	6	4	1	1
1980		16	10	2	4
1981	1;:	45	30	5	10
1982	- 16	- 5	- 3	- 1	- 1
1983	- 22	- 7	- 5	- 1	- 1
1984	- 28	- 11	- 7	- ?	- 3
1985	- 3	- 2	- 1	0	- 1
1986	12	5	3	0	2
1987	26	8	5	1	2
1988	16	6	4	1	1
1989	2	1	1	0	0
1990	51	17	12	2	3
1991	19	6	4	1	1
1992	22	7	4	1	2
1993	41	14	10	1	3
1994	19	6	4	1	1
1995	30	10	7	1	2
1996	17	6	4	1	1
1997	8	3	2	0	1
1998	25	8	5	1	2
1999	0	0	0	0	0
2000	7	2	1	0	1
TOTALS	369	144	96	16	32

Source: Alaska Consultants, Inc.

TABLE 45

ESTIMATED DEMAND FOR RESIDENTIAL LAND
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	16	2.9	1.1	4.0
Multifamily & Trailer	9	0.8	0.3	1.1
1981-85				
Single Family	14	2.5	1.0	3.5
Multifamily & Trailer	6	0.5	0.2	0.7
1986-90				
Single Family	25	4.5	1.8	6.3
Multifamily & Trailer	12	1.1	0.4	1.5
1991-95				
Single Family	29	5.2	2.0	7.2
Multifamily & Trailer	14	1.3	0.5	1.8
1996-2000				
Single Family	12	2.2	0.9	3.1
Multifamily & Trailer	7	0.6	0.2	0.8
TOTAL	144	21.6	8.4	30.0

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 46

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
95 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	51	181	231
1979	52	181	233
1980	53	188	241
1981	62	188	250
1982	60	192	252
1983	58	195	253
1984	56	195	251
1985	55	197	252
1986	56	199	255
1987	58	204	262
1988	58	209	267
1989	58	209	267
1990	62	220	282
1991	63	225	288
1992	65	229	294
1993	68	238	306
1994	68	244	312
1995	71	249	320
1996	72	253	325
1997	72	256	328
1998	74	261	335
1999	74	261	335
2000	74	263	337

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 47

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
95 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	51	6.4
1979	52	6.5
1980	53	6.6
1981	62	7.8
1982	60	7.5
1983	58	7.2
1984	56	7.0
1985	55	6.9
1986	56	7.0
1987	58	7.3
1988	58	7.3
1989	58	7.3
1990	62	7.8
1991	63	7.9
1992	65	8.1
1993	68	8.5
1994	68	8.5
1995	71	8.9
1996	72	9.0
1997	72	9.0
1998	74	9.3
1999	74	9.3
2000	74	9.3

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 48

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	1,418
1979	1,469
1980	1,570
1981	1,876
1982	1,868
1983	1,842
1984	1,798
1985	1,821
1986	1,888
1987	1,997
1988	2,079
1989	2,085
1990	2,238
1991	2,295
1992	2,361
1993	2,484
1994	2,541
1995	2,631
1996	2,682
1997	2,706
1998	2,781
1999	2,781
2000	2,802

Source: Alaska Consultants, Inc.

TABLE 49

ESTIMATED DISPOSABLE SOLID WASTES
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	560	3,420
1979	590	3,550
1980	630	3,790
1981	740	4,460
1982	730	4,450
1983	720	4,390
1984	710	4,320
1985		
1986		
1987		
1988		
1989		
1990	1985-2000 is same as Base Case	
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 50

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	183	229	3
1979	1.26	189	238	9
1980	1.27	205	260	22
1981	1.28	250	230	
1982	1.29	245	316	-6:
1983	1.30	238	309	- 7
1984	1.31	227	297	- 14
1985	1.32	225	297	0
1986	1.33	230	306	9
1987	1.34	238	319	13
1988	1.35	244	329	10
1989	1.36	245	333	4
1990	1.37	262	359	26
1991	1.38	268	370	11
1992	1.39	275	382	12
1993	1.40	289	405	23
1994	1.40	295	413	8
1995	1.40	305	427	14
1996	1.40	311	435	8
1997	1.40	314	440	5
1998	1.40	322	451	11
1999	1.40	322	451	0
2000	1.40	324	454	3

Source: Alaska Consultants, Inc.

TABLE 51

SCHOOL ENROLLMENT FORECAST
95 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978- 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	92	61	153
1979	90	60	150
1980		60	151
1981	1;;	68	170
1982	95	64	159
1983	88	59	147
1984	81	54	135
1985	77	51	128
1986	78	52	130
1987	81	54	135
1988	83	56	139
1989	83	56	139
1990	89	60	149
1991	92	61	153
1992		63	157
1993	1::	66	166
1994	101	68	169
1995	105	70	175
1996	107	72	179
1997	108	72	180
1998	111	74	185
1999	111	74	185
2000	112	75	187

Source: Alaska Consultants, Inc.

TABLE 52

FORECAST OF YAKUTAT SCHOOL DISTRICT REVENUES
95 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	153	$13	$ 623	$13	$ 649
1979	150	13	647	13	673
1980	151	14	691	14	719
1981	170	17	824	17	858
1982	159	17	817	17	851
1983	147	17	801	17	835
1984	135	16	780	16	812
1985	128	16	783	16	815
1986	130	18	843	18	879
1987	135	19	928	19	966
1988	139	21	1,013	21	1,055
1989	139	22	1,074	22	1,?18
1990	149	25	1,220	25	1,270
1991	153	28	1,328	28	1,384
1992	157	30	1,445	30	1,505
1993	166	34	1,619	34	1,687
1994	169	36	1,747	36	1,819
1995	175	40	1,918	40	1,998
1996	179	43	2,080	43	2,166
1997	180	46	2,217	46	2,309
1998	185	50	2,415	50	2,515
1999	185	53	2,560	53	2,666
2000	187	57	2,743	57	2,857

Source: Alaska Consultants, Inc.

TABLE 53

GENERAL FUND
REVENUE FORECAST
95 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Others/	Total
1978	$139	$50	$88	$80	$ 357
1979	149	54		85	383
1980	164	59	1:;		421
1981	203	73	129	1?;	522
1982	208	75	132	120	535
1983	213	77	135	122	547
1984	216	78	137	125	556
1985	228	82	145	131	586
1986	245	88	155	140	628
1987	268		170	153	687
1988	289	1 %	183	165	741
1989	307	110	194	175	786
1990	343	123	217	196	879
1991	371	133	235	212	951
1992	402	144	254	230	1,030
1993	443	159	281	254	1,137
1994	478	172	303	274	1,227
1995	521	187	330	298	1,336
1996	561	201	355	321	1,438
1997	599	215	379	343	1,536
1998	649	233	411	371	1,664
1999	688	247	436	394	1,765
2000	734	263	465	420	1,882

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 54

FORECAST OF REVENUES AND OPERATING EXPENDITURES
95 PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$139	$ 218	$ 357	$ 289	$13	$ 302	$ 55
1979	149	234	383	310	13	323	60
1980	164	257	421	340	14	354	67
1981	203	319	522	422	17	439	83
1982	208	327	535	435	17	452	83
1983	213	334	547	443	17	460	87
1984	216	340	556	451	16	467	89
1985	228	358	586	474	16	490	96
1986	245	383	628	509	18	527	101
1987	268	419	687	556	19	575	112
1988	289	452	741	599	21	620	121
1989	307	479	786	636	22	658	128
1990	343	539	879	712	25	737	142
1991	371	580	951	770	28	798	153
1992	402	628	1,030	834	30	864	166
1993	443	694	1,137	920	34	954	183
1994	478	749	1,227	993	36	1,029	198
1995	521	815	1,336	1,081	40	1,121	215
1996	561	877	1,438	1,164	43	1,207	231
1997	599	937	1,536	1,243	46	1,289	247
1998	649	1,015	1,664	1,347	50	1,397	267
1999	688	1,077	1,765	1,428	53	1,481	284
2000	734	1,148	1,882	1,524	57	1,581	301

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues

Source: Alaska Consultants, Inc.

Cordova

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The material impact of the 95 percent scenario upon the employment, population and community infrastructure of Cordova is practicably imperceptible (see Figure 3). According to the forecast presented in Table 55, the 95 percent scenario is estimated to generate a peak of 11 additional jobs and 22 additional residents in 1982 and 1983, fading to no impact by 1985 after exploration shutdown (see Tables 56 and 57). This amounts to a trivial part (less than 1 percent) of Cordova's employment and population base and will cause a negligible increase in the demand for public services and facilities (see Tables 58 to 68). In that perspective, the quantitative impacts of the 95 percent scenario were deemed too insignificant to merit full-scale analysis.

Cordova, like Yakutat, will confront a period of uncertainty while it awaits the results of exploratory drilling that will indicate whether the leases will yield a bonanza or a bust and, in turn, whether Cordova will be significantly or lightly affected. Even so, Cordova, by virtue of its broader employment base and greater distance from the prime lease areas, is relatively less susceptible to extreme fluctuations in OCS-related economic activities and associated stresses on community facilities and services.

FIGURE 3

Cordova Area
Employment & Resident Population
Base Case & Petroleum Scenarios
1980 - 2000

LEGEND

Base Case
95% Probability Scenario
Mean Probability Scenario
5% Probability Scenario

Source: Alaska Consultants, Inc.

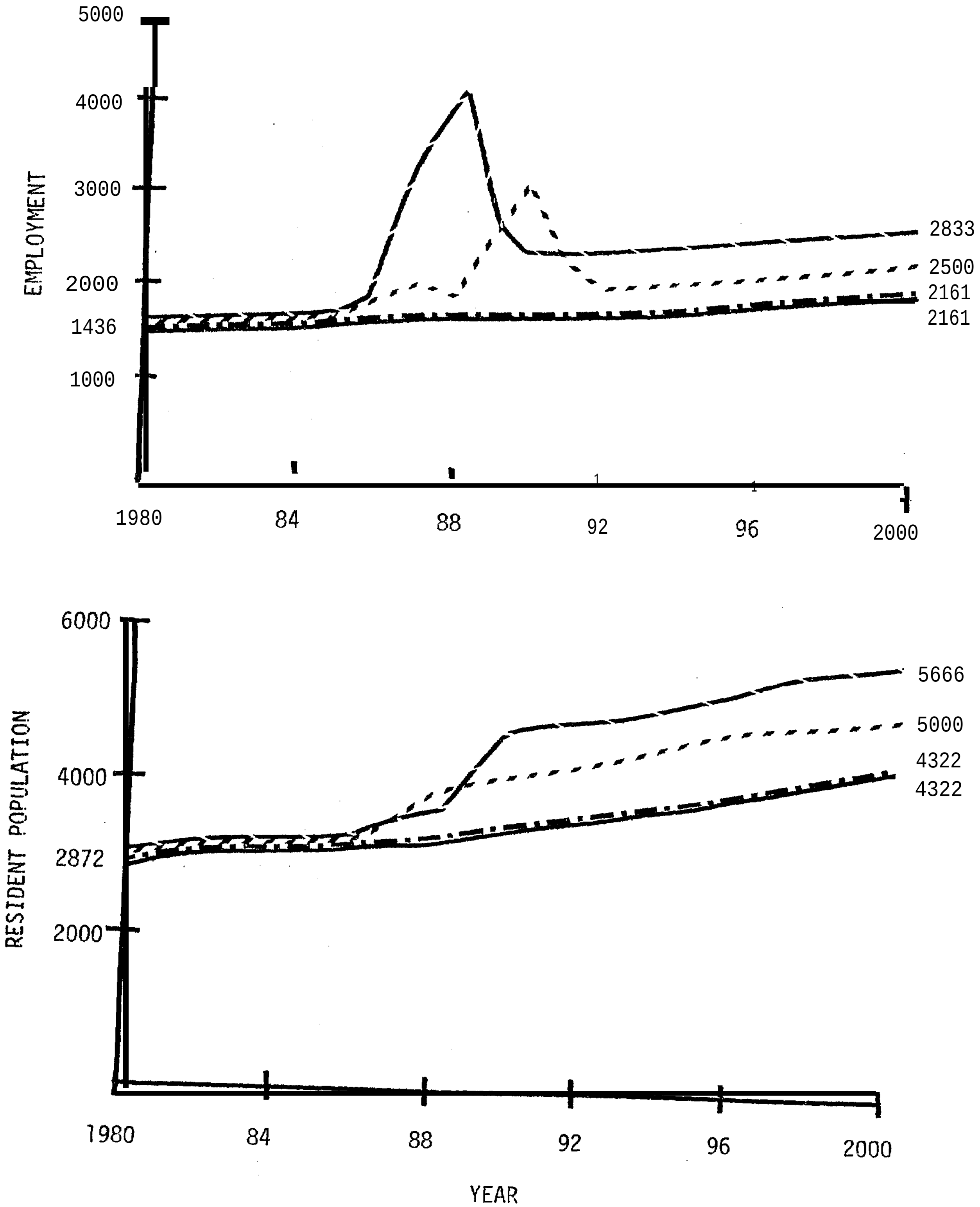


TABLE 55

FORECAST OF EMPLOYMENT AND POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
COROOVA AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUC ING INDUSTRIES	732	743	753	765																
Agriculture, Forestry and Fisheries	(418)	(424)	(430)	(436)																
Mining	(2)	(2)	(2)	(3)																
Manufacturing	(289)	(293)	(297)	(301)																
Contract Construction	(23)	(24)	(24)	(25)																
DISTRIBUTIVE INDUSTRIES	371	387	398	400																
Transportation. Communications and Public Utilities	(80)	(86)	(87)	(81)																
Trade	(161)	(166)	(171)	(175)																
Finance, Insurance and Real Estate	(34)	(35)	(36)	(36)																
Service	(96)	(100)	(104)	(108)																
GOVERNMENT	404	408	412	416																
TOTAL EMPLOYMENT	1,507	1,538	1,563	1,581																
TOTAL POPULATION -																				
COROOVA Cl TY	2,455	2,506	2,547	2,576																
CORDOVA AREA	3,014	3,076	3,126	3,162																

1985 - 2000 is same as Non-OCS Case

Source: Alaska Consultants, Inc.

TABLE 56

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO EXPLORATION ONLY
NORTHERN GULF OF ALASKA - CORDOVA AREA
1981 - 2000

Year	Service Base	Helicopter Service: Exploration	Helicopter Service: Development	Helicopter Service: Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
1981		5										5
1982		10										10
1983		10										10
1984		3										3
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 57

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA - CORDOVA
1981 - 2000

Year	Survey Rigs	Platforms		Supply/Anchor/Tug Boats			Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
		Development Drilling	Operations	Exploration	Development	Production			
1981									56
1982	17!								112
1983	112								112
1984	29								29
1985									
1986									
1987									
1988									
1989									
1990									
1991									
1992									
1993									
1994									
1995									
1996									
1997									
1998									
1999									
2000									

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 58

FORECAST OF NET CHANGE IN HOUSING DEMAND
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978- 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	82	27	14	8	5
1980	28	10	5	3	2
1981	142	48	24	14	10
1982	62	21	11	6	4
1983	50	17	8	5	4
1984	36	10	5	3	2
1985	46	16	8	4	4
1986	56	19	10	5	4
1987	58	19	10	5	4
1988	60	20	10	6	4
1989	58	19	10	5	4
1990	58	19	10	5	4
1991	70	23	12	6	5
1992	74	25	13	7	5
1993	72	24	12	7	5
1994	80	27	14	8	5
1995	78	26	13	8	5
1996	82	27	14	8	5
1997	90	30	15	9	6
1998	90	30	15	9	6
1999	86	29	15	8	6
2000	102	34	17	10	7
TOTALS	1,560	520	265	149	106

Source: Alaska Consultants, Inc.

TABLE 59

ESTIMATED DEMAND FOR RESIDENTIAL LAND
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	19	2.7	1.1	3.8
Multifamily & Trailer	18	1.3	0.5	1.8
1981-85				
Single Family	56	8.1	3.1	11.2
Multifamily & Trailer	56	4.0	1.6	5.6
1986-90				
Single Family	50	7.2	2.8	10.0
Multifamily & Trailer	46	3.3	1.3	4.6
1991-95				
Single Family	64	9.2	3.6	12.8
Multifamily & Trailer	61	4.4	1.7	6.1
1996-2000				
Single Family	76	10.9	4.3	15.2
Multifamily & Trailer	74	5.3	2.1	7.4
TOTAL	520	56.4	22.1	78.5

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 60

PROJECTED CAPACITY REQUIREMENTS
MATER SUPPLY SYSTEM
95 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978- 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	281	984	1,265
1979	290	1,014	1,304
1980	292	1,024	1,316
1981	307	1,070	1,377
1982	313	1,088	1,401
1983	318	1,106	1,424
1984	322	1,125	1,447
1985	327	1,143	1,470
1986	332	1,163	1,495
1987	338	1,184	1,522
1988	344	1,205	1,549
1989	350	1,226	1,576
1990	356	1,247	1,603
1991	363	1,272	1,635
1992	371	1,298	1,669
1993	378	1,324	1,702
1994	386	1,352	1,738
1995	394	1,380	1,774
1996	403	1,409	1,812
1997	412	1,441	1,853
1998	420	1,472	1,892
1999	430	1,504	1,934
2000	440	1,540	1,980

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 61

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
95 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	281	35.1
1979	290	36.2
1980	292	36.5
1981	307	38.4
1982	313	39.1
1983	318	39.8
1984	322	40.2
1985	327	40.9
1986	332	41.5
1987	338	42.3
1988	344	43.0
1989	350	43.8
1990	356	44.5
1991	363	45.4
1992	371	46.4
1993	378	47.3
1994	386	48.2
1995	394	49.2
1996	403	50.4
1997	412	51.5
1998	420	52.5
1999	430	53.8
2000	440	55.0

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 62

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978- 2000

Year	Estimated Capacity Requirements in kw's
1978	6,905
1979	7,252
1980	7,467
1981	7,987
1982	8,305
1983	8,596
1984	8,854
1985	9,143
1986	9,466
1987	9,800
1988	10,146
1989	10,320
1990	10,494
1991	10,704
1992	10,926
1993	11,142
1994	11,362
1995	11,616
1996	11,862
1997	12,132
1998	12,390
1999	12,660
2000	12,966

Source: Alaska Consultants, Inc.

TABLE 63

ESTIMATED DISPOSABLE SOLID WASTES
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,750	16,700
1979	2,890	17,500
1980	2,980	18,000
1981	3,170	19,000
1982	3,260	19,800
1983	3,380	20,500
1984	3,510	21,300
1985		
1986		
1987		
1988		
1989		
1990	1985-2000 is same as Base Case	
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 64

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978- 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	640	800	--
1979	1.26	667	840	40
1980	1.27	677	860	20
1981	1.28	725	928	68
1982	1.29	746	962	34
1983	1.30	763	992	30
1984	1.31	773	1,013	21
1985	1.32	789	1,041	28
1986	1.33	808	1,075	34
1987	1.34	827	1,108	33
1988	1.35	847	1,143	35
1989	1.36	866	1,178	35
1990	1.37	885	1,212	34
1991	1.38	908	1,253	41
1992	1.39	933	1,297	44
1993	1.40	957	1,340	43
1994	1.40	984	1,378	38
1995	1.40	1,010	1,414	36
1996	1.40	1,037	1,452	38
1997	1.40	1,067	1,494	42
1998	1.40	1,096	1,534	40
1999	1.40	1,126	1,576	42
2000	1.40	1,160	1,624	48

Source: Alaska Consultants, Inc.

TABLE 65

SCHOOL ENROLLMENT FORECAST
95 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	331	221	552
1979	341	228	569
1980	345	229	574
1981	362	241	603
1982	369	246	615
1983	375	250	625
1984	379	253	632
1985	385	257	642
1986	392	261	653
1987	399	265	664
1988	406	270	676
1989	413	275	688
1990	420	280	700
1991	428	286	714
1992	437	291	728
1993	446	297	743
1994	455	304	759
1995	465	309	774
1996	474	317	791
1997	485	324	809
1998	496	330	826
1999	506	338	844
2000	519	345	864

Source: Alaska Consultants, Inc.

TABLE 66

FORECAST OF CORDOVA SCHOOL DISTRICT REVENUES
95 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978- 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	552	$ 205	$1,638	$25	$1,868
1979	569	224	1,789	27	2,040
1980	574	239	1,913	29	2,181
1981	603	266	2,131	33	2,430
1982	615	287	2,303	35	2,625
1983	625	310	2,481	38	2,829
1984	632	333	2,623	41	2,997
1985	642	358	2,863	43	3,264
1986	653	386	3,088	47	3,521
1987	664	416	3,327	50	3,793
1988	676	449	3,591	54	4,094
1989	688	484	3,874	59	4,417
1990	700	522	4,178	63	4,763
1991	714	565	4,518	68	5,151
1992	728	610	4,883	74	5,567
1993	743	660	5,282	80	6,022
1994	759	715	5,720	87	6,522
1995	774	773	6,?83	94	7,050
1996	791	837	6,697	101	7,635
1997	809	908	7,262	110	8,280
1998	826	982	7,859	119	8,960
1999	844	1,064	8,512	129	9,705
2000	864	1,111	8,887	135	10,133

Source: Alaska Consultants, Inc.

TABLE 67

GENERAL FUND
REVENUE FORECAST
95 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
'1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 381	$ 191	$ 545	$ 403	$1,520
1979	415	208	595	404	1,658
1980	445	223	637	471	1,776
1981	494	248	708	523	1,973
1982	534	268	766 ,	566	2,134
1983	576	289	825	610	2,300
1984	618	310	885	655	2,468
1985	665	333	952	704	2,654
1986	717	359	1,026	759	2,861
1987	773	388	1,107	819	3,087
1988	834	418	1,195	883	3,330
1969	900	451	1,288	952	3,591
1990	970	486	1,389	1,027	3,872
1991	1,049	526	1,501	1,110	4,186
1992	1,135	569	1,625	1,201	4,530
1993	1,226	615	1,756	1,298	4,895
1994	1,328	666	1,901	1,406	5,301
1995	1,437	720	2,057	1,521	5,735
1996	1,555	780	2,227	1,646	6,208
1997	1,686	845	2,414	1,784	6,729
1998	1,825	915	2,613	1,932	7,285
1999	1,977	991	2,830	2,092	7,890
2000	2,146	1,076	3,072	2,271	8,565

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 68

FORECAST OF REVENUES AND OPERATING EXPENDITURES
95 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Availab for Capit Improvemen
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$ 381	$1,139	$1,520	$1,261	$ 205	$1,466	$ 54
1979	415	1,243	1,658	1,376	224	1,600	58
1980	445	1,331	1,776	1,474	239	1,713	63
1981	494	1,479	1,973	1,637	266	1,903	70
1982	534	1,600	2,134	1,771	287	2,058	76
1983	576	1,724	2,300	1,908	310	2,218	82
1984	618	1,850	2,468	2,047	333	2,380	889
1985	665	1,989	2,654	2,203	358	2,561	93
1986	717	2,144	2,861	2,376	386	2,762	99
1987	773	2,314	3,087	2,563	416	2,979	108
1988	834	2,496	3,330	2,766	449	3,215	115
1989	900	2,691	3,591	2,981	484	3,465	126
1990	970	2,902	3,872	3,213	522	3,735	1374
1991	1,049	3,137	4,186	3,475	565	4,040	146
1992	1,135	3,395	4,530	3,760	610	4,370	160
1993	1,226	3,669	4,895	4,065	' 660	4,725	170
1994	1,328	3,973	5,301	4,400	715	5,115	186
1995	1,437	4,298	5,735	4,761	773	5,534	201
1996	1,555	4,653	6,208	5,154	837	5,991	2179
1997	1,686	5,043	6,729	5,587	908	6,495	234
1998	1,825	5,460	7,285	6,048	982	7,030	255
1999	1,977	5,913	7,890	6,551	1,064	7,615	275
2000	2,146	6,419	8,565	7,112	1,111	8,223	342

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

Seward

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The 95 percent scenario is estimated to stimulate a brief period of minor economic growth at Seward. According to the forecast presented in Table 69, the exploration effort will add up to a total of 32 jobs to Seward's employment base in 1982, with fewer jobs in earlier and later years. The OCS-related direct employment will be connected with marine service base operations. At peak, OCS-related employment under the 95 percent scenario is not expected to add as much as 3 percent of Seward's overall employment base. Such impact as will be felt will be spread over the 1981-1984 period, after which conditions are forecast to return to those that prevail under the non-OCS base case (see Figure 4 and Tables 70 and 71).

This minor growth impact will have only a very marginal effect on the overall demand for public services (see Tables 72 to 82). Possibly, if power and wastewater treatment facilities are still substandard in the early 1980's, OCS impact may add some measure of urgency to ongoing efforts to resolve these problems.

Seward basically resembles Cordova rather than Yakutat in regard to the inherent uncertainty about the ultimate outcome of lease exploration.

That is, Seward has a larger economic base within which to absorb OCS-related growth. Furthermore, under all scenarios Seward is less affected in absolute and relative terms than either Yakutat or Cordova. Therefore, the problems of coping with the future development requirements of the offshore industries should be of less public concern.

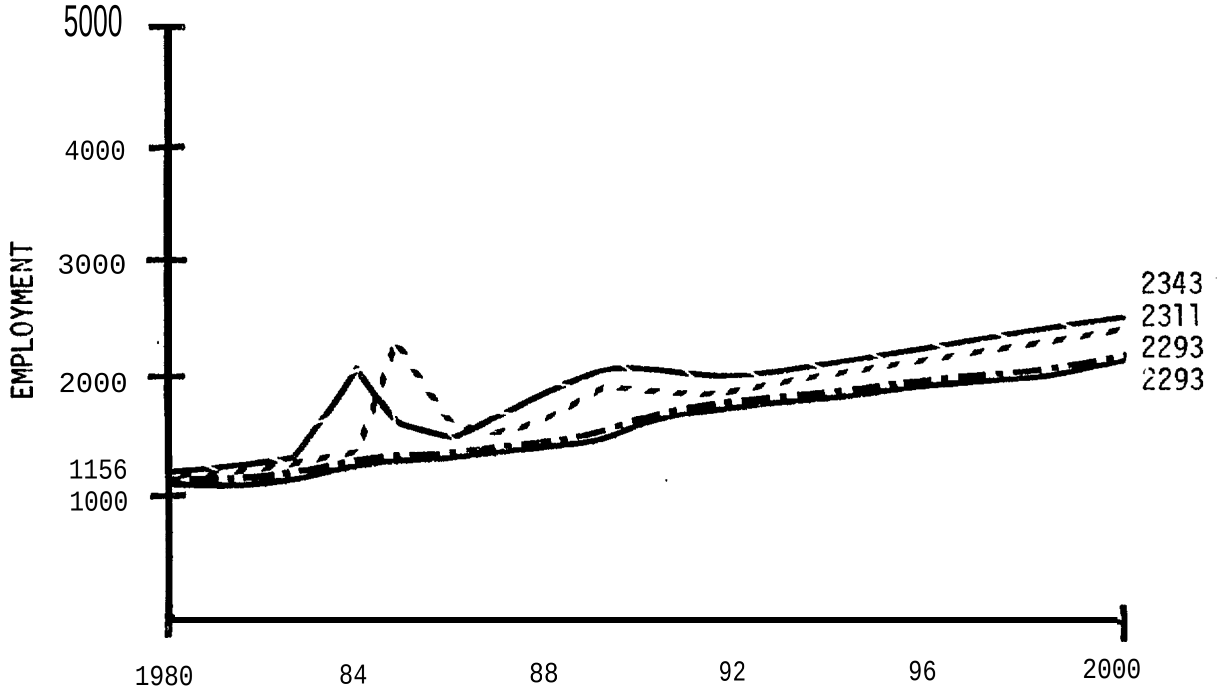
FIGURE 4

Seward Area
Employment & Resident Population
Base Case & Petroleum Scenarios
1980 - 2000

LEGEND

Base Case
95% Probability Scenario-=-~-
Mean Probability Scenario
5% Probability Scenario.

Source: Alaska Consultants, Inc.



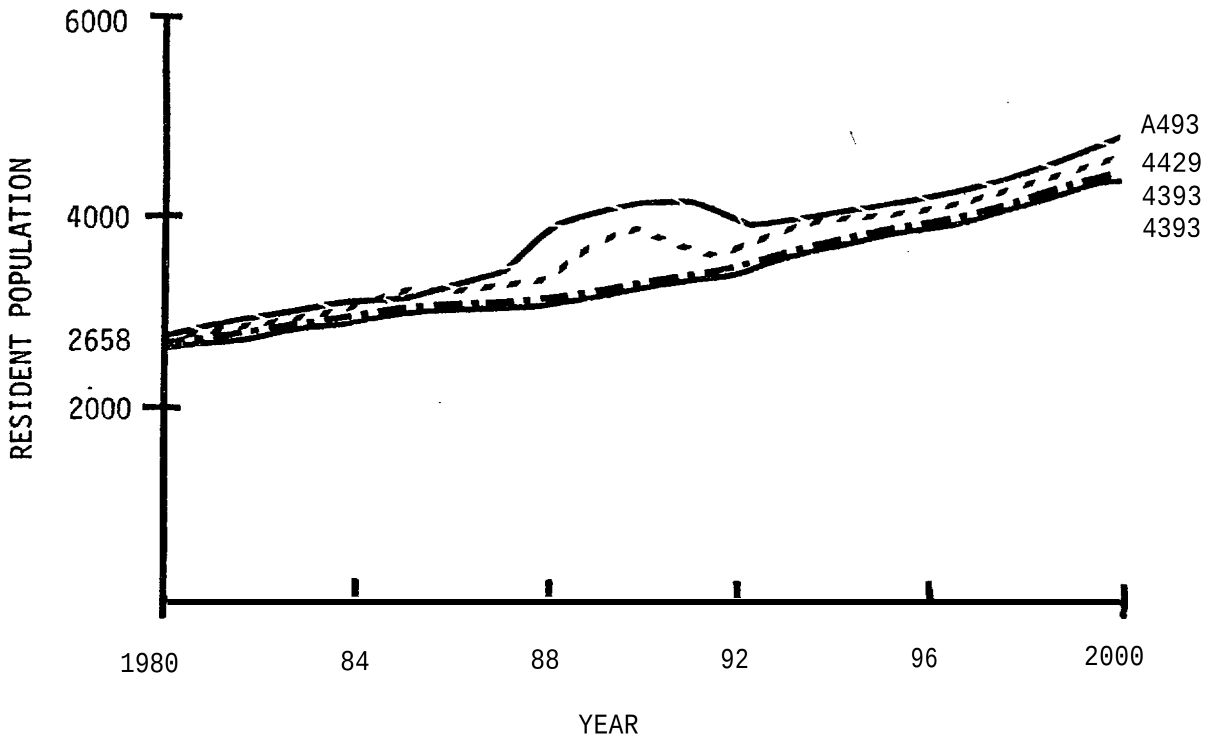


TABLE 69

FORECAST OF EMPLOYMENT AND POPULAT I ON
9S PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
SEWARD AREA
1981 - 2000

INDUSTRY CLASSIFICATION	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	256	258	279	324																
Agriculture, Forestry and Fisheries	(103)	(104)	(120)	(140)																
Mining	(3)	(4)	(9)	(4)																
Manufacturing	(121)	(101)	(125)	(150)																
Contract Construction	(29)	(49)	(30)	(30)																
DISTRIBUTIVE INDUSTRIES	522	539	548	549																
Transportation, Communications and Public Utilities	(81)	(91)	(89)	(78)																
Trade	(238)	(240)	(247)	(253)																
Finance, Insurance and Real Estate	(22)	(24)	(23)	(24)																
Service	(181)	(184)	(189)	(194)																
GOVERNMENT	414	423	431	438																
TOTAL EMPLOYMENT	1,192	1,220	1,258	,311																
TOTAL POPULATION																				
SEWARD CITY	2,058	2,103	2,135	2,191																
SEWARD AREA	2,736	2,796	2,838	2,912																

1985 - 2000 is same as Non-OCS Case

Source, Alaska Consultants, Inc.

TABLE 70

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Service Base	Helicopter Service: Exploration	Helicopter Service: Development	Helicopter Service: Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
1981	13											13
1982	21											21
1983	17											17
1984	5											5
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 71

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA - SEWARD
1981 - 2000

Year	Survey	Rigs	Platforms: Development Drilling	Platforms: Operations	Supply/Anchor/Tug Boats: Exploration	Supply/Anchor/Tug Boats: Development	Supply/Anchor/Tug Boats: Production	Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
1981	21				26					47
1982	21				52					73
1983	15				52					67
1984	17				14					18
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 72

FORECAST OF NET CHANGE IN HOUSING DEMAND
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	12	5	3	1	1
1980	46	17	11	5	1
1981	77	30	20	9	1
1982	61	24	16	7	1
1983	42	15	10	4	1
1984		27	18	8	1
1985	1;:	49	33	14	2
1986	11	4	3	1	0
1987	12	5	3	1	1
1988	13	5	3	1	1
1989	165	63	42	18	3
1990	142	54	36	15	3
1991	32	12	8	3	1
1992		13	9	4	0
1993	1;;	40	27	11	2
1994	107	41	27	12	2
1995	111	42	28	12	2
1996	116	44	29	13	2
1997	121	46	31	13	2
1998	122	46	31	13	2
1999	128	49	33	14	2
2000	135	51	34	15	2
TOTALS	1,793	682	455	194	33

Source: Alaska Consultants, Inc.

TABLE 73

ESTIMATED DEMAND FOR RESIDENTIAL LAND
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	14	2.0	0.8	2.8
Multifamily & Trailer	8	0.6	0.2	0.8
1981-85				
Single Family	97	14.0	5.4	19.4
Multifamily & Trailer	48	3.5	1.3	4.8
1986-90				
Single Family	87	12.5	4.9	17.4
Multifamily & Trailer	44	3.2	1.2	4.4
1991-95				
Single Family	99	14.3	5.5	19.8
Multifamily & Trailer	49	3.5	1.4	4.9
1996-2000				
Single Family	158	22.8	8.8	31.6
Multifamily & Trailer	78	5.6	2.2	7.8
TOTAL	682	82.0	31.7	113.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 74

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
95 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	245	1,369	1,614
1979	246	1,375	1,621
1980	250	1,400	1,650
1981	257	1,419	1,676
1982	263	1,438	1,701
1983	267	1,467	1,734
1984	274	1,526	1,800
1985	286	1,602	1,888
1986	287	1,607	1,894
1987	288	1,614	1,902
1988	289	1,621	1,910
1989	305	1,707	2,012
1990	318	1,782	2,100
1991	321	1,799	2,120
1992	324	1,817	2,141
1993	334	1,871	2,205
1994	344	1,927	2,271
1995	355	1,986	2,341
1996	366	2,046	2,412
1997	377	2,110	2,487
1998	388	2,175	2,563
1999	400	2,242	2,642
2000	413	2,314	2,727

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 75

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
95 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	245	30.6
1979	246	30.8
1980	250	31.3
1981	257	32.1
1982	263	32.9
1983	267	33.4
1984	274	34.2
1985	286	35.8
1986	287	35.9
1987	288	36.0
1988	289	36.1
1989	305	38.1
1990	318	39.8
1991	321	40.1
1992	324	40.5
1993	334	41.7
1994	344	43.0
1995	355	44.4
1996	366	45.8
1997	377	47.1
1998	388	48.5
1999	400	50.0
2000	413	51.6

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 76

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	6,500
1979	6,601
1980	6,911
1981	7,250
1982	7,549
1983	7,804
1984	8,154
1985	8,667
1986	8,851
1987	9,039
1988	9,231
1989	9,726
1990	10,152
1991	10,248
1992	10,347
1993	10,659
1994	10,980
1995	11,313
1996	11,661
1997	12,024
1998	12,390
1999	12,774
2000	13,179

Source: Alaska Consultants, Inc.

TABLE 77

ESTIMATED DISPOSABLE SOLID WASTES
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,590	15,700
1979	2,650	16,100
1980	2,750	16,700
1981	2,850	17,200
1982	2,960	18,000
1983	3,070	18,600
1984	3,230	19,600
1985		
1986		
1987		
1988		
1989		
1990	1985-2000 is same as Base Case	
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 78

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978- 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	990	1,238	--
1979	1.26	995	1,254	16
1980	1.27	1,012	1,285	31
1981	1.28	1,042	1,334	49
1982	1.29	1,066	1,375	41
1983	1.30	1,081	1,405	30
1984	1.31	1,108	1,451	46
1985	1.32	1,157	1,527	76
1986	1.33	1,161	1,544	17
1987	1.34	1,166	1,562	18
1988	1.35	1,171	1,581	19
1989	1.36	1,234	1,678	97
1990	1.37	1,288	1,765	87
1991	1.38	1,300	1,794	29
1992	1.39	1,313	1,825	31
1993	1.40	1,353	1,894	69
1994	1.40	1,394	1,952	58
1995	1.40	1,436	2,010	58
1996	1.40	1,480	2,072	62
1997	1.40	1,526	2,136	64
1998	1.40	1,572	2,201	65
1999	1.40	1,621	2,269	68
2000	1.40	1,672	2,341	72

Source: Alaska Consultants, Inc.

TABLE 79

SCHOOL ENROLLMENT FORECAST
95 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	312	168	480
1979	313	169	482
1980	319	172	491
1981	329	177	506
1982	336	181	517
1983	341	784	525
1984	350	189	539
1985	365	196	561
1986	366	197	563
1987	368	198	566
1988	369	199	568
1989	389	209	598
1990	406	219	625
1991	410	221	631
1992	414	223	637
1993	426	230	656
1994	439	237	676
1995	453	243	696
1996	466	251	717
1997	481	259	740
1998	496	266	762
1999	511	275	786
2000	527	284	811

Source: Alaska Consultants, Inc.

TABLE 80

FORECAST OF SEWARD SCHOOL DISTRICT REVENUES
95 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD a/
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$.515	$1,157	$28	$1,700
1979	482	548	1,231	30	1,809
1980	491	591	1,329	32	1,952
1981	506	647	1,452	35	2,134
1982	517	700	1,572	38	2,310
1983	525	754	1,693	41	2,488
1984	539	821	1,843	45	2,709
1985	561	904	2,032	49	2,985
1986	563	962	2,162	52	3,176
1987	566	1,025	2,303	56	3,384
1988	568	1,090	2,450	59	3,599
1989	598	1,217	2,735	66	4,018
1990	625	1,348	3,030	73	4,451
1991	631	1,443	3,243	79	4,765
1992	637	1,544	3,470	84	5,098
1993	656	1,685	3,788		5,565
1994	676	1,841	4,137	1::	6,078
1995	696	2,009	4,515	110	6,634
1996	717	2,194	4,930	120	7,244
1997	740	2,400	5,394	131	7,925
1998	762	2,620	5,888	143	8,651
1999	786	2,864	6,437	156	9,457
2000	811	3,014	6,774	164	9,952

a/ The City of Seward does not raise any direct revenues for school purposes. The Kenai Peninsula Borough funds and operates a boroughwide school system. This table presents Seward's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes.

Source: Alaska Consultants, Inc.

TABLE 81

GENERAL FUND
REVENUE FORECAST
95 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 536	N/A	$ 354	$ 649	$1,539
1979	571	N/A	377	691	1,639
1980	616	N/A	407	745	1,768
1981	672	N/A	443	814	1,929
1982	727	N/A	480	881	2,088
1983	783	N/A	517	948	2,248
1984	852	N/A	563	1,032	2,447
1985	943	N/A	623	1,141	2,707
1986	1,003	N/A	662	1,214	2,879
1987	1,068	N/A	705	1,292	3,065
1988	1,137	N/A	751	1,375	3,263
1989	1,269	N/A	838	1,535	3,642
1990	1,405	N/A	927	1,699	4,031
1991	1,503	N/A	992	1,818	4,313
1992	1,609	N/A	1,062	1,946	4,617
1993	1,756	N/A	1,159	2,124	5,039
1994	1,918	N/A	1,266	2,320	5,504
1995	2,095	N/A	1,383	2,534	6,012
1996	2,289	N/A	1,511	2,768	6,568
1997	2,501	N/A	1,650	3,025	7,176
1998	2,732	N/A	1,804	3,305	7,841
1999	2,987	N/A	1,971	3,612	8,570
2000	3,266	N/A	2,156	3,950	9,372

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 82

FORECAST OF REVENUES AND OPERATING EXPENDITURES
95 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements a/
	Property Tax	Other Revenues	Total a/	City Operations	school Support	Total b/ b/	
* 1978	$ 536	$1,003	$1,539	$1,432	$ 515	$1,947	$ 107
1979	571	1,068	1,639	1,525	548	2,073	114
1980	616	1,152	1,768	1,646	591	2,237	122
1981	672	1,257	1,929	1,794	647	2,441	135
1982	727	1,361	2,088	1,943	700	2,643	145
1983	783	1,465	2,248	2,091	754	2,845	157
1984	852	1,595	2,447	2,276	821	3,097	171
1985	943	1,764	2,707	2,519	904	3,423	188
1986	1,003	1,876	2,879	2,680	962	3,642	199
1987	1,068	1,997	3,065	2,852	1,025	3,877	213
1988	1,137	2,126	3,263	3,036	1,090	4,126	227
1989	1,269	2,373	3,642	3,389	1,217	4,606	253
1990	1,405	2,626	4,031	3,751	1,348	5,099	280
1991	1,503	2,810	4,313	4,041	1,443	5,484	272
1992	1,609	3,008	4,617	4,296	1,544	5,840	321
1993	1,756	3,283	5,039	4,691	1,685	6,376	348
1994	1,918	3,586	5,504	5,122	1,841	6,963	382
1995	2,095	3,917	6,012	5,594	2,009	7,603	418
1996	2,289	4,279	6,568	6,111	2,194	8,305	457
1997	2,501	4,675	7,176	6,680	2,400	9,080	496
1998	2,732	5,109	7,841	7,296	2,620	9,916	545
1999	2,987	5,583	8,470	7,975	2,864	10,839	595
2000	3,266	6,106	9,372	8,722	3,014	11,736	650

a/ Includes intergovernmental revenues and miscellaneous other revenues.
b/ The City of Seward does not make any direct expenditures for school support. The Kenai Peninsula Borough funds and operates a boroughwide school system. The figure for school support represents Seward's projected pro rata share of the Kenai Peninsula Borough's school expenditures but is not actually to be included in the City's budget.

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - MEAN SCENARIO

Introduction

The statistical mean resource probability scenario assumes that exploration will lead to discovery of nine commercial oil and gas fields on the Yakutat Shelf and Middleton Shelf. These fields will be developed with the offshore production platforms, submarine pipelines and onshore oil storage terminals and trans-shipment facilities required for production. The coastal communities of Yakutat, Cordova and Seward will each be called upon to provide logistic and other support functions for exploration and field development and production (see Figures 5 and 6 and Table 83).

Furthermore, under this scenario, the Yakutat and Cordova areas will each provide sites for a marine terminal for trans-shipment of crude oil and for a natural gas liquefaction plant. These projects will entail major construction programs employing large temporary workforces and then sizable permanent workforces for terminal and plant operation. The onshore product handling facilities and their permanent employment specified under this scenario by Dames and Moore are as follows:

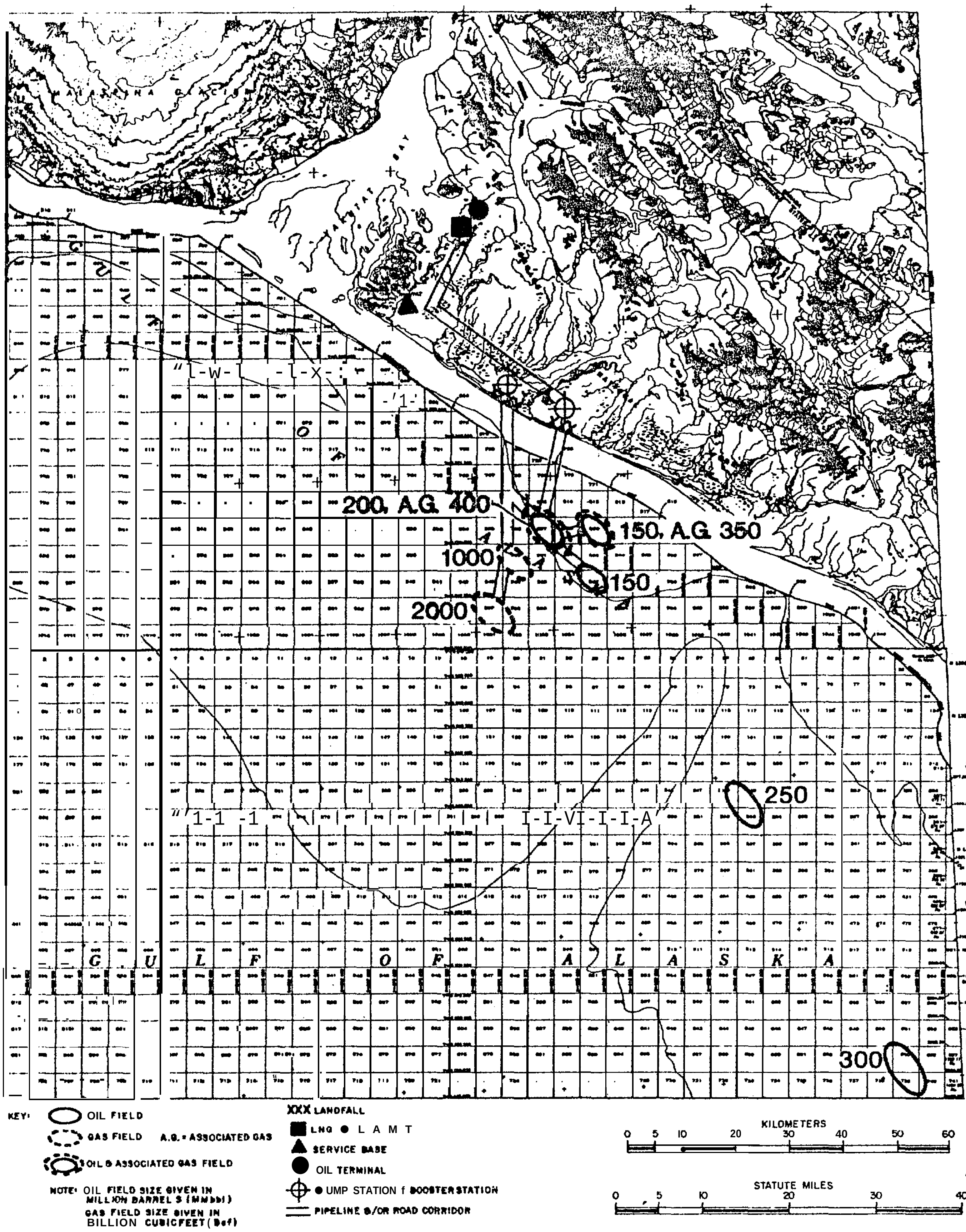
- Yakutat oil terminal: 250,000 barrels per day capacity, 240 permanent jobs.
- Yakutat LNG plant: 1 billion cubic feet per day capacity, 42 permanent jobs.

- Hinchinbrook Island (Cordova) oil terminal: 100 000 barrels per day capacity, 160 permanent jobs.
- Hinchinbrook Island (Cordova) LNG plant: .3 billion cubic feet per day capacity, 28 permanent jobs.

According to the forecasts developed upon the premises of the mean scenario, the timing and scale of OCS-related growth is characteristically different for each of the three coastal communities. The specific role each community comes to play is determined largely by the assets it possesses of value to the offshore industries, especially its location in relation to the hypothesized oil and gas discoveries.

FIGURE 5

YAKUTAT SHELF AREA



SOURCE: DAMES & MOORE

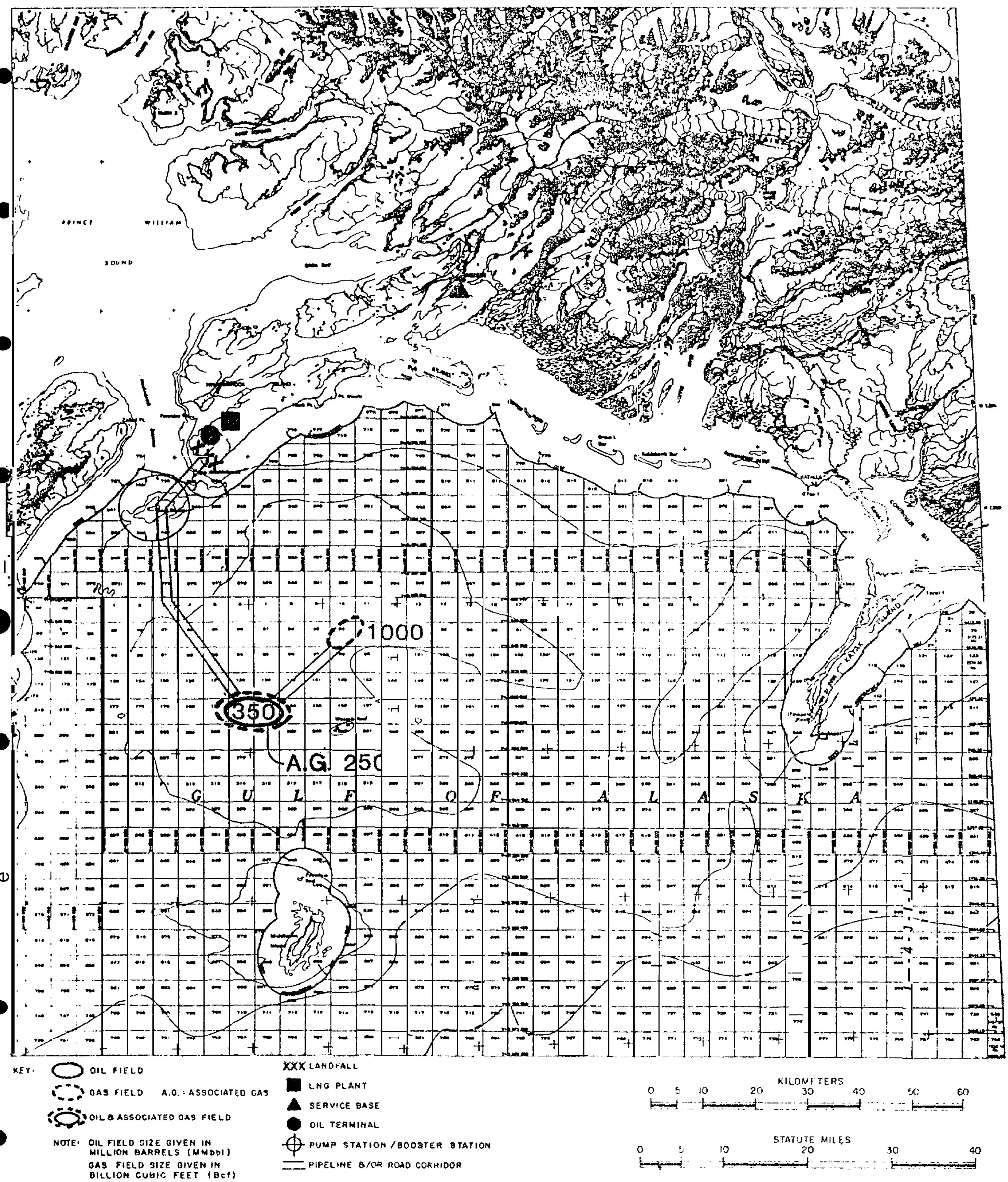
FIELD AND ONSHORE SITE LOCATIONS

STATISTICAL MEAN RESOURCE LEVEL SCENARIO

OIL, ASSOCIATED GAS AND NON-ASSOCIATED GAS

FIGURE 6

MIDDLETON SHELF AREA



SOURCE: DAMES & MOORE

FIELD AND ONSHORE SITE LOCATIONS

STATISTICAL MEAN RESOURCE LEVEL SCENARIO

OIL, ASSOCIATED GAS AND NON-ASSOCIATED GAS

TABLE 83

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD, CORDOVA AND YAKUTAT
MEAN (AND 5 PERCENT) PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA a/

Phase, Task and Area of Operations	Seward	Cordova	Yakutat
EXPLORATION			
Survey			
Offshore Geophysical and Geological Surveying [area of operation]	Not Applicable	Survey vessels conducting geophysical and geological surveys on the Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Survey vessels conducting geophysical and geological surveys on the Yakutat Shelf outside the Yakutat coastal area.
Onshore Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying the Middleton (Yakataga) and Yakutat Shelves.	Not Applicable	Not Applicable
Rigs			
Offshore Exploration Well Drilling [area of operation]	Not Applicable	Rigs drilling exploration wells on Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Rigs drilling exploration wells on the Yakutat Shelf outside the Yakutat coastal area.

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Middleton (and Yakataga) Shelf.	Not Applicable	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Yakutat Shelf.
Onshore Service Base	Shore base supplying rigs and boats on Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	Not Applicable	Shore base supplying rigs and boats on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, and other cargo.
Air Transportation	Not Applicable	Helicopter service from Cordova Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Middleton (and Yakataga) Shelf.	Helicopter service from Yakutat Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Yakutat Shelf.
Construction	Constructing a permanent service base on Resurrection Bay.	Not Applicable	Constructing a permanent service base on Monti Bay.
DEVELOPMENT			
<u>Platform Installation and Offshore Pipeline Construction</u>			
Offshore Platform Installation [area of operation]	Not Applicable	Locating, installing and commissioning platforms on the Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Locating, installing and commissioning platforms on the Yakutat Shelf outside the Yakutat coastal area.

Pipeline Construction [area of operation]	Not Applicable	Laying and burying subsea gathering lines and a trunk line to Hinchinbrook Island.	Laying and burying subsea gathering lines and a trunk line to the Yakutat Forelands.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total NGA platform installation and pipelaying and burying will be provided from Seward.	Not Applicable	Supply/anchor/tug boats transporting materials to platforms, lay barges, and bury barges. Half of the vessels for the total NGA platform installation and pipelaying and burying will be provided from Yakutat.
Onshore Service Base	Shore base supplying boats, platforms, lay barges and bury barges with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation and pipeline construction in the NGA will be provided from Seward.	Not Applicable	Shore base supplying boats, platforms, lay barges and bury barges with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation and and pipeline construction in the NGA will be provided from Yakutat.
Air Transportation	Not Applicable	Helicopter service at Cordova Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Middleton (and Yakataga) Shelf.	Helicopter service at Yakutat Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Yakutat Shelf.
Construction	Coating of all pipe used in subsea gathering and trunk pipelines at Seward.	Constructing onshore pipeline, oil terminal and LNG plant at Hinchinbrook Island.	Constructing onshore pipeline, oil terminal and LNG plant on Yakutat Bay.

Platforms			
Offshore			
Development Drilling [area of operation]	Not Applicable	Development drilling on platforms on the Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Development drilling on platforms on the Yakutat Shelf outside the Yakutat coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Middleton (and Yakataga) Shelf.	Not Applicable	SUpply boats transporting materials to platforms on Yakutat Shelf.
Onshore			
Service Base	Shore base supplying boats and platforms on Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	Not Applicable	Shore base supplying boats and platforms on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.
Air transportation	Not Applicable	Helicopter service at Cordova Airport transporting offshore personnel and small volume, light weight freight to platforms on Middleton (and Yakataga) Shelf.	Helicopter service at Yakutat Airport transporting offshore personnel and small volume, light weight freight to platforms on Yakutat Shelf.
PRODUCTION			
Platforms			
Offshore			
Platform Operations [area of operation]	Not Applicable	Operating platforms with periodic workovers andwell stimulation on Middleton (and Yakataga) Shelf.	Operating platforms with workovers and well stimulation on Yakutat Shelf.

Marine Transportation [port area]	Supply boats transporting materials to platforms on Middleton and Yakataga Shelves. Half of the Middleton (and Yakataga) Shelf effort will be provided from Seward.	Supply boats transporting materials to platforms on Middleton (and Yakataga) Shelf. Half of the Middleton (and Yakataga) Shelf effort will be provided from Seward.	Supply boats transporting materials to platforms on the Yakutat Shelf.
Onshore Service Base	Shore base providing half the effort in supplying boats and platforms on the Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base providing half the effort in supplying boats and platforms on the Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying boats and platforms on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.
Oil Terminal and LNG Plant Operations	Not Applicable	Operating oil terminal and LNG plant processing oil and gas from the Middleton Shelf. Forty percent of the total NGA oil terminal/LNG plant employment will be provided at Hinchinbrook Island. Hinchinbrook Island oil terminal and LNG plant employees assumed to commute daily from Cordova.	Operating oil terminal and LNG plant processing oil and gas from the Yakutat Shelf. Sixty percent of the total NGA oil terminal/LNG plant will be provided at Yakutat.

a/ The 5 percent probability resource level includes exploration, development and offshore production on the Yakataga Shelf enclosed in (). The Yakataga Shelf is not included in the mean case.

Source: Alaska Consultants, Inc. Derived from facility and OCS employment scenarios prepared by Dames and Moore.

Yakutat

COMMUNITY FORECASTS

Significant Factors Affecting Growth

There are three waves of events or activities that will shape direct OCS-related employment at Yakutat.

First, there will be a period of steady but moderate (compared to later events) expansion as Yakutat is chosen to function as the primary support base for the exploration phase.

Second, the corporate decisions to develop the oil and gas discoveries assumed under this scenario will spur a major construction boom at Yakutat. Construction of petroleum storage facilities and a marine oil terminal for trans-shipment of crude oil and of an LNG plant will span about four years, and employ a transient construction workforce that, at times, exceeds a thousand workers. These workers are assumed to be housed in a construction camp at the construction site rather than at the main settlement at Yakutat. Roughly contemporaneously with terminal construction, the level of service base and other logistical support will climb to supply the material and manpower requirements of offshore platform installation, field development and submarine pipelaying activities.

Finally, the onset of terminal operations in 1990, supplemented by the function of providing ongoing logistic and industrial support for the maintenance of offshore production, will stabilize OCS-related employment for the second decade of the scenario.

The multiplier effect of the permanent workforce wil' substantially boost indirect employment in non-OCS sectors of the local economy beginning in 1990 and carry through the remainder of the forecast period.

Future Employment

The annual employment forecasts for Yakutat under the Mean Scenario are displayed in Table 84. The energy industry comes to dominate the local economy as OCS-related direct and indirect employment account for about 57 percent of all employment by 2000. Over the two decades of the forecast, this scenario engenders an average annual growth rate of 7 percent plus. Seven percent would be an exceptionally high annual rate of growth to manage over a 20-year period, even if it were evenly distributed over time. In the case of this scenario, the bulk of Yakutat's expansion is bunched into a 4-5 year peak period of intensive construction activity, preceded by a relatively moderate expansion associated with initial exploration and followed by a decade of stable employment once field production begins.

During early exploration, Yakutat functions as a support base. In this capacity, about 65 new direct jobs and another 23 indirect jobs increase Yakutat's employment base by one quarter.

At the startup of construction for the LNG plant (1986) and the oil terminal facilities (1987), overall employment jumps by as many as 1,308 jobs or 340 percent above the comparable employment level under the non-OCS scenario. The major share of these new jobs (about 80 percent) will be held by transient workers engaged in construction projects. These workers are expected to be housed in field camps such as are commonly provided for construction workforces on projects in remote areas. This temporary workforce will depart at construction project completion, to be succeeded by the permanent resident workforce that will operate the LNG plant and the oil terminal facilities. In preparation for production, field development and pipelaying activites will also boost the level of service base and other support activities (see 'Tables 85 and 86).

Once production ensues, the forecast is for employment to stabilize at a level that is about half the peak. OCS-related employment accounts for about 650 new jobs over the 1991-2000 decade. Oil terminal operations will account for over half of the direct OCS-related employment, augmented mainly by service base and LNG plant operations.

Basic OCS activities will stimulate indirect employment of about 225 workers distributed in almost all economic sectors, but most heavily in the trade and services sector and in local government. Partly because indirect employment lags behind direct employment growth, but also because the temporary construction project workers residing in field camps are not fully integrated into the local economy, indirect employment does not peak and level off until the LNG plant and oil terminal are in operation.

Future Population

As a rule, population growth is directly linked to employment growth. However, in the mean and 5 percent scenarios, the construction camp workforce is not counted as part of basic employment for purposes of calculating indirect employment and total population for the reason that the construction workforce is not assumed to be integrated into the local economy. Also, since separate housing and utilities are assumed to be provided for this workforce by the project developers, the camp workforce itself is omitted from the population base for purposes of calculating the demand for public facilities and services, except for those service systems, e.g. public safety or health and social services, upon which they are likely to impinge.

It is assumed that the City of Yakutat will annex all developed land in the vicinity under this scenario. Therefore, all permanent area residents are counted in the City's population base and service area.

The estimated 1980 population of 604 persons in the Yakutat area grows by less than 200 residents during the first five years of exploration

TABLE 84

FORECAST OF EMPLOYMENT ANO POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
YAKUTAT AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	114	118	139	140	135	766	1,269	1,215	507	239	24.2	.241	247	.253	263	271	259	265	265	267
Agriculture, Forestry and Fisheries	(46)	(48)	(48)	(50)	(50)	(50)	(50)	(50)	(50)	(52)	(54)	(56)	(56)	(58)	(58)	(60)	(613)	(62)	(62)	(62)
Mining	(2)	(3)	(3)	(2)	(2)	(3)	(6)	(7)	(11)	(12)	(15)	(18)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
Manufacturing	(50)	(50)	(61)	(61)	(61)	(62)	(63)	(68)	(104)	(112)	(119)	(124)	(129)	(134)	(139)	(139)	(139)	(142)	(142)	(142)
Contract Construction	(16)	(17)	(27)	(27)	(22)	(651)	(1,150)	[1,090)	(324)	(63)	(54)	(43)	(42)	(41)	(46)	(52)	(40)	(41)	(41)	(43)
DISTRIBUTIVE INDUSTRIES	138	151	190	198	211	254	295	339	454	722	749	717	591	687	599	720	726	738	738	740
Transportation, Communications and Public Utilities	(59)	(68)	(97)	(102)	(107)	(116)	(138)	(175)	(270)	(491)	(504)	(470)	(344)	(441)	(349)	(464)	(470)	(477)	(477)	(477)
Trade	(40)	(42)	(47)	(47)	(51)	(68)	(73)	(77)	(87)	(109)	(118)	(121)	(121)	(119)	(122)	(125)	(125)	(128)	(128)	(128)
Finance, Insurance and Real Estate	(7)	(7)	(7)	(8)	(10)	(14)	(15)	(15)	(18)	(24)	(25)	(24)	(24)	(25)	(25)	(26)	(26)	(26)	(26)	(26)
Service	(32)	(34)	(39)	(41)	(43)	(56)	(69)	(72)	(79)	(98)	(102)	(102)	(102)	(102)	(103)	(105)	(105)	(107)	(107)	(109)
GOVERNMENT	93	94	102	102	107	124	131	136	145	179	187	188	186	186	188	192	195	198	198	198
TOTAL EMPLOYMENT	345	363	431	440	453	1,144	1,695	1,690	1,106	1,140	1,178	1,146	1,024	1,126	1,050	1,183	1,180	1,201	1,201	1,205
Employees Resident in Construction Camps	(--)	(--)	(--)	(--)	(--)	(623)	(1,123)	(1,061)	(313)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
TOTAL POPULATION - YAKUTAT AREA	690	726	810	810	815	949	1,047	1,105	1,487	2,148	2,221	2,153	2,154	2,131	2,175	2,238	2,260	2,299	2,299	2,306

Source: Alaska Consultants, Inc.

TABLE 8S

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - YAKUTAT AREA
1981 - 2000

Year	Service Base	Helicopter Service Exploration	Helicopter Service Development	Helicopter Service Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
1981	20	12										32
1982	24	15										39
1983	40	25										65
1984	40	25										59
1985	40	25										59
1986	50	18			436			187				169
1987	67	18	3		34		116	973				1,211
1988	88	15	10			12	609	440		7		1,181
1989	130	10	13	5		38	275			40	35	546
1990	127	5	13	5						240	35	425
1991	97		9	20						240	42	408
1992	78			30						240	42	390
1993	77			35						240	42	394
1994	70			35						240	42	387
1995	70			35						240	42	387
1996	70			35						240	42	387
1997	70			35						240	42	387
1998	70			35						240	42	387
1999	70			35						240	42	387
2000	70			35						240	42	387

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 86

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - YAKUTAT
1981 - 2000

Year	Survey	Rigs	Platforms: Development Drilling	Platforms: Operations	Supply/Anchor/Tug Boats: Exploration	Supply/Anchor/Tug Boats: Development	Supply/Anchor/Tug Boats: Production	Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
1981		139			65					204
1982		164			76					240
1983		280			130					410
1984		280			130					410
1985		280			130					410
1986		210			98	15				323
1987		210			98	23		233		564
1988		185	40		87	37		700	21	1,070
1989		118	149	16	54	72	13	934	44	1,400
1990		47	322	32	22	57	26	933		1,439
1991			523	80		14	65	333		1,015
1992			336	96			78			510
1993			121	112			91			324
1994				137			91			228
1995				162			91			253
1996				237			91			328
1997				262			91			353
1998				287			91			378
1999				287			91			378
2000				287			91			378

Source: Dames and Moore/Alaska Consultants, Inc.

before the pace accelerates. Then, between 1988 and 1990, entering the production phase, resident population is forecast to almost double from about 1,105 to 2,148, thereafter leveling off. This time period is likely to be the most difficult period of growth management experienced at Yakutat.

Since most of the new permanent arrivals will certainly be non-Native, Yakutat's Tlingit population would dwindle to a minority status by the end of the 1980's, bringing significant changes in the social character and community leadership of the settlement.

IMPACT ASSESSMENT

Social Impacts

The growth premised in the mean scenario implies major change in Yakutat's community infrastructure (see Tables 87 to 97) and social organization. Resident population is forecast to triple in a few years. This rapid growth will strain the City's ability to install the public improvements and maintain the public services necessary to accommodate additional residents. Serious housing shortages and overtaxed public services will likely prevail for a period, especially since Yakutat does not have an established home-building industry.

The rapid increase in purchasing power and the lag in commercial expansion will spur inflation until a new equilibrium is reached between demand for and the supply of goods and services. In the meantime, families and individuals with fixed incomes or employed in activities unrelated to the offshore industries, most likely to be pre-lease sale residents, will suffer erosion of their economic position.

The social instability associated with rapid growth and high job and population turnover during the construction boom and initial operation of the terminals may be reflected in a higher incidence of social problems.

The diminution of Yakutat's Tlingit residents to a minority status in their historic community will coincide with the emergence of new patterns of social and political leadership. The traditional role of the fisheries will be diminished as the City's economy is reoriented to industrial wage employment. Subsistence resources will be subjected to new harvest pressures. Given the strong preference expressed in the past by most Yakutat residents for limited growth in their community, these changes will probably not be welcomed. The changes may well prove to be a source of friction that polarizes the tradit·onal community and the more numerous newer residents.

Within local government, there would occur a thorough change in the scope and scale of City operations brought about by the need to look after the common needs of a settlement many times larger than previously.

Impacts on Community Infrastructure

Housing and Residential Land. The demand for housing at Yakutat increases more than fourfold from about 144 to 608 units. This rising demand is felt during exploration and field development, but the sharpest increase coincides with the start up of the oil terminal and LNG plant operations around 1989-1990. In those two years, an estimated 345 new dwellings will be demanded. That would be about double the Yakutat area's present total housing stock. Once this shot of demand is satisfied, the forecast anticipates very little additional demand for the forecast period.

The estimated demand for newly developed residential land is about 51 hectares (127 acres), compared to about 12 hectares (30 acres) under the non-OCS scenario. Yakutat has an ample reserve of buildable raw land reasonably close to the town center, so "land supply in itself is not foreseen to be a problem. The more clifficult community development problems will concern achieving the most efficient land use pattern and economical utilities development for the long term under housing crisis conditions that place a premium on quick, short term solutions. Possibly, as a transitional measure, the construction camp housing can be adapted to absorb temporarily a part of the housing demand. The camp's use will be phasing down as the surge of new permanent resident growth occurs and, though distant from town, would be accessible by road.

Utilities. The residential expansion forecast under the mean scenario will drastically increase the burden on the community's basic utilities. Though there do not seem to be any major physical obstacles to upgrading the capacity of the various utilities, the fiscal and managerial constraints are formidable for a town of Yakutat's size. Financing expansion of the municipal water and sewer systems will be a heavy strain at a time when other public works are also competing for a share of the City's as yet " imited borrowing capacity. As the time frame for installation of residential utilities for new residential subdivisions will be very tight, a carefully coordinated financing and construction program will be essential, lest a delay of critical utility services postpones occupancy of the new dwellings that will be urgently needed to shelter new residents.

The community utility estimates omit the requirements of these onshore OCS-related industrial facilities: marine service bases, temporary construction camps and oil and gas terminals. In the absence of specific reasons to conclude otherwise, it was generally assumed that the task of providing for these industrial utility needs would not fall upon the locality. At Yakutat, however, under the mean scenario, there are instances in which it may be mutually advantageous for the local utility and the industrial operators to cooperate in the provision of certain utility functions; most importantly, for electric power generation. Where relevant to the analysis of community utility demands, industrial utility requirements will also be discussed.

- Water. Available hydrologic data suggests that the groundwater supplies in the Yakutat area are abundant in quantity and of high quality. Thus, although it is expected that domestic capacity demands will quadruple over the base case and that total public use will nearly double, development of an adequate water supply does not seem to present any difficulties.

  However, it is expected that it will be necessary to install a distribution system to service about 51 hectares (127 acres) and over 600 residences in a very short time. As these new residential tracts will not be predominately for Alaska Natives, Yakutat will not be eligible to obtain the support of the U.S. Public Health Service which has assisted with water and sewer improvements in the past. Yakutat will have to look to other sources for funding, including its own revenues.

  The City might be able to reduce its direct fiscal commitments by such devices as special assessments and strong subdivision development regulations. High land development costs and effective land use planning to promote compact development may foster a trend to higher densities and more multifamily dwellings than have been customary. This, too, would be fiscally preferable for the City, though it also represents another change in the traditional character of the town.

Water consumption at the in-town marine service base will be substantial, mainly for supply to offshore operations. Use peaks at about 757 kiloliters (200,000 gallons) per day around 1990, or at about the same time when community consumption begins to peak. Given the proximity of the service base to the settlement, it seems preferable to develop a unified water supply and storage system to serve both town and service base needs. This course would be consistent with the City's water development policy. It, in fact, already has taken steps to connect the water supply system at the existing service base to the City system. An integrated water system would allow a more economic and more reliable water supply system, especially for the irregular but critical peak capacity needs of service boats, fire protection and fish processing.

Presumably, the distance of the oil and gas terminals from settled areas will oblige those facilities to develop independent water supply systems.

- Sewer. A need to upgrade Yakutat's sewage treatment plant, barely adequate in capacity for the base case forecast, can be expected almost immediately after the lease sale. By 1990, domestic sewage treatment capacity will have to be increased four times over the base case. These improvements and the related waste collection system will necessitate substantial capital expenditures.

Compared to non-industrial sources, the marine service base will generate a minor additional volume of sewage and it is reasonable to expect that facility would be connected to the City's expanded sewage collection and treatment system. However, it does not appear feasible to connect the oil and gas terminals which are presumed to install their own treatment plants.

- Electric Power. The power plant at Yakutat has a firm peak power capacity of 1,225 kwwhich is barely adequate for current needs. Purchase of an additional 1,200 kw unit is under consideration. Even if this unit is acquired, the system would again be operating at peak capacity within two to three years after the lease sale. As offshore development accelerates, the curve of community power demand climbs precipitously, attaining an estimated capacity requirement of 6,444 kwby 1990. Thereafter, demand increases more slowly, rising to about 6,918 kw by 2000. Thus, considered apart from industrial power needs, it is expected that the consumer power system will have to increase its generating capacity by a factor of about 5 in the decade after the lease sale. The small privately owned local power company that operates Yakutat's power system may be hard pressed to marshal the capital funds that will be needed to keep pace with this demand.

Under the mean scenario, estimated industrial power consumption for construction projects and for operation of the LNG plant will exceed many times over non-industrial use at Yakutat. While it is impossible to make a confident estimate of LNG plant power consumption without the details of plant design, available data suggests that the LNG plant operation may use about 20,000 kw daily or better than triple the power requirements of the entire community. Furthermore, the plant will have use of natural gas for power generation, and can achieve a much lower unit cost than can be realized by the small diesel units that the power utility uses. If it were feasible for the local power company to purchase bulk power from the LNG plant, it should become possible for the utility to deliver electricity to its customers at cheaper rates and without the large capital investment in relatively inefficient diesel generators that would otherwise be imperative. Also, the marine service base, whose peak power usage is estimated at 1,600 kw, may find it preferable to purchase power from a reliable supplier than establish its own system.

- Solid Waste Disposal. The volume of solid wastes to be disposed of is forecast to grow to almost 2,721 metric tons (3,000 tons) annually or to three times over the base case. As Yakutat's waste disposal site has ample capacity, no problems are anticipated in this regard.

Construction debris and other industrial wastes will contribute amounts ranging from about 544 to 1,542 metric tons (600 to 1,700 tons) annually. Depending on conditions at the industrial sites, it may be environmentally sounder to designate a single disposal site for solid waste materials from all sources rather than allow creation of a number of scattered disposal sites. If so, the existing disposal site should be able to accept all solid wastes for disposal.

- Communications. The existing telephone exchange has the capacity to handle 400 telephone hook-ups. The forecast is that this system capacity will be exceeded by the mid-1980s and by 1990 the system's capacity requirement can be expected to surpass 1,000 hook-ups.

Public Safety

- Police. This scenario is expected to result in about six police officers being added during the peak construction years, estimated to be around 1986/87, and perhaps one additional jail cell. Construction camp workers are counted in the population base used for purposes of estimating police service demands.

- Fire Protection. The oil terminal and LNG plant are presumed to provide their own fire protection requirements. Otherwise, as long as new residential development occurs close by the present settled area, no major additions to the City's fire protection facilities ought to be demanded. However, if new centers of residential settlement are allowed to develop closer to the industrial sites, then a need for additional fire stations and firefighting equipment is foreseen.

Health and Social Services. Within this forecast period, Yakutat's resident population does not pass the threshhold which is ordinarily thought to justify a local hospital and a pair of resident physicians and a dentist. Yakutat grows to 2,306 persons by 2000, compared to a threshhold standard of 3,000 to 3,500 persons.

However, there are factors directly related to OCS development that may justify a higher than average level of medical services at Yakutat. Not included in Yakutat's resident population base but potentially a part of its health service area is a sizable labor force stationed offshore on the exploratory drill rigs, production platforms, service boats, etc. The offshore labor force reaches 1,400 persons at peak times and averages about 400 otherwise. Also omitted from Yakutat's population base is the temporary construction project work force of up to 1,123 persons resident in construction camps.

Furthermore, offshore and construction work is notoriously dangerous, with high accident and injury rates. The operation of the oil and LNG terminals at Yakutat also raises the possibility, however faint, of a large scale industrial accident with many casualties. In emergency situations, the closest hospital care is now at Cordova or Juneau. In these circumstances, it seems reasonable to conclude that Yakutat is likely to require superior medical facilities and services to care for the health needs of the people in its service area.

Therefore, it is projected that by the late 1980's, Yakutat will obtain a hospital with about 10 full-care beds, two resident physicians and other appropriate professional medical staff.

As for social services, it is assumed that rapid population growth will increase the workload of the community mental health center and the local social service system. Therefore, additional office space and social workers or counselors are likely to be demanded to provide counseling, alcoholism care and other critical social services.

Education. Elementary and secondary school enrollment is projected to triple over the term of the mean scenario. Yakutat's recently constructed school facilities have ample classroom space for the base case but will become overcrowd by 1990 in the mean scenario. At that time, it is expected that there will be a demand for two additional classrooms in both the elementary and secondary schools to meet minimum facility standards. At full enrollment, augmenting of school-related recreational facilities should be demanded.

Recreation. Yakutat would need to enlarge substantially its recreational facilities under the mean scenario. For new residential areas, about 6 additional acres of neighborhood parks and playgrounds can be expected. High public participation in such indoor sports as basketball and swimming might necessitate additional indoor facilities sized in excess of standard. In addition, it is likely that the City's small boat harbor would need to be nearly tripled in capacity. Since most of the population growth under this scenario occurs by 1990, these improvements ought to be provided by that date.

Population growth may also increase the recreational harvest of the area's fish and wildlife and thereby magnify the potential for conflict among traditional subsistence, commercial and recreational users of these renewable resources.

Local Government Finances. For the the purpose of comparing the fiscal impact of OCS development scenarios upon local governments, the base case revenue and expenditure forecasts were adjusted on a per capita basis to reflect the incremental costs and revenues attributable to increased population. Where appropriate, the assessed value of OCS industrial real property (service bases, oil and LNG terminals, land pipelines, etc.) was separately estimated and the property tax revenues that OCS facilities would yield under prevailing local property tax rates and within the limitations of AS 29.53.045(b) were added to the annual revenue estimates.

On the conservative assumption that the same range and quality of public services would be provided under the mean scenario as in the base case, the operating budget is forecast to grow twenty-fold over the 1978 baseline. If new services are added, or existing service levels upgraded, then operating expenditures would grow correspondingly.

At Yakutat, local school district revenues and expendi.tures increase only slightly, since the local contribution to school support amounts to only 2 percent of the school district budget.

The general fund revenue forecast begins to climb slowly in the early 1980's in response to the population growth associated with the economic stimulus of exploration. OCS facilities do not begin to have an important tax impact until 1988 when the first stage of the LNG plant is scheduled to be added to the real property tax base. The capital-intensive LNG and oil installations swell property tax revenues and by 1989, it is projected that Yakutat will reach the property tax revenue ceiling of $1,500 per capita annual ly imposed on local governments by AS 29.53.045(b). Yakutat's property tax income is limited by this ceiling through the rest of the forecast period.

Discounted for population growth and inflation at 6 percent annually, Yakutat's per capita income revenue situation compares favorably with the base case during the early years of OCS production. However, toward the close of the scenario, due to the constraints of AS 29.53.045(b), the per capita purchasing power of municipal revenues is only slightly above the 1978 level.

A critical feature of Yakutat's fiscal situation during the period of most rapid development is the coordination of public works projects with the income flow from new revenue sources. Yakutat's capital improvements programming will be extremely sensitive to any delay in the OCS facility construction projects that would interrupt or delay revenues needed to finance community development.

CAUSE/EFFECT OF IMPACTS

Because of its closeness to the oil and gas fields assigned to the Yakutat and Yakataga Shelves under this scenario, Yakutat becomes the chief base for the offshore industry in the Northeast Gulf of Alaska Construction and operation of the large marine service base on Monti Bay and oil and LNG terminals within the road-connected area promote rap" d in-migration of new workers and their families. Population ultimately climbs to 250 percent of the base case forecast. New industrial, residential and public works construction transform the physical and social fabric of Yakutat.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

OCS development will bring generally unwanted industrial growth to Yakutat with potentially adverse effects on the traditional fisheries-based economy. (That this degree and type of growth is unwanted is borne out by a socioeconomic survey of Yakutat conducted in 1975 by Alaska Consultants, Inc. and in numerous statements by various Yakutat representatives). During the transition period, there are apt to be serious strains on housing, public utilities, educational and health services and the City finances, until Yakutat is fully geared up to provide for new residents.

SUMMARY OF IMPACTS

The swift growth forecast for the mean scenario will spell acute growth management problems for Yakutat during its rapid evolution from a small predominately Tlingit fishing community to a much larger settlement of newcomers mainly dependent upon the OCS industry for their livelihood.

Due to the construction boom and sustained employment in oil and gas operations, Yakutat is forecast to quadruple in size by the close of the century. The oil and gas industry becomes the dominant feature of the local economy, eventually accounting for more than half of the settlement's economic base. The commercial fisheries, formerly the mainstay of the local economy, will become greatly diminished in relative importance.

Along with these economic changes, some significant changes in the social and political structure may be expected. Due to the influx of new residents, the local Tlingit population will lose its numerical majority as well as much of its influence in local government to newcomers. The scale and character of local government may also change as it struggles to provide the new services and facilities necessary for a rapidly growing population. It can be anticipated that during the growth phase, community facilities will be overtaxed accompanied by a housing shortage and inflation.

TABLE 87

FORECAST OF NET CHANGE IN HOUSING DEMAND
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
7978- 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	2	3	2	0	1
1979	9	6	4	1	1
1980	28	16	10	2	4
1981	86	38	26	4	8
1982	36	16	10	2	4
1983	84	36	24	4	8
1984	0	0	0	0	0
1985	5	1	1	0	0
1986	132	53	36	5	12
1987	94	35	23	4	8
1988	98	39	26	4	9
1989	272	109	73	12	24
1990	599	236	158	26	52
1991	- 25	-12	- 8	- 1	- 3
1992	- 28	- 13	- 9	- 1	- 3
1993	53	19	13	2	4
1994	- 3	- 3	- 2	0	- 1
1995	30	10	7	1	2
1996	17	6	4	1	1
1997	8	3	2	0	1
1998	25	8	5	1	2
1999	0	0	0	0	0
2000	7	2	1	0	1
TOTALS	1,529	608	406	67	135

Source: Alaska Consultants, Inc.

TABLE 88

ESTIMATED DEMAND FOR RESIDENTIAL LAND
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	16	2.9	1.1	4.0
Multifamily & Trailer	9	0.8	0.3	1.1
1981-85				
Single Family	61	11.0	4.2	15.2
Multifamily & Trailer	30	2.7	1.1	3.8
1986-90				
Single Family	316	56.9	22.1	79.0
Multifamily & Trailer	156	14.0	5.5	19.5
1991-95				
Single Family	1	0.2	0.0	0.2
Multifamily & Trailer	0	0.0	0.0	0.0
1996-2000				
Single Family	12	2.2	0.8	3.1
Multifamily & Trailer	7	0.6	0.2	0.8
TOTAL	608	35.3	91.3	126.6

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 89

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
MEAN PROBABILITY SCENARIO
CITY OF YAKUTAT
1978- 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	51	181	231
1979	52	181	233
1980	53	188	241
1981	86	188	274
1982	91	192	283
1983	101	195	296
1984	101	195	296
1985	102	197	299
1986	119	199	318
1987	131	204	335
1988	138	209	347
1989	186	209	395
1990	268	220	488
1991	278	225	503
1992	269	229	498
1993	269	238	507
1994	266	244	510
1995	272	249	521
1996	280	253	533
1997	282	256	538
1998	287	267	548
1999	287	261	548
2000	288	263	551

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 90

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
MEAN PROBABILITY SCENARIO
CITY OF YAKUTAT
1978- 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	51	6.4
1979	52	6.5
1980	53	6.6
1981	86	10.8
1982		11.4
1983	1:1	12.6
1984	101	12.6
1985	102	12.8
1986	119	14.9
1987	131	16.4
1988	138	17.2
1989	186	23.2
1990	268	33.5
1991	278	34.8
1992	269	33.6
1993	269	33.6
1994	266	33.2
1995	272	34.0
1996	280	35.0
1997	282	35.2
1998	287	35.9
1999	287	35.9
2000	288	36.0

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 91

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
1978- 2000

Year	Estimated Capacity Requirements in kw's
1978	1,418
1979	1,469
1980	1,570
1981	1,828
1982	1,960
i 983	2,228
1984	2,268
1985	2,323
1986	2,752
1987	3,089
1988	3,315
1989	4,416
1990	6,444
1991	6,663
1992	6,459
1993	6,462
1994	6,393
1995	6,525
1996	6,714
1997	6,780
1998	6,897
1999	6,897
2000	6,918

Source: Alaska Consultants, Inc.

TABLE 92

ESTIMATED DISPOSABLE SOLID WASTES
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
1978- 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	560	3,420
1979	590	3,550
1980	630	3,790
1981	720	4,350
1982	770	4,660
1983	870	5,300
1984	900	5,450
1985	920	5,580
1986	1,080	6,560
1987	1,200	7,300
1988	1,280	7,770
1989	1,740	10,540
1990	2,560	15,490
1991	2,640	16,020
1992	2,560	15,530
1993	2,560	15,540
1994	2,540	15,670
1995	2,590	15,690
1996	2,660	16,140
1997	2,690	16,300
1998	2,740	16,580
1999	2,740	16,580
2000	2,740	16,630

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 93

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	183	229	3
1979	1.26	189	238	9
1980	1.27	205	260	22
1981	1.28	243	311	51
1982	1.29	259	334	23
1983	1.30	295	384	50
1984	1.31	295	386	2
1985	1.32	296	391	5
1986	1.33	394	464	73
1987	1.34	384	515	51
1988	1.35	423	571	56
1989	1.36	532	724	153
1990	1.37	768	1,052	328
1991	1.38	756	1,043	- 9
1992	1.39	743	1,033	- 10
1993	1.40	762	1,067	34
1994	1.40	759	1,063	- 4
1995	1.40	769	1,077	14
1996	1.40	775	1,085	8
1997	1.40	778	1,089	4
1998	1.40	786	1,100	11
1999	1.40	786	1,100	0
2000	1.40	788	1,103	3

Source: Alaska Consultants, Inc.

TABLE 94

SCHOOL ENROLLMENT FORECAST
MEAN PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	92	61	153
1979	90	60	150
1980	91	60	151
1981	99	67	166
1982	100	67	167
1983	107	71	178
1984	102	68	170
1985	98	65	163
1986	114	76	190
1987	126	83	209
1988	133	88	221
1989	178	119	297
1990	258	172	430
1991	267	177	444
1992	258	173	431
1993	258	173	431
1994	256	170	426
1995	261	174	435
1996	269	179	448
1997	271	181	452
1998	276	184	460
1999	276	184	460
2000	277	184	461

Source: Alaska Consultants, Inc.

TABLE 95

FORECAST OF YAKUTAT SCHOOL DISTRICT REVENUES
MEAN PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	153	$13	$ 623	$13	$ 649
1979	150	13	647	13	673
1980	151	14	691	14	719
1981	166	17	805	17	839
1982	167	18	858	18	894
1983	178	20	970	20	1,010
1984	170	21	982	21	1,024
1985	163	21	998	21	1,040
1986	190	26	1,226	26	1,278
1987	209	30	1,437	30	1,497
1988	221	34	1,612	34	1,680
1989	297	48	2,295	48	2,391
1990	430	74	3,523	74	3,671
1991	444	80	3,856	80	4,016
1992	431	83	3,968	83	4,134
1993	431	88	4,207	88	4,383
1994	426	92	4,406	92	4,590
1995	435	100	4,770	100	4,970
1996	448	109	5,206	109	5,424
1997	452	116	5,569	116	5,801
1998	460	125	6,007	125	6,257
1999	460	131	6,256	131	6,518
2000	461	141	6,765	141	7,047

Source: Alaska Consultants, Inc.

TABLE 96

GENERAL FUND
REVENUE FORECAST
MEAN PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$139	$ 50	$ 88	$ 80	$ 357
1979	149	54		85	383
1980	164	59	1::	94	421
1981	361	101	178	1 62	802
1982	396	113	199	180	888
1983	460	134	235	213	1,042
1984	487	142	249	226	1,104
1985	520	151	266	241	1,178
1986	958	185	326	296	1,765
1987	1,366	218	383	349	2,316
1988	2,974	244	429	390	4,037
1989	2,700 b/	348	612	556	4,216
1990	3,222 b/	533	937	851	5,543
1991	3,332 b/	584	1,027	933	5,876
1992	3,230 b/	600	1,055	959	5,844
1993	3,231 b/	636	1,119	1,018	6,004
1994	3,196 b/	667	1,173	1,067	6,103
1995	3,262 b/	722	1,269	1,154	6,407
1996	3,357 b/	787	1,384	1,259	6,787
1997	3,390 b/	843	1,482	1,347	7,062
1998	3,448 b/	908	1,598	1,453	7,407
1999	3,448 b/	946	1,664	1,513	7,571
2000	3,459 b/	1,024	1,801	1,638	7,922

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

TABLE 97

FORECAST OF REVENUES AND OPERATING EXPENDITURES
MEAN PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Availab for Capit Improvement
	Property Tax	Other Revenues	Tota 1 a/	City Operations	School Support	Total	
1978	$ 139	$ 218	$ 357	$ 289	$13	$ 302	$ 55
1979	149	234	383	310	13	323	60
1980	164	257	421	340	14	354	67
1981	361	441	802	585	17	602	200
1982	396	492	888	652	18	670	218
1983	460	582	1,042	772	20	792	250
1984	487	617	1,104	818	21	839	265
1985	520	658	1,178	873	21	894	284
1986	958	807	1,765	1,070	26	1,096	669
1987	1,366	950	2,316	1,259	30	1,289	1,027
1988	2,974	1,063	4,037	1,409	34	1,443	2,594
1989	2,700 b/	1,516	4,216	2,009	48	2,057	2,159
1990	3,222 b/	2,321	5,543	3,077	74	3,151	2, 392
1991	3,332 b/	2,544	5,876	3,373	80	3,453	2,423
1992	3,230 b/	2,614	5,844	3,466	83	3,549	2,295
1993	3,231 b/	2,773	6,004	3,676	88	3,764	2,240
1994	3,196 b/	2,907	6,103	3,854		3,946	2,157
1995	3,262 b/	3,145	6,407	4,170	1;;	4,270	2,137
1996	3,357 b/	3,430	6,787	4,548	109	4,657	2,130
1997	3,390 b/	3,672	7,062	4,864	116	4,980	2,082
1998	3,448 b/	3,959	7,407	5,249	125	5,374	2,033
1999	3,448 b/	4,123	7,571	5,467	131	5,598	1,973
2000	3,459 b/	4,463	7,922	5,917	141	6,058	1,864

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.
b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

Cordova

COMMUNITY FORECASTS

Significant Factors Affecting Growth

Compared to the base case, the most significant factor affecting growth at Cordova under the mean scenario will be its role as home base for the workforce for operation of the marine oil terminal on Hinchinbrook Island. That facility alone directly employs almost three-fourths of this scenario's OCS-related workforce and accounts for a similar share of the extra secondary employment and total additional population growth as well.

A number of circumstantial factors work to mitigate impacts on Cordova under this scenario.

The character of the town's harbor and access to it make Cordova less appealing than Yakutat or Seward as a marine service base site. Cordova's chronic water supply problems--a critical utility for service bases--and the potential for conflict with the fishing fleet's use of the harbor are further handicaps. Thus, Cordova plays only a minimal role during the exploration phase. Its airport is used by helicopter services transporting work crews to offshore exploration rigs on the Middleton Shelf area.

The designated sites for the onshore oil terminal and LNG plant are on Hinchinbrook Island, about 48 kilometers (30 miles) from Cordova itself. It is assumed that the non-resident construction project workforce will be sheltered at the project site, will not take up residence at Cordova and will chiefly affect Cordova as in-transit passengers at the airport. Furthermore, it can be assumed the project materials will be shipped directly to the project site, not through Cordova. The result of locating the projects at remote sites is that virtually no direct physical impact and little employment impact is expected to make itself felt at Cordova from construction of the oil and LNG terminals.

This scenario does assume that the permanent workforce for the Hinchinbrook Island terminals will commute from Cordova as home base, as a preferred alternative to construction of a new community on the Island exclusively for terminal personnel and their families.

Future Employment

Since Cordova contributes only helicopter support services during the exploration phase, only about a dozen new jobs are created during the first five post-lease sale years (see Table 98).

There follow two pulses of construction activity corresponding with the building of the oil terminal (442 man-years of employment in 1986-1988) and the LNG plant (1,021 man-years in 1989-1991). However, the remoteness of these projects from the town of Cordova and the likelihood that

Cordova's work force will be able to supply only a small portion of the construction labor will moderate local economic impacts.

Over the second decade of the scenario, Cordova will average about 340 extra jobs or about a 15 percent increase over the base case. The oil terminal will add an estimated 160 jobs in 1988 and the LNG plant another 28 jobs in 1991 to the resident workforce. The secondary economy will benefit by about 113 new jobs, nearly all in the sectors of trade, and services and government. Significantly, almost all these new workers and their families will be added at Cordova when the Middleton Shelf platforms begin to deliver oil to the Hinchinbrook Island terminal (see Tables 99 and 100).

Future Population

Resident population growth at Cordova from OCS development is minimal, amounting to less than 100 persons, until the oil terminal goes into operation around 1988. Then and thereafter, the 160 jobs provided by the terminal support half of all permanent OCS-related population growth at Cordova. The LNG plant around 1991 lends a second, lesser boost to the economic and population base. The combined direct and indirect OCS-related population levels off after 1990 at about 675 persons or 15 percent of the permanent population.

TABLE 98

FORECAST OF EMPLOYMENT AND POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
CORDOVA AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	732	743	753	765	777	959	1,088	849	1,175	1,409	1,064	915	934	947	961	979	994	1,008	1,022	1,038
Agriculture, Forestry and Fisheries	(418)	(424)	(430)	(436)	(443)	(450)	(457)	(464)	(471)	(478)	(485)	(492)	(499)	(506)	(514)	(522)	(530)	(538)	(546)	(554)
Mining	(2)	(2)	(2)	(3)	(3)	(3)	(9)	(17)	(18)	(10)	(11)	(11)	(16)	(17)	(17)	(22)	(23)	(23)	(23)	(24)
Manufacturing	(289)	(293)	(297)	(301)	(306)	(311)	(316)	(324)	(329)	(334)	(362)	(372)	(378)	(383)	(388)	(393)	(398)	(403)	(409)	(415)
Contract Construction	(23)	(24)	(24)	(25)	(25)	(195)	(306)	(44)	(357)	(587)	(206)	(40)	(41)	(41)	(42)	(42)	(43)	(44)	(44)	(45)
DISTRIBUTIVE INDUSTRIES	369	383	398	410	423	441	450	668	694	712	732	750	770	791	812	836	861	885	911	939
Transportation, Communications and Public Utilities	(79)	(82)	(87)	(90)	(94)	(98)	(91)	(263)	(269)	(273)	(278)	(279)	(280)	(281)	(282)	(283)	(284)	(285)	(286)	(287)
Trade	(160)	(166)	(171)	(176)	(181)	(187)	(195)	(217)	(227)	(235)	(242)	(250)	(259)	(268)	(278)	(289)	(300)	(311)	(322)	(334)
Finance, Insurance and Real Estate	(34)	(35)	(36)	(36)	(36)	(38)	(39)	(43)	(45)	(45)	(46)	(46)	(47)	(48)	(48)	(49)	(50)	(50)	(51)	(52)
Service	(96)	(100)	(104)	(108)	(112)	(118)	(125)	(145)	(153)	(159)	(166)	(175)	(184)	(194)	(204)	(215)	(227)	(239)	(252)	(266)
GOVERNMENT	404	408	412	416	420	427	434	460	469	475	478	480	485	490	495	501	506	511	516	523
TOTAL EMPLOYMENT	1,505	1,534	1,563	1,591	1,620	1,827	1,972	1,977	2,338	2,596	2,274	2,145	2,189	2,228	2,268	2,316	2,361	2,404	2,449	2,500
Employees Resident in Construction Camps	(--)	(--)	(--)	(--)	(--)	(168)	(278)	(8)	(319)	(547)	(167)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
TOTAL POPULATION - CORDOVA CITY	2,452	2,499	2,547	2,592	2,639	2,703	2,760	3,208	3,289	3,338	3,433	3,495	3,566	3,632	3,695	3,773	3,847	3,920	3,990	4,073
CORDOVA AREA	3,010	3,068	3,126	3,182	3,240	3,318	3,388	3,938	4,058	4,098	4,214	4,290	4,378	4,458	4,536	4,632	4,722	4,812	4,898	5,000

Source: Alaska Consultants, Inc.

TABLE 99

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - CORDOVA AREA
1981 - 2000

Year	Service Base	Helicopter Service: Exploration	Helicopter Service: Development	Helicopter Service: Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Onshore Onsite
1981		4										4
1982		6										6
1983		10										10
1984		12										12
1985		15										15
1986		10	7			12	156					185
1987		5	3				278					286
1988	5		1	5			8			160		179
1989	5		4	5		12		307		160		493
1990	5		6	5				547		160		723
1991	10			10				167		160	22	369
1992	10			10						160	28	208
1993	10			10						160	28	208
1994	10			10						160	28	208
1995	10			10						160	28	208
1996	10			10						160	28	208
1997	10			10						160	28	208
1998	10			10						160	28	208
1999	10			10						160	28	208
2000	10			10						160	28	208

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 1o0

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - CORDOVA

Year	Survey	Rigs	Platforms		Supply/Anchor/Tug Boats			P ≥tform Installation	Offshore Pipeline Construction	Total Employment Offshore onsite
			Development Drilling	Operations	Exploration	Development	Production			
1981		46								46
1982		71								71
1983		118								118
1984		140								140
1985		168								168
1986		140						233	21	394
1987		48	56					234		338
1988			100	16			6			122
1989			112	16			6	233	39	406
1990			61	16			6	234		317
1991				32			13			45
1992				32			13			45
1993				57			13			70
1994				57			13			70
1995				57			13			70
1996				82			13			95
1997				82			13			95
1998				82			13			95
1999				82			13			95
2000				82			13			95

Source: Dames and Moore/Alaska Consultants, Inc.

IMPACT ASSESSMENT

Social Impacts

The social impacts of OCS development at Cordova through the exploration and development stages appear likely to be minimal. The physical arrangement that insulates Cordova from the direct impact of the construction and operation of the oil and gas terminals greatly attenuates adverse social impacts.

At the onset of production, Cordova will suddenly be confronted with the challenge of absorbing an estimated 675 new residents. It is to Cordova's advantage under this scenario that the form growth impacts will take is tied to specific events and dates rather than being open-ended. This lends a predictability to the future which makes it feasible to bring impacts into focus and to respond with definite programs and actions.

Impacts on Community Infrastructure

Housing and Residential Land. The added population growth Cordova experiences under the mean scenario results in a demand for 250 more new dwellings than in the base case, or a total of 791 units over the forecast period (see Table 101). Part of this demand is spread over the exploration and development phases, but the greatest demand is felt around 1988 in step with the start-up of the new oil terminal. At that time, a demand for 216 units is estimated.

Due to the population growth occurring under this scenario, an estimated 47 hectares (116 acres) will be converted to residential development, of which about 15 hectares (38 acres) can be attributed to OCS development (see Table 102). This estimate assumes that the densities and housing types that prevail nowadays will continue. Inasmuch as Cordova is already sorely pressed for developable land in and around the settled area, it seems likely that high densities will occur as a matter both of economics and local development policy.

Utilities. Inasmuch as each of Cordova's basic utilities required upgrading to meet projected base case demands, any additional impact stemming from OCS development would influence Cordova's future public works programming. Since the construction camps and oil and LNG terminals located on Hinchinbrook Island will require self-sufficient utilities, nearly all of the impacts on the settlement of Cordova will derive from population growth. The small scale marine service base in Cordova's harbor area is not expected to have a measurable effect on overall utilities demand.

- Water. The base case analysis suggests that Cordova should anticipate that water use will increase two to three times by 2000. In order to accommodate this growth, it is probable that Cordova will have to undertake major projects for water source development and storage, as its existing supply and storage are marginal even for present demands.

The estimated population growth under the mean scenario will add 3 percent to 4 percent to total water use (see Table 103). This increase should not be difficult to accommodate once needed system improvements are completed to ensure an adequate source of supply. Before then, any additional demand will leave Cordova vulnerable to periodic seasonal water shortages.

Under this scenario, additional water distribution lines will be demanded to serve new residential subdivisions, estimated at about 16 hectares (40 acres) above the base case.

- Sewer. The design capacity of 2,650 kiloliters (700,000 gallons) per day of Cordova's sewage treatment plant is nominally sufficient for a treatment load projected by 2000 to reach 1,892 liters (500,000 gallons) per day or about 15 percent higher than under the base case (see Table 104). However, heavy water infiltration into the sewer system at times greatly reduces the effective treatment capacity. While recent repairs have eliminated some of the leakage, the treatment plant will still be subject to overflow loads during times of high infiltration. Therefore, either further repairs will have to be undertaken to reduce inflow or additional treatment capacity added.

- Electric Power. If the expansion program now under consideration by the Cordova Electric Cooperative is fully realized, it will have a generating capacity of 13,500 kw from the combined production of seven diesel units. This capacity is adequate for the base case and adequate for the mean scenario until the mid-1990's, as long as no replacement units become necessary (see Table 105). By 2000, it is estimated that about 15,000 kw of generating capacity will be demanded for community use, plus about 4,000 kw for service base operations. As the LNG plant is sited about 48 kilometers (30 miles) away on Hinchinbrook Island, Cordova, unlike Yakutat, will not gain the option of switching to natural gas-powered generation as a more economic alternative to diesel generators.

- Solid Waste Disposal. Under any case, the City of Cordova will have to develop a new landfill site within two to three years as the Odiak Slough site presently used will not have any more room. For the short run, through about 1990, the mean scenario hardly changes the volume of disposable solid waste (see Table 106). After that, the volume of waste increases by 15 percent over the base case, to about 5,442 metric tons (6,000 tons) annually.

At Hinchinbrook Island, provision will have to be made for disposal of construction debris and industrial waste of approximately 363 to 454 metric tons (400 to 500 tons) annually.

- Communications. The 1,200-unit capacity of the existing telephone exchange will be fully used by about 1987, a few years earlier than under the base case (see Table 107). About 800 hook-ups are projected between that date and the end of the forecast. Therefore, the telephone utility can anticipate a need to add to the exchange as well as providing service to an estimated 770 residents more than it served in 1978.

Public Safety.

- Police. Cordova can expect a demand for about four additional police officers and four jail cells over 'the forecast period.

- Fire Protection. The City's existing fire protection facilities should be adequate. It is assumed that the industrial facilities on Hinchinbrook Island will provide for their own fire protection.

Health and Social Services. The Cordova Community Hospital's capacity will be exceeded by the late 1980's under the mean scenario. This may be a conservative estimate as the construction industry, which experiences an above-average accident rate, will be especially busy at Cordova in those years. A demand for an estimated 18 hospital care beds is anticipated by 2000. This is within the capacity of the new hospital recommended for construction in the Cordova Comprehensive Plan.

Education. Under the mean scenario, Cordova's existing school facilities will begin to be overcrowded around 1990 (see Table 108). During the next decade, an estimated four new elementary and five secondary classrooms will have to be built to keep on par with the established standard. However, if Cordova sought to maintain its current high standards, then a demand a total of about 10 new elementary and 17 new secondary classrooms would be expected.

Recreation. 'New residential areas built for the 250 or so new families supported by OCS development would demand a few additional acres of neighborhood parks. Otherwise, the recreational amenities assumed for the base case should also be adequate for the mean scenario population.

Local Government Finances. The mean scenario stimulates a 15% increase in Cordova's population, but a much larger increase in its local tax revenue potential (see Tables 109 and 110). It is assumed that the City will annex Hinchinbrook Island, giving the City access to the real property tax base represented by the oil and gas terminals.

Upon completion of the oil terminal in 1988, Cordova's assessed valuation is projected to grow to the point that its oil and gas property tax revenues reach the limit allowed by State law. This situation persists through 2000, assuming Cordova maintains its present tax rate. At 2000, Cordova's projected annual property tax revenues alone stand at 285% above the base case compared to a 15 percent population increase. Other revenue sources, such as sales tax and intergovernmental revenues, are assumed to grow at the same rate as population, so that as a whole, total general fund revenues vary from about 60 percent to 100 percent above the base case.

The expenditures forecast for City operations and school support rises roughly in step with population growth, but more slowly than the revenue forecast (see Table 111). Thus, once Cordova is through the financial straits of the period of most rapid City expansion, its overall fiscal status should be enhanced under the premises of the mean scenario.

CAUSE/EFFECT OF IMPACTS

Noteworthy OCS development impacts upon Cordova arise almost wholly from the decision to make use of Cordova as the home base or “bedroom community” for the oil and LNG terminal personnel. Otherwise, Cordova is bypassed as an onshore site for OCS activities, except for minor logistic support. This situation greatly diminishes the potential for conflict between the established fishing industry and the offshore industries for use of Cordova’s limited harbor facilities and waterfront lands.

Fortunately for Cordova, under this scenario’s premises, the scale and timing of OCS-related growth should be fairly predictable, as information about the staffing needs for both terminal operations should be obtainable a couple of years before growth impacts occur.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

This scenario delivers to Cordova a predictable steep population increase of about 16 percent over a year's time. The major growth management issue should concern making best use of lead time for advance planning. By the occasion of final industry decisions to construct the oil and LNG terminals, Cordova should be ready to implement a fiscal strategy, including annexation of the industrial sites, and a public works program on a schedule that dovetails with the development schedule for the industrial facilities.

Problems of particular concern to the community will be "land and housing development and redevelopment, water supply and sanitary waste treatment, telephone system capacity and public safety facilities. It should be noted that these same problems are also of concern under the base case. The mean scenario will make the necessity of these improvements evident earlier and more acutely.

SUMMARY OF IMPACTS

OCS development impact on Cordova is expected to follow a well defined course. As events unfold in this scenario, decisions to build onshore industrial facilities on Hinchinbrook Island near, but physically isolated from town, should give Cordova two to three years' warning of impacts due to its eventual involvement as a "bedroom community" for the terminals' labor force. The growth impact will be momentarily substantial, about

16 percent in one year, and then will level off. The short-term critical impacts appear related to new residential land development and the capacity constraints of utility systems which would also need attention under the base case. Assuming that the City expands its boundaries to annex the Hinchinbrook Island terminal site, the City's property tax base should grow more than adequately over the long run to support expanded city services to meet growth impacts.

TABLE 101

FORECAST OF NET CHANGE IN HOUSING DEMAND
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi - Family	Trailer
1978	0	0	0	0	0
1979	82	27	14	8	5
1980	28	10	5	3	2
1981	138	46		13	10
1982	58	19	1::	5	4
1983	58	20	10	6	4
1984	56	19	10	5	4
1985	58	20	10	6	4
1986	78	28	14	8	6
1987	70	24	12	7	5
1988	550	216	110	62	44
1989	100	36	18	10	8
1990	60	20	10	6	4
1991	116	41	21	12	8
1992	76	26	13	8	5
1993	88	30	15	9	6
1994	80	27	14	7	6
1995	78	26	13	8	5
1996	96	33	14	9	7
1997	90	30	15	9	6
1998	90	30	15	9	6
1999	86	29	15	8	6
2000	102	34	17	10	7
TOTALS	2,238	791	401	228	162

Source: Alaska Consultants, Inc.

TABLE 102

ESTIMATED DEMAND FOR RESIDENTIAL LAND
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	19	2.7	1.1	3.8
Multifamily & Trailer	18	1.3	0.5	1.8
1981-85				
Single Family	63	9.1	3.5	12.6
Multifamily & Trailer	62	4.5	1.7	6.2
1986-90				
Single Family	161	23.2	9.0	32.2
Multifamily & Trailer	154	11.1	4.3	15.4
1991-95				
Single Family	73	10.5	4.1	14.6
Multifamily & Trailer	70	5.0	2.0	7.0
1996-2000				
Single Family	76	10.9	4.3	15.2
Multifamily & Trailer	74	5.3	2.1	7.4
TOTAL	770	83.6	32.6	116.2

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 103

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
MEAN PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	281	984	1,265
1979	290	1,014	1,304
1980	292	1,024	1,316
1981	306	1,070	1,376
1982	312	1,088	1,400
1983	318	1,106	1,424
1984	324	1,125	1,449
1985	330	1,143	1,473
1986	338	1,163	1,501
1987	345	1,184	1,529
1988	401	1,205	1,606
1989	411	1,226	1,637
1990	417	1,247	1,664
1991	429	1,272	1,701
1992	437	1,298	1,735
1993	446	1,324	1,770
1994	453	1,352	1,805
1995	462	1,380	1,842
1996	472	1,409	1,881
1997	481	1,441	1,922
1998	490	1,472	1,962
1999	499	1,504	2,003
2000	509	1,540	2,049

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 104

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
MEAN PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	281	35.1
1979	290	36.2
1980	292	36.5
1981	306	38.2
1982	312	39.0
1983	318	39.8
1984	324	40.5
1985	330	41.2
1986	338	42.2
1987	345	43.1
1988	401	50.1
1989	411	51.4
1990	417	52.1
1991	429	53.6
1992	437	54.6
1993	446	55.8
1994	453	56.6
1995	462	57.8
1996	472	59.0
1997	481	60.1
1998	490	61.2
1999	499	62.4
2000	509	63.6

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 105

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	6,905
1979	7,252
1980	7,467
1981	7,976
1982	8,284
1983	8,596
1984	8,910
1985	9,234
1986	9,622
1987	9,995
1988	11,814
1989	12,114
1990	12,294
1991	12,642
1992	12,870
1993	13,134
1994	13,374
1995	13,608
1996	13,896
1997	14,166
1998	14,436
1999	14,694
2000	15,000

Source: Alaska Consultants, Inc.

TABLE 106

ESTIMATED DISPOSABLE SOLID WASTES
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,750	16,700
1979	2,890	17,500
1980	2,980	18,000
1981	3,170	19,000
1982	3,250	19,700
1983	3,370	20,500
1984	3,530	21,400
1985	3,660	22,200
1986	3,780	23,000
1987	3,900	23,600
1988	4,570	27,700
1989	4,720	28,700
1990	4,880	34,400
1991	5,010	35,400
1992	5,100	36,000
1993	5,290	36,800
1994	5,310	37,400
1995	5,400	38,100
1996	5,510	38,900
1997	5,620	39,700
1998	5,730	40,400
1999	5,830	41,100
2000	5,950	42,000

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 107

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	640	800	--
1979	1.26	667	840	40
1980	1.27	677	860	20
1981	1.28	725	925	65
1982	1.29	743	958	33
1983	1.30	763	992	34
1984	1.31	781	1,023	31
1985	1.32	802	1,059	36
1986	1.33	830	1,104	45
1987	1.34	846	1,134	30
1988	1.35	1,053	1,422	288
1989	1.36	1,088	1,480	58
1990	1.37	1,117	1,530	50
1991	1.38	1,157	1,597	67
1992	1.39	1,183	1,644	47
1993	1.40	1,207	1,690	46
1994	1.40	1,234	1,728	38
1995	1.40	1,260	1,764	36
1996	1.40	1,287	1,802	38
1997	1.40	1,317	1,844	42
1998	1.40	1,346	1,884	40
1999	1.40	1,378	1,929	45
2000	1.40	1,410	1,974	45

Source: Alaska Consultants, Inc.

TABLE 108

SCHOOL ENROLLMENT FORECAST
MEAN PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	331	221	552
1979	341	228	569
1980	345	229	574
1981	361	241	602
1982	368	246	614
1983	375	250	625
1984	382	254	636
1985	389	259	648
1986	398	266	664
1987	407	271	678
1988	473	315	788
1989	485	323	808
1990	492	328	820
1991	506	337	843
1992	515	343	858
1993	525	351	876
1994	535	357	892
1995	544	363	907
1996	556	370	926
1997	567	377	944
1998	577	385	962
1999	588	392	980
2000	600	400	1,000

Source: Alaska Consultants, Inc.

TABLE 109

FORECAST OF CORDOVA SCHOOL DISTRICT REVENUES
MEAN PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	552	$ 205	$1,638	$25	$1,868
1979	569	224	1,789	27	2,040
1980	574	239	1,913	29	2,181
1981	602	266	2,127	32	2,425
1982	614	287	2,299	35	2,621
1983	625	310	2,481	38	2,829
1984	636	335	2,678	41	3,054
1985	648	362	2,892	44	3,298
1986	664	390	3,121	48	3,559
1987	678	425	3,398	52	3,875
1988	788	524	4,187	64	4,775
1989	808	569	4,550	69	5,188
1990	820	612	4,895	75	5,582
1991	843	667	5,335	81	6,083
1992	858	720	5,756	88	6,564
1993	876	779	6,230	95	7,104
1994	892	841	6,722	103	7,666
1995	907	906	7,247	111	8,264
1996	926	980	7,841	120	8,941
1997	944	1,060	8,475	129	9,664
1998	926	1,145	8,811	135	10,091
1999	980	1,214	9,712	148	11,074
2000	1,000	1,337	10,693	163	12,193

Source: Alaska Consultants, Inc.

a

TABLE 110

GENERAL FUND
REVENUE FORECAST
MEAN PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	Property Taxes		Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 381		$ 191	$ 545	$ 403	$1,520
1979	415		208	595	404	1,658
1980	445		223	637	471	1,776
1981	494		248	707	523	1,972
1982	533		267	784	565	2,129
1983	576		289	825	610	2,300
1984	622		312	891	658	2,483
1985	671		337	961	710	2,679
1986	1,755		363	1,037	766	3,921
1987	2,922		395	1,129	835	5,281
1988	4,824	b/	487	1,391	1,029	7,731
1989	5,412	b/	531	1,511	1,117	8,571
1990	5,670		571	1,625	1,202	9,068
1991	5,400	b/	622	1,772	1,311	9,105
1992	5,242	b/	672	1,912	1,415	9,241
1993	5,349	b/	727	2,068	1,530	9,674
1994	5,448	b/	784	2,233	1,651	10,116
1995	5,542	b/	846	2,408	1,781	10,577
1996	5,660	b/	915	2,606	1,928	11,109
1997	5,770	b/	989	2,817	2,084	11,660
1998	5,880	b/	1,069	3,042	2,250	2,241
1999	5,985	b/	1,133	3,225	2,385	2,728
2000	6,110	b/	1,248	3,552	2,628	3,538

a/ "Other" includes license fees, permits, interest earnings, sa e and rental of municipal property and miscellaneous other revenues.

b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

TABLE 111

FORECAST OF REVENUES AND OPERATING EXPENDITURES
MEAN PROBABILITY SCENARIO
CITY OF CORDOVA
1978- 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expendítures			Available for Capital Improvement
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$ 381	$1,139	$1,520	$1,261	$ 205	$1,466	$ 54*
1979	451	1,243	1,658	1,376	224	1,600	58
1980	445	1,331	1,776	1,474	239	1,713	63
1981	494	1,478	1,972	1,635	266	1,901	71
1982	533	1,596	2,129	1,766	287	2,053	76
1983	576	1,724	2,300	1,908	310	2,218	82
1984	622	1,861	2,483	2,060	335	2,395	88
1985	671	2,008	2,679	2,223	362	2,585	94
1986	1,755	2,166	3,921	2,398	390	2,788	1,133
1987	2,922	2,359	5,281	2,611	425	3,036	2,245
1988	4,824 b/	2,907	7,731	3,217	524	3,741	3,990
1989	4,824 b/	3,159	7,983	3,496	569	4,065	3,918
1990	5,670	3,398	9,068	3,761	612	4,373	4,695
1991	5,400 b/	3,705	9,105	4,101	667	4,768	4,337
1992	5,242 b/	3,999	9,241	4,425	720	5,145	4,096
1993	5,349 b/	4,325	9,674	4,787	779	5,566	4,108
1994	5,448 b/	4,668	10,116	5,166	841	6,007	4,109
1995	5,542 b/	5,035	10,577	5,572	906	6,478	4,099
1996	5,660 b/	5,449	11,109	6,030	980	7,010	4,099
1997	5,770 b/	5,890	11,660	6,519	1,060	7,579	4,081
1998	5,880 b/	6,361	12,241	7,040	1,145	8,185	4,056
1999	5,985 b/	6,743	12,728	7,463	1,214	8,677	4,051
2000	6,110 b/	7,428	13,538	8,220	1,337	9,557	3,981

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.
b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

Seward

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The main contributing factors to Seward's growth above the base case are the operation of the marine service base and pipe coating yard established there. Construction of the comprehensive service base and the pipe coating yard is not undertaken until justified by the discovery of oil and gas fields within range of Seward's port. Construction of the service base and pipe coating yard on Seward's waterfront calls for a large transient workforce. As with other major construction projects, housing for workers is assumed to be provided onsite in temporary camps. Regardless, the presence of these workers in town is expected to stimulate the local economy, though to a lesser degree than permanent resident employees would.

The service base and pipe coating yard are busiest during 1988-1991 when they are heavily engaged in supplying material for platform installation, development drilling and submarine oil and gas pipelaying. Afterwards, the pipeyard shuts down and the service base slows down, and Seward's growth returns to the pattern forecasted for the base case.

Future Employment

Seward's initial low level of involvement in offshore exploration adds less than 50 local jobs during the first half-dozen years of this scenario (see Table 112). The pace picks up with construction of the expanded marine service base--a one-year project that employs about 450 construction workers, the majority of whom are expected to be non-residents of Seward (see Tables 113 and 114).

In the aftermath of field development, total employment derived from OCS activities declines to an estimated 18 jobs, less than 1 percent of Seward's total economic base. Overall, this OCS scenario generates a mild boom-bust cycle at Seward, with the bust tempered by expansion in other unrelated sectors of the economy.

Future Population

Over the long run, Seward's permanent population is negligibly affected by OCS-related activities. Only for the period 1985-1991 is a significant portion (between 5 percent and 10 percent) of Seward's total population tied to OCS activities, for the most part during the years of peak support activity from the marine service base. Seward, in fact, suffers a net loss of resident population for a couple of years after OCS activities subside, until the growth momentum of the base case economic events takes up the slack.

TABLE 112

FORECAST OF EMPLOYMENT AND POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
SEWARD AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	256	257	279	326	830	444	401	441	553	567	571	574	579	586	592	598	605	611	617	624
Agriculture, Forestry and Fisheries	(103)	(104)	(120)	(140)	(152)	(156)	(160)	(168)	(184)	(204)	(216)	(218)	(220)	(222)	(224)	(226)	(228)	(230)	(232)	(234)
Mining	(3)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(8)	(8)	(9)
Manufacturing	(121)	(100)	(125)	(151)	(202)	(201)	(201)	(201)	(254)	(306)	(308)	(310)	(313)	(316)	(319)	(322)	(325)	(328)	(331)	(334)
Contract Construction	(29)	(49)	(30)	(31)	(472)	(83)	(35)	(67)	(110)	(52)	(41)	(40)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)
DISTRIBUTIVE INDUSTRIES	515	526	552	571	619	631	651	699	792	801	770	755	777	808	849	892	937	984	1,033	1,085
Transportation, Communications and Public Utilities	(75)	(81)	(92)	(97)	(108)	(121)	(127)	(154)	(215)	(211)	(161)	(123)	(113)	(110)	(113)	(116)	(119)	(122)	(125)	(12[illegible]
Trade	(237)	(239)	(247)	(254)	(273)	(274)	(281)	(291)	(308)	(315)	(325)	(336)	(352)	(369)	(387)	(406)	(426)	(447)	(469)	(49[illegible]
Finance, Insurance and Real Estate	(22)	(23)	(24)	(25)	(28)	(26)	(27)	(29)	(31)	(32)	(32)	(33)	(34)	(35)	(37)	(39)	(41)	(43)	(45)	(47
Service	(181)	(183)	(189)	(195)	(210)	(210)	(216)	(225)	(238)	(243)	(252)	(263)	(278)	(294)	(312)	(331)	(351)	(372)	(394)	(41[illegible]
GOVERNMENT	413	421	431	440	463	463	471	483	502	510	512	516	525	534	545	556	567	578	590	60[illegible]
TOTAL EMPLOYMENT	1,184	1,204	1,262	1,337	,912	I ,538	1,523	1,623	1,847	1,878	1,853	1,845	1,881	1,928	1,986	2,046	2,109	2,173	2,240	2,31[illegible]
Employees Resident in Construction Camps	(--)	(--)	(--)	(--)	(436)	(49)	(--)	(29)	(58)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--
TOTAL POPULATION -																				
SEWARD CITY	2,046	2,079	2,141	2,230	2,414	2,397	2,409	2,476	2,729	2,817	2,728	2,662	2,714	2,781	2,939	2,951	3,042	3,134	3,230	3,33[illegible]
SEWARD AREA	2,720	2,764	2,846	2,964	3,209	3,186	3,202	3,291	3,628	3,744	3,626	3,539	3,607	3,696	3,907	3,923	4,044	4,166	4,294	4,42[illegible]

Source: Alaska Consultants, Inc.

TABLE 113

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN 4041119 ALASKA - SEWARD AREA
1981 - 2000

Year	Service Base	Helicopter Service: Exploration	Helicopter Service: Development	Helicopter Service: Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
1981	8											8
1982	11											11
1983	20											20
1984	23											23
1985	27				436							463
1986	41				34				15			90
1987	44											44
1988	65								29			94
1989	119								58			177
1990	115											115
1991	67											67
1992	28											28
1993	16											16
1994	10											10
1995	10											10
1996	10											10
1997	10											10
1998	10											10
1999	10											10
2000	10											10

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 114

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - SEWARD
1981 - 2000

Year	Survey	Rigs	Platforms: Development Drilling	Platforms: Operations	Supply/Anchor/Tug Boats: Exploration	Supply/Anchor/Tug Boats: Development	Supply/Anchor/Tug Boats: Production	Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
1981	17				21					38
1982	21				33					54
1983	35				55					90
1984	37				65					102
1985	40				78					118
1986	31				65	14				11-0
1987	23				22	22				67
1988	17					37	7			61
1989	10					71	7			88
1990	4					56	7			67
1991						14	13			27
1992							13			13
1993							13			13
1994							13			13
1995							13			13
7996							13			13
1997							13			13
1998							13			13
1999							13			13
2000							13			13

Source: Dames and Moore/Alaska Consultants, Inc.

Social Impacts

In the larger context of other events, OCS development will have few social impacts upon Seward. Generally, the port facilities required at Seward for offshore support activities are compatible with the City's physical infrastructure and would probably be convertible to other uses when no longer in demand by the offshore industries. The OCS labor force's composition well matches the occupational structure of the City's workforce.

The short-term economic benefits of this scenario for Seward might be cited as a favorable social impact.

Impacts on Community Infrastructure

Housing and Residential Land. The general pattern of housing demand under the mean scenario anticipates a steady increase in demand interrupted by two relatively mild boom-bust cycles in response to the economic stimulus of service base construction and, later intensive service base activity around 1988-1989. The s" owdown of service base activities after 1990 might produce, for a per od, some excess capacity in the housing stock.

As a net result, the long-term demand for housing and residential land under this scenario eventually balances out at about the same level as the non-OCS scenario (see Tables 115 and 116).

Utilities. This scenario causes a bulge in Seward's growth curve from 1988 to 1991. The effect is to accelerate the date for putting in place those utility system improvements that would eventually be demanded to serve normal population growth (see Tables 117 to 121).

- Water. The additional water demand accruing from residential users and marine service base consumption can be satisfied by the water system improvements that the City is now completing.

- Sewer. Any additional sanitary waste treatment requirements arising under the mean scenario will be easily met within the capacity of the treatment plant that the City is proposing to install for its base case needs.

- Electric Power. Electric power has in recent years accounted for Seward's most nettlesome utility problems. Currently programmed improvements are probably adequate to meet Seward's demands to 1990 under the base case. However, under the mean scenario, an estimated additional 2,500 kw of capacity, including up to 1,600 kw for the marine service base, will be called for by about 1986.

- Solid Waste Disposal. The mean scenario does not significantly differ from the base case.

- Communications. The mean scenario does not significantly differ from the base case.

Public Safety

- Police. The mean scenario does not differ from the base case.

- Fire Protection. There should be no change in the demand for fire protection facilities over the base case.

Health and Social Services. The impact of the mean scenario is essentially similar to the base case.

Education. The minor enrollment increase projected under the mean scenario can be accommodated within existing school facilities (see Table 122).

Recreation. This scenario does not materially increase the long run demand for recreational facilities at Seward, but does advance the effective time of demand into the middle of the forecast period.

Local Government Finances. In contrast to Yakutat and Cordova under the mean scenario, Seward receives neither the boon of fattened industrial tax base nor the burden of coping with substantial community impacts. Consistent with the general tenor of this scenario for Seward, the overall pattern of local public revenues and expenditures is not much changed (see Tables 123 to 125).

CAUSE/EFFECTOF IMPACTS

The suitability of Seward's port as a base for servicing offshore activities contributes a boost to Seward's economy throughout the scenario. The boost is strongest during the four years when Seward's service base and pipe coating yard are busiest in support of field development; otherwise, OCS impacts are minor.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

The brief, steep spurt of growth of Seward will particularly affect in the short run the housing supply and residential land development for new residents. Because Seward already has high property tax and bonded indebtedness rates, it may encounter fiscal limits upon its ability to fund community development projects.

SUMMARY OF IMPACTS

OCS development in the mean scenario has little long-term growth impact upon Seward. For the most part it advances by a few years the deadline for community development programs that would be demanded for the base case. The OCS activities assigned to Seward appear compatible with the town's economic and physical structure.

TABLE 115

FORECAST OF NET CHANGE IN HOUSING DEMAND
MEAN PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	12	5	4	1	0
1980	46	17	11	5	1
1981	61	24	16	7	1
1982	45	17	11	5	1
1983	82	31	21	9	1
1984	118	45	30	13	2
1985	245	95	63	27	5
1986	- 25	- 10	- 7	- 3	0
1987	12	5	4	1	0
1988	83	33	22	9	2
1989	331	129	86	37	6
1990	118	44	29	13	2
1991	-112	- 46	- 31	- 13	- 2
1992	-83	- 33	- 22	- 9	- 2
1993	68	26	17	7	2
1994	89	34	23	9	2
1995	111	42	28	12	2
1996	116	44	29	13	2
1997	121	46	31	13	2
1998	122	46	31	13	2
1999	128	49	33	14	2
2000	135	51	34	15	2
TOTALS	1,793	694	463	198	33

Source: Alaska Consultants, Inc.

TABLE 116

ESTIMATED DEMAND FOR RESIDENTIAL LAND
MEAN PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	15	2.2	0.8	3.0
Multifamily & Trailer	7	0.5	0.2	0.7
1981-85				
Single Family	141	20.3	7.9	28.2
Multifamily & Trailer	71	5.1	2.0	7.1
1986-90				
Single Family	134	19.3	7.5	26.8
Multifamily & Trailer	67	4.8	1.9	6.7
1991-95				
Single Family	15	2.2	0.8	3.0
Multifamily & Trailer	8	0.6	0.2	0.8
1996-2000				
Single Family	158	22.8	8.8	31.6
Multifamily & Trailer	78	5.6	2.2	7.8
TOTAL	694	83.4	32.3	115.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 117

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
MEAN PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	245	1,369	,614
1979	246	1,375	,621
1980	250	1,400	,650
1981	256	1,419	,675
1982	260	1,438	,698
1983	268	1,467	,735
1984	279	1,526	,805
1985	302	1,602	,904
1986	300	1,607	,907
1987	301	1,614	1,915
1988	310	1,621	1,931
1989	341	1,707	2,048
1990	352	1,782	2,134
1991	341	1,799	2,140
1992	333	1,817	2,150
1993	339	1,871	2,210
1994	348	1,927	2,275
1995	367	1,986	2,353
1996	369	2,046	2,415
1997	380	2,110	2,490
1998	392	2,175	2,567
1999	404	2,242	2,646
2000	416	2,314	2,730

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 118

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
MEAN PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	245	30.6
1979	246	30.8
1980	250	31.3
1981	256	32.0
1982	260	32.5
1983	268	33.5
1984	279	34.9
1985	302	37.8
1986	300	37.5
1987	301	37.6
1988	310	38.8
1989	341	42.6
1990	352	44.0
1991	341	42.6
1992	333	41.6
1993	339	42.4
1994	348	43.5
1995	367	45.9
1996	369	46.1
1997	380	47.5
1998	392	49.0
1999	404	50.5
2000	416	52.0

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 119

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
MEAN PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	6,500
1979	6,601
1980	6,911
1981	7,208
1982	7,463
1983	7,826
1984	8,299
1985	9,146
1986	9,239
1987	9,446
1988	9,873
1989	10,884
1990	11,232
1991	10,878
1992	10,617
1993	10,821
1994	11,088
1995	11,721
1996	11,769
1997	12,132
1998	12,498
1999	12,882
2000	13,287

Source: Alaska Consultants, Inc.

TABLE 120

ESTIMATED DISPOSABLE SOLID WASTES
MEAN PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,590	15,700
1979	2,650	16,100
1980	2,750	16,700
1981	2,840	17,100
1982	2,930	17,800
1983	3,070	18,600
1984	3,290	19,900
1985	3,630	22,000
1986	3,630	22,000
1987	3,680	22,300
1988	3,820	23,100
1989	4,240	25,700
1990	4,460	27,000
1991	4,320	26,100
1992	4,210	25,500
1993	4,290	26,000
1994	4,400	26,600
1995	4,650	28,200
1996	4,670	28,300
1997	4,810	29,200
1998	4,960	30,000
1999	5,110	31,000
2000	5,280	31,900

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 121

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
MEAN PROBABILITY SCENARO
SEWARD AREA
1978- 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	990	1,238	---
1979	1.26	995	1,254	16
1980	1.27	1,012	1,285	31
1981	1.28	1,036	1,326	41
1982	1.29	1,053	1,358	32
1983	1.30	1,084	1,409	51
1984	1.31	1,129	1,479	70
1985	1.32	1,224	1,616	137
1986	1.33	1,214	1,615	- 1
1987	1.34	1,219	1,633	18
1988	1.35	1,252	1,690	
1989	1.36	1,381	1,878	1::
1990	1.37	1,425	1,952	74
1991	1.38	1,379	1,903	- 49
1992	1.39	1,346	1,871	- 32
1993	1.40	1,372	1,921	50
1994	1.40	1,406	1,968	47
1995	1.40	1,448	2,027	59
1996	1.40	1,492	2,089	62
1997	1.40	1,538	2,153	64
1998	1.40	1,584	2,218	65
1999	1.40	1,633	2,286	68
2000	1.40	1,684	2,358	72

Source: Alaska Consultants, Inc.

TABLE 122

SCHOOL ENROLLMENT FORECAST
MEAN PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	312	168	480
1979	313	169	482
1980	319	172	491
1981	327	176	503
1982	332	179	511
1983	342	185	527
1984	357	192	549
1985	386	208	594
1986	383	206	589
1987	385	207	592
1988	396	213	609
1989	436	235	671
1990	450	243	693
1991	436	235	671
1992	426	229	655
1993	434	233	667
1994	444	240	684
1995	470	253	723
1996	472	254	726
1997	486	262	748
1998	501	270	771
1999	516	278	794
2000	533	286	819

Source: Alaska Consultants, inc.

TABLE 123

FORECAST OF SEWARD SCHOOL DISTRICT REVENUES
MEAN PROBABILITY SCENARIO
CITY OF SEWARD a/
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$ 515	$1,157	$28	[illegible]
1979	482	548	1,231	30	[illegible]
1980	491	591	1:329	32	1,952
1981	503	641	1,444	35	2,120
1982	511	690	1,554	38	2,282
1983	527	754	1,699	41	2,494
1984	549	834	1,877	45	2,756
1985	594	956	2,153	52	3,161
1986	589	998	2,248	54	3,300
1987	592	1,070	2,423	58	3,551
1988	609	1,167	2,629	64	3,860
1989	671	1,363	3,069	74	4,506
1990	693	1,492	3,360	81	4,933
1991	671	1,531	3,449	83	5,063
1992	655	1,585	3,569	86	5,240
1993	667	1,711	3,853	93	5,657
1994	684	1,859	4,187	101	6,147
1995	723	2,003	4,692	114	6,809
1996	726	2,217	4,994	121	7,332
1997	748	2,422	5,455	132	8,009
1998	771	2,646	5,959	144	8,749
1999	794	3,838	6,391	155	9,384
2000	819	3,158	7,114	172	10,444

a/ The City of Seward does not raise any direct revenues for school purposes. The Kenai Peninsula Borough funds and operates a boroughwide school system. This table presents Seward's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes.

Source: Alaska Consultants, Inc.

TABLE 124

GENERAL FUND
REVENUE FORECAST
MEAN PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 536	N/A	$ 354	$ 649	$1,539
1979	571	N/A	377	691	1,639
1980	616	N/A	407	745	1,768
1981	776	N/A	441	809	2,026
1982	832	N/A	475	871	2,178
1983	906	N/A	519	951	2,376
1984	995	N/A	573	1,050	2,618
1985	1,311	N/A	657	1,206	3,174
1986	1,348	N/A	687	1,261	3,296
1987	1,401	N/A	736	1,351	3,488
1988	1,515	N/A	803	1,472	3,790
1989	1,735	N/A	937	1,720	4,392
1990	1,839	N/A	1,026	1,882	4,747
1991	1,880	N/A	1,053	1,932	4,865
1992	1,793	N/A	1,090	1,998	4,881
1993	1,926	N/A	1,177	2,160	5,263
1994	2,079	N/A	1,279	2,345	5,703
1995	2,313	N/A	1,432	2,628	6,373
1996	2,452	N/A	1,525	2,796	6,773
1997	2,666	N/A	1,666	3,056	7,388
1998	2,898	n/A	1,819	3,337	8,054
1999	3,100	N/A	1,952	3,582	8,634
2000	3,434	N/A	2,173	3,987	9,594

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

TABLE 125

FORECAST OF REVENUES AND OPERATING EXPENDITURES
MEAN PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total	City Operations	School Support b/	Total b/	
1978	$ 536	$1,003	$1,539	$1,432	$ 515	$1,947	$ 107
1979	571	1,068	1,639	1,525	548	2,073	114
1980	616	1,152	1,768	1,646	591	2,237	122
1981	776	1,250	2,026	1,784	641	2,425	242
1982	832	1,346	2,178	1,921	690	2,611	257
1983	906	1,470	2,376	2,097	754	2,851	279
1984	995	1,623	2,618	2,316	834	3,150	302
1985	1,311	1,863	3,174	2,658	956	3,614	516
1986	1,348	1,948	3,296	2,779	998	3,777	517
1987	1,401	2,087	3,488	2,978	1,070	4,048	510
1988	1,515	2,275	3,790	3,246	1,167	4,413	544
1989	1,735	2,657	4,392	3,791	1,363	5,154	601
1990	1,839	2,908	4,747	4,149	1,492	5,641	598
1991	1,880	2,985	4,865	4,259	1,531	5,790	606
1992	1,793	3,088	4,881	4,406	1,585	5,991	475
1993	1,926	3,337	5,263	4,762	1,711	6,493	501
1994	2,079	3,624	5,703	5,171	1,859	7,030	532
1995	2,313	4,060	6,373	5,794	2,003	7,797	579
1996	2,452	4,321	6,773	6,165	2,217	8,382	608
1997	2,666	4,722	7,388	6,738	2,422	9,160	650
1998	2,898	5,156	8,054	7,357	2,646	10,003	697
1999	3,100	5,534	8,634	7,897	2,838	10,735	737
2000	3,434	6,160	9,594	8,790	3,158	11,948	804

a/ Includes intergovernmental revenues and miscellaneous other revenues.
b/ The City of Seward does not make any direct expenditures for school support. The Kenai Peninsula Borough funds and operates a boroughwide school system. The figure for school support represents Seward's projected pro rata share of the Kenai Peninsula Borough's school expenditures but is not actually to be included in the City's budget.

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - 5 PERCENT SCENARIO

Introduction

Under this high scenario, very favorable initial findings on the Yakutat, Yakataga and Middleton Shelves promote an intensified exploration and field evaluation effort. Ultimately, 18 commercial oil and gas discoveries are brought into production totalling recoverable reserves of 4.4 billion barrels of oil and 13 trillion cubic feet of gas. Associated with field development and production is a full array of offshore and onshore industrial facilities (see Figures 7 through 9 and Table 83).

Due to the massive quantities of material required under this scenario for offshore field development (including installment of 22 production platforms, 630 production wells and 233 kilometers (145 miles) of submarine pipelines), large scale service bases are constructed at Yakutat and Seward. The base at Yakutat maintains a high level of activity throughout the producing life of the fields, but the Seward base is busiest during field development.

The offshore oil field on the Yakataga Shelf along with certain oil fields on the Yakutat and Middleton Shelves are brought into production with offshore storage and transfer facilities. As a consequence, apart from their logistic support, the development and operation of these fields cast few impacts upon the shoreside.

On the other hand, all gas production and most oil production from the Yakutat and Middleton fields is brought ashore by submarine pipeline to sites near Yakutat and Cordova. The major onshore product-handling facilities and their permanent employment specified under this scenario include:

- Yakutat oil terminal: 700,000 barrels per day capacity; 408 permanent jobs.

- Yakutat LNG plant: 2 billion cubic feet per day capacity; 102 permanent jobs.

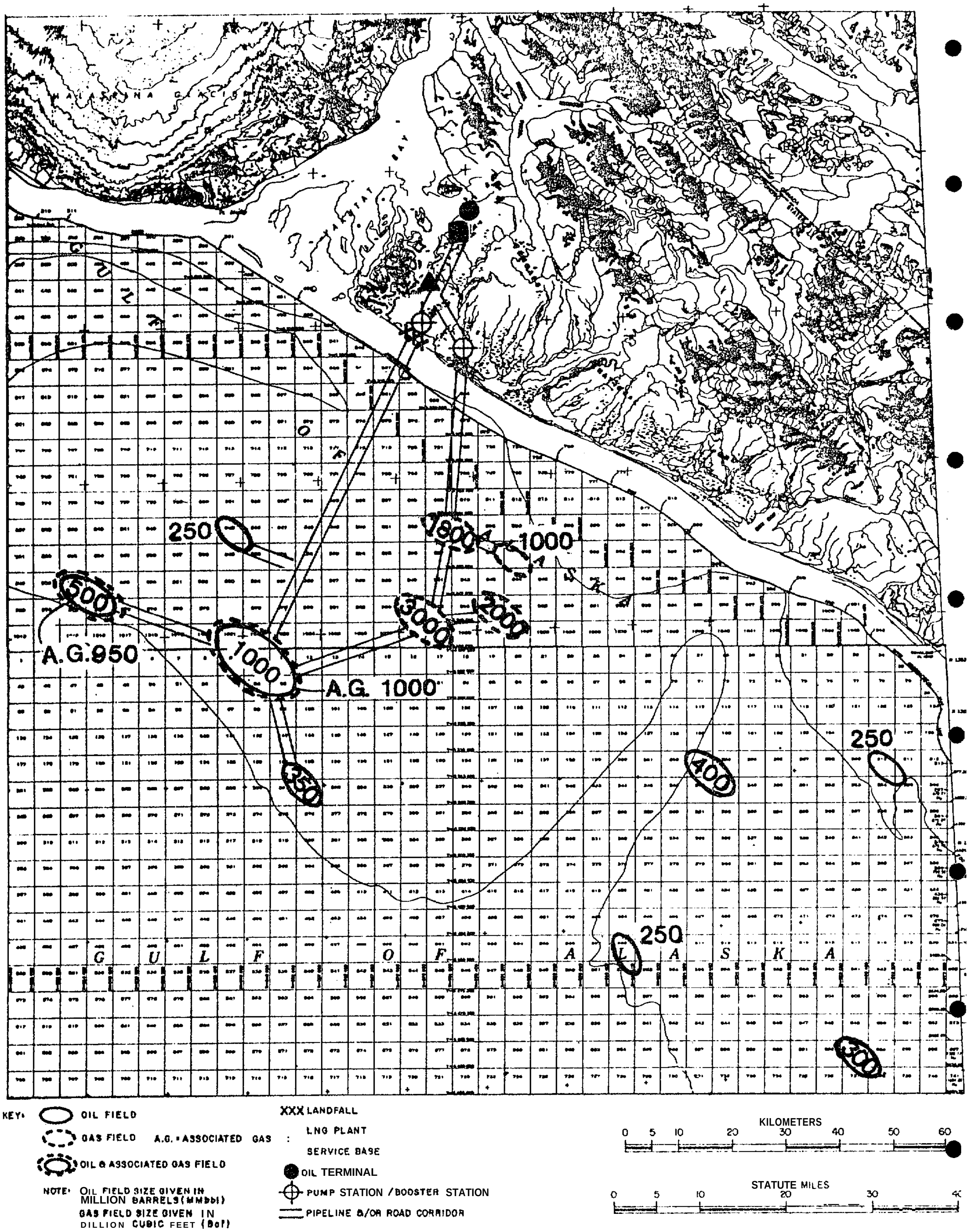
- Hinchinbrook Island (Cordova) oil terminal: 100,000 barrels per day capacity; 272 permanent jobs.

- Hinchinbrook Island (Cordova) LNG plant: .75 billion cubic feet per day capacity; 68 permanent jobs.

Thus, the regional pattern of OCS development in this high scenario closely resembles the pattern of the mean scenario, except that the scale of facilities and operations is larger. By virtue of its proximity to the supposed prime oil and gas discoveries, Yakutat is still the most impacted settlement, this time on an overwhelming scale. The industrial impacts from oil and gas development on the fields nearest Cordova are again deflected to Hinchinbrook Island, although Cordova absorbs the brunt of popu' ation growth generated by the Hinchinbrook Island terminals.

FIGURE 7

YAKUTAT SHELF AREA



SOURCE: DAMES & MOORE

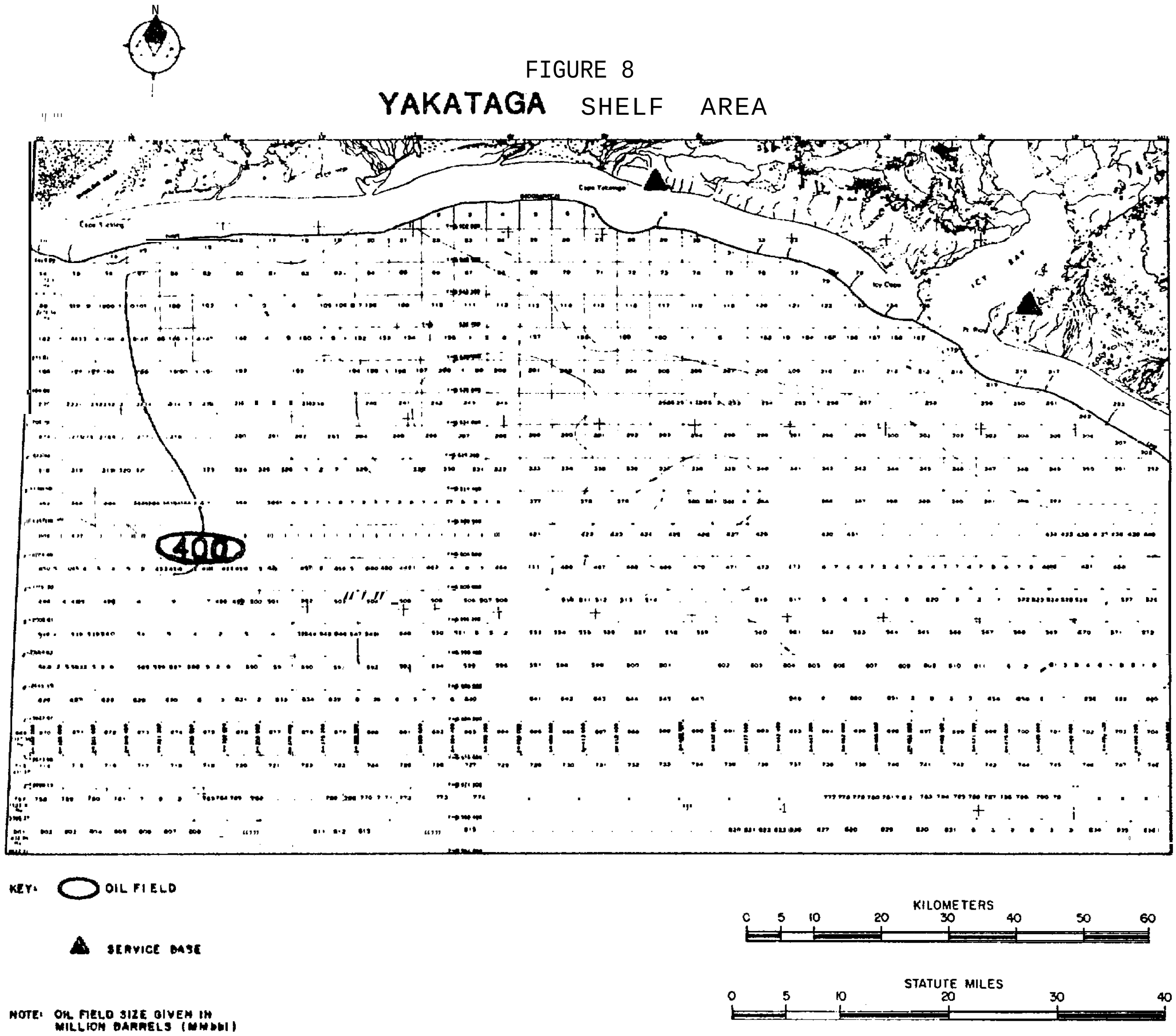
FIELD AND ONSHORE SITE **LOCATIONS**

5% PROBABILITY RESOURCE LEVEL **SCENARIO**

OIL, ASSOCIATED GAS **AND NON-ASSOCIATED GAS**

FIGURE 8

YAKATAGA SHELF AREA



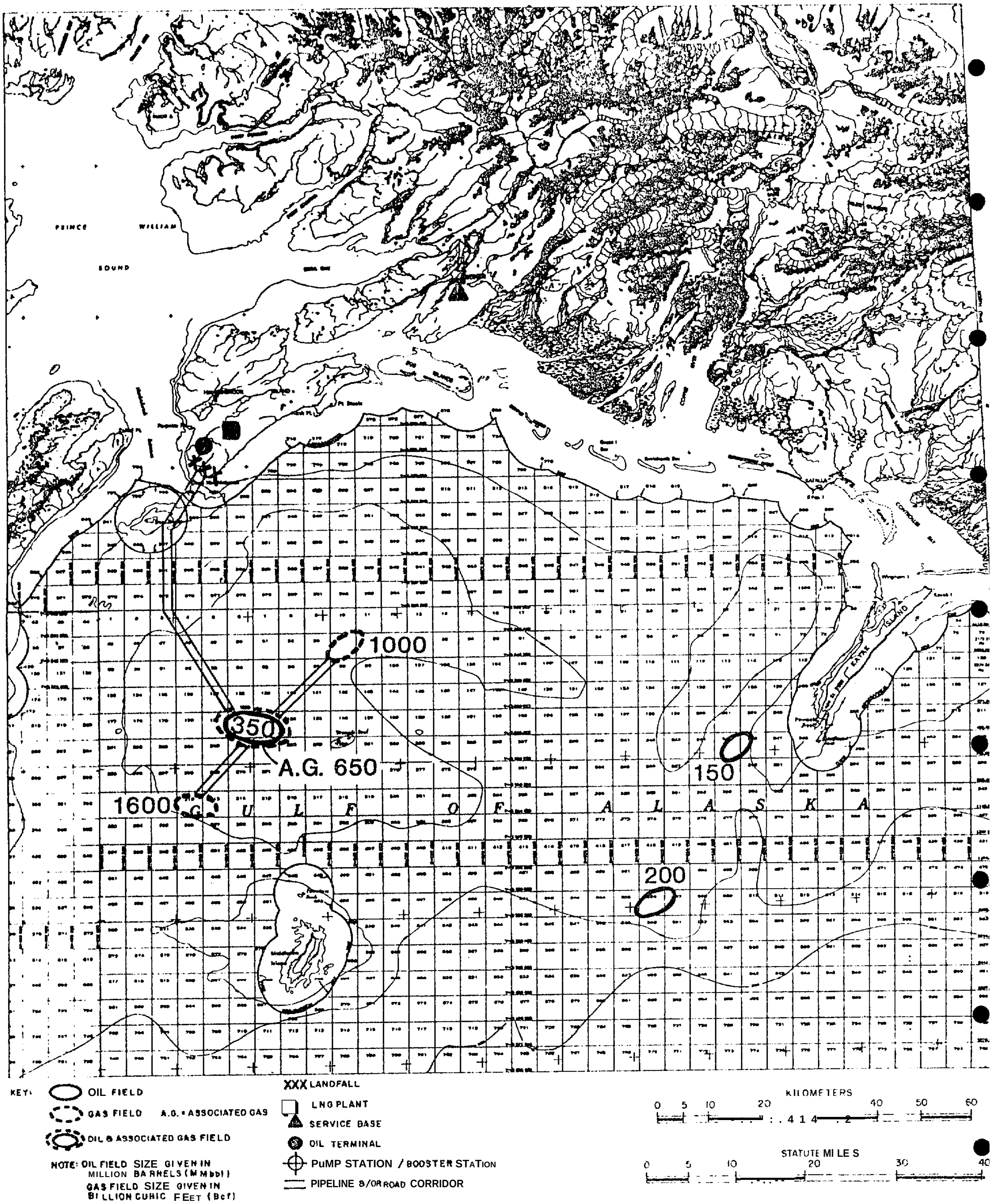
SOURCE, DAMES & MOORE

FIELD AND ONSHORE **SITE** LOCATIONS

5% **PROBABILITY** RESOURCE **LEVEL** SCENARIO

OIL ANQ ASSOCIATED GAS

FIGURE 9
MIDDLETON SHELF AREA



SOURCE : DAMES & MOORE

FIELD AND ONSHORE SITE LOCATIONS

5% PROBABILITY RESOURCE LEVEL SCENARIO

OIL, ASSOCIATED GAS AND NON-ASSOCIATED GAS

Seward is more actively engaged in providing logistic support under this scenario, but it is still too remote from the oil and gas fields to be a feasible landfall for product pipelines. Resurrection Bay at Seward has been touted as the most suitable harbor in the southcentral region of Alaska for construction of offshore production platforms. Nevertheless, the scenario assumes that it will prove economically more feasible to transport the platforms for installation in the Northern Gulf lease area from shipyards on the west coast or from Japan.

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The cause of Yakutat's additional growth in the 5% scenario is its multi-faceted engagement in the offshore oil and gas industry in the Northeast Gulf of Alaska. Throughout all phases of the offshore enterprise, Yakutat is drafted as the key upland site most favorably situated to support offshore activities. Large oil and gas discoveries are made and consequently, the tempo of offshore development is fast and emphatic.

From the outset of the sale, Yakutat's Monti Bay industrial waterfront is chosen as the preferred site from which to deliver the various offshore support functions to the fields in the Yakutat vicinity. The service base facilities are progressively expanded in response to the mushrooming scale of offshore development. Yakutat airport also comes heavily into play as the most central location at which to base most of the helicopter service operations which ferry offshore workers and some light material and equipment to and from job sites.

Large commercial discoveries of oil and gas relatively near offshore from Yakutat lead to the selection of a combination submarine pipeline/ upland marine oil terminal/oil tanker system as the most feasible transport system for oil production from the fields nearest Yakutat. (Some more distant oil fields on Yakutat and Yakataga Shelves are developed with offshore storage and product transfer systems). All commercial natural gas discoveries are piped ashore for liquefaction and transport by LNG tanker.

As Yakutat Bay monopolizes the harbor sites within feasible range of the offshore fields which also exhibit the physical traits necessary for marine operations, that area becomes the target for onshore delivery of oil and gas and related product-handling facilities. The decisions to construct these onshore facilities at remote sites, connected by road to Yakutat, shape the pace and structure of OCS-prompted growth at Yakutat.

While the onshore oil and gas terminals are built by a temporary construction workforce housed at the job site, beginning with the production phase the two terminals require an operating workforce that is larger than Yakutat's present population. These facilities create permanent jobs that draw new residents with suitable occupational skills to Yakutat. These newcomers are assumed to settle in or near the existing townsite rather than at separate housing areas.

Beyond the workers in the OCS industries, the process of town-building and economic expansion that the OCS payrolls instigate will also swell Yakutat's secondary economy many times over its present size.

Future Employment

This scenario quickly and permanently alters the economic structure of Yakutat. By the fourth year after the lease sale, OCS-related employment climbs to 1,213 jobs, more than double total employment under the base case, and never again falls below that level (see Table 126).

Service base operations and helicopter services add the first increment of *new* jobs, and continue to add employment up to a total of 250 jobs in the four busiest years of field development. During production, the service base and helicopter services contribute a steady 240 jobs (see Table 127).

Industrial construction activities to expand port facilities and complete the LNG plant and oil terminal dominate the employment picture beginning around 1984 and for the following four years. At peak, these construction projects contribute 3,493 jobs in 1985 and 3,580 jobs in 1986. These jobs are expected to be filled for the most part by transient workers.

The operation of the oil terminal contributes an estimated 408 permanent jobs and the LNG plant adds another 102.

The offshore workers employed on exploration rigs and development platforms (see Table 128) are assumed to be transient employees who will retain a home base outside Alaska. This assumption is changed for the more stable workforce that mans the production platforms at the end of the first decade. About 160 offshore jobs held by workers who become permanent residents are allocated to Yakutat.

The OCS employment has substantial multiplier effects on the local economy. Because most of the construction workforce is non-resident, the multiplier stimulus it provides to the local economy is relatively low compared to the effect of the permanent employment of the production phase. By production time, about 450 permanent jobs are indirectly created by OCS development, most in the sectors of trade, service and government.

Overall, OCS development quadruples employment levels in the Yakutat area by 1988, contributing a total of about 2,736 permanent jobs.

Future Population

The 5 percent scenario profoundly alters the population growth trend at Yakutat. By the close of the forecast period, the population has grown fourfold over the estimate for the non-OCS case. Most of the permanent population growth is related to the operations of the oil terminal and LNG plant, augmented by the steady local employment provided by ongoing offshore support functions. Yakutat's population is also inflated by the choice of Yakutat as home base by some offshore production workers.

The population influx is concentrated in the first decade of the forecast period. Growth occurs in fits and starts, mainly propelled by successive

TABLE 126

FORECAST OF EMPLOYMENT AND POPULATION
S PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
YAKUTAT AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	114	119	140	1,170	3,654	3,741	1,573	1,304	758	385	416	437	449	442	432	446	456	472	472	474
Agriculture, Forestry and Fisheries	(46)	(48)	(48)	(50)	(50)	(50)	(50)	(50)	(50)	(52)	(54)	(56)	(56)	(58)	(58)	(60)	(60)	(62)	(62)	(62)
Mining	(2)	(3)	(3)	(2)	(2)	(2)	(2)	(16)	(39)	(64)	(103)	(127)	(131)	(117)	(100)	(107)	(127)	(137)	(137)	(137)
Manufacturing	(50)	(51)	(61)	(63)	(67)	(67)	(69)	(157)	(160)	(185)	(185)	(190)	(196)	(201)	(205)	(205)	(206)	(209)	(209)	(209)
Contract Construction	(16)	(17)	(28)	(1,055)	(3,535)	(3,622)	(1,452)	(1,081)	(509)	(84)	(74)	(64)	(66)	(66)	(69)	(74)	(63)	(64)	(64)	(66)
DISTRIBUTIVE INDUSTRIES	146	187	209	270	338	363	376	603	889	1,149	1,204	1,132	1,143	1,155	1,135	1,131	1,136	1,144	1,144	1,146
Transportation, Communications and Public Utilities	(66)	(97)	(114)	(137)	(141)	(162)	(201)	(373)	(611)	(820)	(864)	(787)	(785)	(796)	(778)	(773)	(774)	(777)	(777)	(777)
Trade	(40)	(45)	(48)	(65)	(95)	(97)	(80)	(108)	(130)	(154)	(162)	(166)	(172)	(172)	(173)	(173)	(174)	(176)	(176)	(176)
Finance, Insurance and Real Estate	(7)	(7)	(7)	(12)	(20)	(21)	(17)	(22)	(28)	(35)	(35)	(35)	(36)	(37)	(36)	(37)	(38)	(38)	(38)	(38)
Service	(33)	(37)	(40)	(56)	(82)	(83)	(78)	(100)	(120)	(140)	(143)	(144)	(150)	(150)	(148)	(148)	(150)	(153)	(153)	(155)
GOVERNMENT	94	97	103	125	166	165	143	177	206	242	248	251	257	259	255	257	262	267	267	267
TOTAL EMPLOYMENT	354	402	452	1,565	4,158	4,269	2,092	2,084	1,853	1,776	1,868	1,820	1,849	1,856	1,822	1,834	1,854	1,883	1,883	1,887
Employees Resident in Construction Camps	(--)	(--)	(--)	(1,020)	(3,493)	(3,580)	(1,420)	(1,039)	(460)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
TOTAL POPULATION - YAKUTAT AREA	801	804	852	1,020	1,239	1,285	1,247	1,937	2,687	3,420	3,601	3,501	3,580	3,591	3,519	3,540	3,608	3,663	3,663	3,670

Source: Alaska Consultants, Inc.

TABLE 127

EST IMATED DIRECT OHS}! ORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCERAR1O
NORTHERN GULF OF ALASKA - YAKUTAT AREA
1981 - 2000

Year	Service Base	Helicopter Service Exploration	Helicopter Service Development	Helicopter Service Production	Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsites
1981	24	15										39
1982	42	25										67
1983	51	30										81
1984	57	35			375			645				1,112
1985	49	30			375			3,118				3,572
1986		25	5			50		3,530				3,678
1987	1::	18	10				435	985				1,563
1988	250	18	23	5			1,039				85	1,420
1989	268	10	31	10		25	435			204	85	1,068
1990	256	5	29	20						408	102	820
1951	274			35						408	102	853
1992	198			50						408	102	776
1993	179			75						408	102	764
1994	183			80						408	102	773
1995	165			80						408	102	755
19'36	160			80						408	102	750
1997	160			80						408	102	750
1998	160			80						408	102	750
1999	160			80						408	102	750
2000	160			80						408	102	750

Source: Dames and Moore/Alaska Consul tants, Inc.

TABLE 128

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - YAKUTAT

Year	Survey	Rigs	Platforms		Supply/Anchor/Tug Boats			Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
			Development Drilling	Operations	Exploration	Development	Production			
1981		149			78					277
1982		294			136					430
1983		353			164					517
1984		379			176					555
1985		341			158					499
1986		314			130	32		233	62	771
1987		210	28		98	57		700		1,093
1988		210	91	16	98	152	13	1,366		1,946
1989		112	294	32	76	133	26	1,867	83	2,623
1990		112	574	64	22	137	52	1,547	83	2,591
1991			771	112		114	91	1,699		2,787
1992			840	185		44	130	600		1,799
1993			726	258			195			1,179
1994			404	356			208			968
1995			84	431			208			723
1996				506			208			714
1997				606			208			814
1998				656			208			864
1999				656			208			864
2000				656			208			864

Source: Dames and Moore/Alaska Consultants, Inc.

decisions about Yakutat's role as support base, and oil terminal and LNG plant site. Furthermore, because the job mix will be constantly changing through the exploration and development phases, there will be very high population turnover as well as rapid population growth during this first decade. Population should stabilize, once the production phase begins around 1990.

IMPACT ASSESSMENT

Social Impacts

This scenario portends the most severe social impacts for Yakutat, resulting in a very large amount of growth and wholesale change in the social, physical and economic organization of the community. Within a few years, this scenario will inundate the traditional settlement with development equal to three new Yakutats. Inasmuch as most present Yakutat residents view with alarm the prospect of rapid growth from oil and gas, these social impacts will be adversely felt locally.

Among the most probable social impacts will be a serious housing crisis and shortcomings in the quality of public services (see Tables 129 to 139); inflation in the cost of goods and services, to the disadvantage of long-term residents not benefiting from the oil boom; social problems associated with the instability of a large, transient population, with high job turnover; environmental deterioration adversely affecting the subsistence and renewable resource base; and transfer of social, political and economic power from the Native community to newcomers who do not share the traditional local values. The emergent community would be shaped by its dependency on oil and gas development.

Impacts on Community Infrastructure

Housing and Residential Land. The housing needs of the population growth forecast under this scenario will require a massive construction program. It is estimated that Yakutat can expect to add about 800 units to its housing stock during the next decade. Demand is strong throughout the exploration and development phases, and peaks with the onset of production when an estimated 500 new dwellings will be demanded in two years.

It is estimated that about 68 hectares (167 acres) of land will be newly developed for residential use by 1990 to accommodate this expansion of the housing stock.

Utilities. The residential and industrial growth that occurs under this scenario will impose enormous increases in demand on the various util ty systems. The development of large tracts for new residential use will necessitate the installation of distribution networks as well as the development of basic plant capacity for water and power supply and waste treatment.

- Water. Yakutat is fortunately gifted with an abundant supply of groundwater suitable for community use. Development of additional public water supplies can be accomplished within a brief time and at relatively low cost, both for the community system and for the separate water requirements at the LNG plant and oil terminal sites. It is estimated that City water use will triple in volume over the forecast period. To accommodate this usage, construction of additional water storage facilities and extension of the public water distribution system to service the 800 additional dwellings expected to be occupied by 1990 will be demanded.

- Sewer. Yakutat's sewage collection and treatment systems are totally inadequate for the population growth of this scenario. The collection system will have to be extended to 800 new residences. The City's treatment plant, whose present design capacity is barely adequate for the target population under the base case, will thus be overloaded almost immediately after the commencement of offshore exploration. It is estimated that a facility with a treatment capacity of about 1,514 kiloliters (400,000 gallons) of sewage a day will be demanded by 1990 compared with a treatment capacity of about 284 kiloliters (75,000 gallons) per day under the base case.

  It is important to note that the City will no longer qualify for aid in facility construct on from the U.S. Public Health

Service which has funded and supervised installation of the existing water and sewer system. That program is limited to projects of benefit primarily to Alaska Natives.

Electric Power. The power plant at Yakutat has a firm peak power capacity of 1,225 kw. Even if the power company proceeds to purchase the 1,200 kw unit it is considering, its capacity would again be fully used within a two or three year period after the lease sale. As offshore development accelerates, community power demand rises precipitously, attaining an estimated capacity requirement of 10,260 kw by 1990. Thereafter, demand increases slowly, rising to about 11,000 kw by 2000. Thus, Yakutat's power system will have to take a giant step up in capacity in a short time, merely to meet community needs.

Under the high scenario, estimated industrial power consumption for construction projects and for operation of the LNG plant will exceed many times over non-industrial use at Yakutat. While it is impossible to make a confident estimate of LNG plant power consumption without the details of plant design, available data suggests that the proposed LNG plant operation for this scenario may use about 40,000 kw daily or about four times the power requirements of the entire community. Also, the marine service base has a peak power usage estimated at 3,200 kw.

The LNG plant will have use of natural gas for power generation, and can achieve a much lower unit cost than can be realized by the small diesel units that the power utility uses. If it were feasible for the local power company to purchase bulk power from the LNG plant, it should become possible for the utility to deliver electricity to ts customers at cheaper rates and without the large capita" investment in relatively inefficient diesel generators that would otherwise be imperative.

- Solid Waste Disposal. Despite the estimate that the volume of wastes in this scenario will grow about four times over the base case and almost 10 times the present level, it is not anticipated that disposal of this waste will present a major problem or call for a major capital investment. Since it would be environmentally preferable to designate a single solid waste disposal site for the entire road-connected area, including the terminals, the destination of industrial solid wastes is in this instance a matter of concern. It is estimated that the industrial plants will produce high volumes of waste debris during the construction period and continue to produce industrial wastes thereafter. Still, the City's landfill site should be able to accept the waste materials.

- Communications. The existing telephone exchange has the capacity to handle 400 telephone hook-ups. The forecast is that this system capacity will be exceeded by the mid-1980s and by 1990 the system's capacity requirement will near 1,400 hook-ups.

Public Safety

- Police. Yakutat can expect a peak of eleven police officers and about six new jail cells during the height of construction activity around 1984-1986. Thereafter, the demand for police services should level off or decline.

- Fire Protection. This forecast would be essentially the same as under the mean scenario.

Health and Social Services. Under this scenario, Yakutat reaches the threshhold population needed to justify a local hospital with 12 to 15 general care beds by about 1990. Yakutat would also be able to support two resident physicians and the various professional personnel needed to staff the hospital.

Due to increased need for community mental health and social services, additional offices and staff will have to be provided by about 1985, when the influx of construction workers peaks.

Education. School enrollments are forecast to reach about five times the base line level of 1978. Yakutat's elementary and secondary school buildings are in excellent condition and more than adequate for base case needs. However, enrollment growth under the 5 percent scenario should result in the City's having to double school capacity in order to maintain minimum educational standards.

It is estimated that a minimum of eight additional elementary classrooms and eight secondary classrooms will be demanded by about 1990, at which time the largest increases in enrollment will occur.

Recreation. The City would be responsible for recreational services for about 650 more families under this scenario than under the base case. Substantial additions to the community's recreational facilities will therefore be demanded, particularly more space for indoor sports like swimming and basketball and an expansion of the small boat harbor capacity by three to four times existing capacity. This scenario also poses the threat of competition among subsistence, commercial and recreational users for the right to harvest the Yakutat area's fish and wildlife resources. Heavy use pressure could degrade the recreational quality of accessible outdoor recreational areas.

Since the great burst of growth occurs toward the end of the 1980's, the problems of recreational facilities and recreational resource management should be felt most acutely at that same time.

Local Government Finances. As with the mean scenario, extraordinary growth in Yakutat's local property tax base eventually generates ample public revenues for local government. Until the capital-intensive oil and gas terminals start to add to the tax base in 1987, local revenues from various sources are projected to grow in step with population. Expenditures, too, are conservatively expected to rise at the same per capita rate. Thus, at the outset, Yakutat will not have any unusual source of funds to cushion initial growth impacts or to initiate public improvements in anticipation of later growth. Beginning in 987, Yakutat's property tax revenues reach the statutory limitation set on "ocal governments' authority to tax certain oil and gas properties and are expected to remain at the limit for the rest of the scenario. Overall, Yakutat's revenue situation is most favorably affected during the early years of production. Toward the end of the scenario, due to inflation and the constraints of AS 29.53.045(b) on the City's capacity to levy taxes, the actual purchasing power of municipal revenues approaches the 1978 level.

CAUSE/EFFECT OF IMPACTS

Because of its closeness to the oil and gas fields assigned to the Yakutat and Yakataga Shelves under this scenario, Yakutat becomes the chief base for the offshore industry in the Northeast Gulf of Alaska Construction and operation of the large marine service base on Monti Bay and oil and LNG terminals within the road-connected area promote rap·d in-migration of new workers and their families. This major growth results in a year 2000 population of 3,670 residents, compared to the City of Yakutat's baseline 406 residents in 1978 and a base case forecast of 934 persons for the Yakutat area by 2000. New industrial, residential and public works construction transform the physical and social fabric of Yakutat.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

In order to accommodate growth under this OCS development scenario, the City can expect to accomplish a comprehensive community development program that would quadruple the capacity of the community infrastructure over the base case forecast. As town growth is not spread evenly over the forecast period, but is bunched up in just a couple of years, it is expected that housing and public facilities and services will be overloaded until there is time to complete a housing construction and capital improvements program. Growth management will also call heavily upon the City government's abilities to carry out critical community development planning, financial planning and administrative tasks under urgent circumstances. The City will be hard-pressed to keep up with the financial burdens of community growth until the plentiful revenues from the industrial tax base become available.

The major social issue at Yakutat will be the changes in the economic and social order that oppose the survival of the cultural identity of the Yakutat Tlingits. Under this scenario, the socioeconomic base and cultural coherence of the traditional settlement threatens to be dissolved in the flood of new development. The determined resistance of Yakutat Natives to this prospect may set apart original residents and newcomers.

SUMMARY OF IMPACTS

The 5 percent scenario is expected to engender a high degree of growth in the Yakutat area, as Yakutat Bay becomes the center of major offshore oil and gas operations for the Gulf of Alaska sale area. Population in the Yakutat area is forecast to increase to about 3,600 persons by 2000 or sixfold over the 1980 baseline and fourfold over the non-OCS forecast for 2000. This rapid growth would transform Yakutat from a small predominately Tlingit fishing community to a semi-urban town mainly supported by employment in various activities related to offshore oil and gas development.

This transition is expected to be accompanied by acute problems of physical growth and social change. Town growth is forecast to create a demand for 800 new housing units, along with related land development. Expansion of residential utilities, particularly power supply and sewage collection and treatment, will entail major capital improvement programs. Similarly, the demand for service programs for education, recreation, public safety and health and social services will, for a time, likely outpace the City's ability to provide.

Finally, these marked changes in economic structure, town size and the scope of the role of local government will probably result in a shift of local political control from the traditional Tlingit community to the more numerous newcomers.

TABLE 129

FORECAST OF NET CHANGE IN HOUSING DEMAND
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	2	3	2	0	1
1979	9	6	4	1	1
1980	28	16	10	2	4
1981	104	45	30	5	3
1982	96	40	27	4	9
1983	48	21	14	2	5
1984	184	74	50	8	16
1985	203	80	53	9	18
1986	40	16	11	2	3
1987	- 56	- 25	- 17	- 3	- 5
1988	692	33	22	4	7
1989	674	270	1 81	30	59
1990	597	236	158	26	52
1991	35	12	8	1	3
1992	-160	- 66	- 44	- 7	- 15
1993	57	20	14	2	4
1994	47	17	11	2	4
1995	- 22	- 11	- 7	- 1	- 3
1996	1	0	0	0	0
1997	8	3	2	0	1
1998	25	8	5	1	2
1999	0	0	0	0	0
2000	7	2	1	1	1
TOTALS	2,619	800	536	88	176

Source: Alaska Consultants, Inc.

TABLE 130

ESTIMATED DEMAND FOR RESIDENTIAL LAND
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	16	2.9	1.1	4.0
Multifamily & Trailer	9	0.8	0.3	1.1
1981-85				
Single Family	174	31.3	12.2	43.5
Multifamily & Trailer	86	7.7	3.1	10.8
1986-90				
Single Family	355	63.9	24.9	88.8
Multifamily & Trailer	175	15.8	6.1	21.9
1991-95				
Single Family	- 18	- 3.2	- 1.3	- 4.5
Multifamily & Trailer	- 10	- 0.9	- 0.3	- 1.2
1996-2000				
Single Family	8	1.4	0.6	2.0
Multifamily & Trailer	5	0.4	0.2	0.6
TOTAL	800	120.2	46.9	167.1

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 131

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
5 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978- 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	51	181	231
1979	52	181	233
1980	53	188	241
1981		188	276
1982	1::	192	292
1983	106	195	301
1984	128	195	323
1985	155	197	352
1986	161	199	360
1987	156	204	360
1988	242	209	451
1989	336	209	545
1990	428	220	648
1991	450	225	675
1992	438	229	667
1993	448	238	686
1994	449	244	693
1995	440	249	689
1996	442	253	695
1997	451	256	707
1998	458	261	719
1999	458	261	719
2000	459	263	722

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 132

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
5 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	51	6.4
1979	52	6.5
1980	53	6.6
1981	88	11.0
1982	100	12.5
1983	106	13.2
1984	128	16.0
1985	155	19.4
1986	161	20.1
1987	156	19.5
1988	242	30.2
1989	336	42.0
1990	428	53.5
1991	450	56.2
1992	438	54.8
1993	448	56.0
1994	449	56.1
1995	440	55.0
1996	442	55.2
1997	451	56.4
1998	458	57.2
1999	458	57.2
2000	459	57.4

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 133

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	1,418
1979	1,469
1980	1,570
1981	1,876
1982	2,171
1983	2,343
1984	2,856
1985	3,531
1986	3,726
1987	3,679
1988	5,811
1989	8,061
1990	10,260
1991	10,803
1992	10,503
1993	10,740
1994	10,773
1995	10,557
1996	10,620
1997	10,824
1998	10,989
1999	10,989
2000	11,010

Source: Alaska Consultants, Inc.

TABLE 134

ESTIMATED DISPOSABLE SOLID WASTES
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978- 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	560	3,420
1979	590	3,550
1980	630	3,790
1981	740	4,460
1982	850	5,160
1983	920	5,580
1984	1,130	6,860
1985	1,400	8,480
1986	1,460	8,880
1987	1,430	8,690
1988	2,250	13,620
1989	3,140	19,050
1990	4,070	24,660
1991	4,290	25,960
1992	4,170	25,240
1993	4,260	25,810
1994	4,230	25,890
1995	4,190	25,370
1996	4,210	25,220
1997	4,290	26,010
1998	4,360	26,410
1999	4,360	26,410
2000	4,370	26,460

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 135

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978- 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	183	229	3
1979	1.26	189	238	9
1980	1.27	205	260	22
1981	1.28	250	320	60
1982	1.29	290	374	54
1983	1.30	311	404	30
1984	1.31	385	504	100
1985	1.32	465	614	110
1986	1.33	481	640	26
1987	1.34	456	611	- 29
1988	1.35	489	660	49
1989	1.36	759	1,032	372
1990	1.37	995	1,363	331
1991	1.38	1,007	1,390	27
1992	1.39	941	1,308	- 82
1993	1.40	961	1,345	37
1994	1.40	978	1,369	24
1996	1.40	967	1,354	- 15
1997	1.40	967	1,354	0
1998	1.40	970	1,358	4
1999	1.40	978	1,369	11
2000	1.40	978	1,369	0

Source: Alaska Consultants, Inc.

TABLE 136

SCHOOL ENROLLMENT FORECAST
5 PERCENT PROBABILITY SCENARIO
YAKUTAT AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	92	61	153
1979	90	60	150
1980		60	151
1981	1;;	68	170
1982	111	74	185
1983	112	75	187
1984	129	85	214
1985	149	99	248
1986	154	103	257
1987	150		249
1988	232	1::	387
1989	322	215	537
1990	410	234	684
1991	432	288	720
1992	420	280	700
1993	430	286	716
1994	431	287	718
1995	422	282	704
1996	425	283	708
1997	433	289	722
1998	440	293	733
1999	440	293	733
2000	440	294	734

Source: Alaska Consultants, Inc.

TABLE 137

FORECAST OF YAKUTAT SCHOOL DISTRICT REVENUES
5 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	153	$13	$ 623	$13	$ 649
1979	150	13	647	13	673
1980	151	14	691	14	719
1981	170	17	824	17	858
1982	185	20	951	20	991
1983	187	21	1,019	21	1,061
1984	214	26	1,237	26	1,289
1985	248	32	1,519	32	1,583
1986	257	35	1,658	35	1,728
1987	249	36	1,713	36	1,785
1988	387	59	2,822	59	2,940
1989	537	87	4,150		4,324
1990	684	117	5,604	1!;	5,838
1991	720	131	6,254	131	6,516
1992	700	135	6,445	135	6,715
1993	716	146	6,989	146	7,281
1994	718	155	7,426	155	7,736
1995	704	161	7,720	161	8,042
1996	708	172	8,228	172	8,572
1997	722	186	8,896	186	9,268
1998	733	200	9,572	200	9,972
1999	733	208	9,969	208	10,385
2000	734	225	10,772	225	11,222

Source: Alaska Consultants, Inc.

TABLE 138

GENERAL FUND
REVENUE FORECAST
5 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 139	$ 50	$ 88	$ 80	$ 357
1979	149	54	95	85	383
1980	164	59	104	94	421
1981	368	104	183	166	821
1982	430	125	220	200	975
1983	479	140	247	225	1,091
1984	1,178	178	314	285	1,955
1985	2,633	230	404	367	3,634
1986	2,847	251	441	401	3,940
1987	4,000 b/	260	456	415	5,131
1988	4,464 b/	427	752	684	6,327
1989	4,720 b/	629	1,105	1,005	7,459
1990	5,130 b/	848	1,491	1,356	8,825
1991	5,402 b/	947	1,665	1,513	9,527
1992	5,252 b/	975	1,716	1,560	9,503
1993	5,370 b/	1,057	1,860	1,691	9,978
1994	5,386 b/	1,124	1,977	1,797	10,284
1995	5,278 b/	1,168	2,054	1,867	10,367
1996	5,310 b/	1,245	2,190	1,990	10,735
1997	5,412 b/	1,346	2,366	2,151	11,275
1998	5,494 b/	1,448	2,546	2,314	11,802
1999	5,494 b/	1,505	2,655	2,410	12,064
2000	5,505 b/	1,627	2,870	2,606	12,608

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

b/ property tax revenues limited to $1,500 annually Per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

TABLE 139

FORECAST OF REVENUES AND OPERATING EXPENDITURES
5 PERCENT PROBABILITY SCENARIO
CITY OF YAKUTAT
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements
	Property Tax	Other Revenues	Total a/	City Operations	School Support	Total	
1978	$ 139	$ 218	$ 357	$ 289	$13	$ 302	$ 55
1979	149	234	383	310	13	323	60
1980	164	257	421	340	14	354	67
1981	368	453	821	600	17	617	204
1982	430	545	975	722	20	742	233
1983	479	612	1,091	812	21	833	258
1984	1,178	777	1,955	1,031	26	1,057	898
1985	2,633	1,001	3,634	1,327	32	1,359	2,275
1986	2,847	1,093	3,940	1,449	35	1,484	2,456
1987	4,000 b/	1,131	5,131	1,500	36	1,536	3,595
1988	4,464 b/	1,863	6,327	2,470	59	2,529	3,798
1989	4,720 b/	2,739	7,459	3,631	87	3,718	3,741
1990	5,130 b/	3,695	8,825	4,899	117	5,016	3,809
1991	5,402 b/	4,125	9,527	5,469	131	5,600	3,927
1992	5,252 b/	4,251	9,503	5,636	135	5,771	3,732
1993	5,370 b/	4,608	9,978	6,110	146	6,256	3,722
1994	5,386 b/	4,898	10,284	6,494	155	6,649	3,635
1995	5,278 b/	5,089	10,367	6,747	161	6,908	3,459
1996	5,310 b/	5,425	10,735	7,193	172	7,365	3,370
1997	5,412 b/	5,863	11,275	7,773	186	7,959	3,316
1998	5,494 b/	6,308	11,802	8,364	200	8,564	3,238
1999	5,494 b/	6,570	12,064	8,711	208	8,919	3,145
2000	5,505 b/	7,103	12,608	9,417	225	9,642	2,966

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.
b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

COMMUNITY FORECASTS

Significant Factors Affecting Growth

The development factors causing growth at Cordova in the 5 percent scenario are similar in kind but more powerful in scale than in the mean scenario. The geographic considerations persist that previously ruled out Cordova as a candidate for a major service base or as a pipeline landfall site. Thus, Cordova is again more or less untouched by OCS impacts during the first six to eight years of post-lease exploration and development activity, despite the larger scale of OCS operations premised under this scenario. A larger construction workforce is assigned onsite to the Hinchinbrook Island projects, but these workers are assumed to be transient passengers through Cordova to other destinations rather than locally resident.

The OCS impacts are delayed until production begins toward the end of the 1980's. At that time Cordova is affected through its function as the home community of the commuting labor force for the Hinchinbrook Island terminals. Under this scenario, a large operating workforce--about double the number of the mean scenario--is allotted to the terminals, because the manning requirements for the terminal facilities are about double the requirements of the mean scenario. The overall direct and indirect impacts also double.

As the schedule of development events becomes fixed, Cordova should have a two to three year period for advance capital improvements planning and, as funds allow, implementation to build the infrastructure needed to accommodate future growth.

Future Employment

Initial impacts on Cordova are light, adding less than 25 OCS jobs to Cordova's payrolls through the exploration phase (see Tables 140 to 142).

Over the second decade of OCS development, this scenario abruptly adds an estimated 675 extra jobs to Cordova's employment base compared to the non-OCS case. About two-thirds of these jobs are directly OCS related, with the remainder arising in the secondary economy, mostly in the sectors of trade, service and government.

Of the 450 OCS-related jobs about 340 or 75 percent are directly tied to the oil and gas terminal operations. Miscellaneous marine and air transportation support serv ces add another 60 jobs. As offshore platform activities shift into routine maintenance and production operations, it is projected that a portion of the offshore platform labor force will choose to transfer its place of residency to Cordova.

The oil and gas terminal construction projects are estimated to require 1,000 and 1,600 man-years of onsite labor respectively, with little spillover effect on Cordova.

Future Population

Early exploration adds fewer than 50 new residents to Cordova's population. The construction of an oil terminal and LNG plant on Hinchinbrook Island draws a large transient workforce to the Cordova area, but, as it is expected that the workforce will be housed at on-site construction camps, these projects will have negligible population impact on the settlement of Cordova.

The major stimulus to permanent population growth in Cordova, as at Yakutat, will stem from the permanent workforce employed in the operations of the oil terminal and LNG plant on Hinchinbrook Island. These workers are assumed to commute daily from Cordova. They and their families thus will directly and indirectly add to the employment and population base at Cordova. The long-term forecast after 1990 is for OCS-related activities to increase Cordova's population by about 1,350 residents or an increased one-third over the base case population.

IMPACT ASSESSMENT

Social Impacts

OCS impacts at Cordova will focus on the people employed by the industry rather than on the oil and gas operations. The sudden rapid town growth envisioned in the scenario promises to tax severely Cordova's ability to organize its resources to build the housing and public improvements that

TABLE 140

FORECAST OF EMPLOYMENT AND POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
COROOVA AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
COMMODITY PRODUCING INDUSTRIES	732	743	753	765	777	941	1,669	2,086	1,250	989
Agriculture, Forestry and Fisheries	(418)	(424)	(430)	(436)	(443)	(450)	(457)	(464)	(471)	(478)
Mining	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(17)	(45)	(54)
Manufacturing	(289)	(293)	(297)	(301)	(306)	(311)	(317)	(323)	(329)	(406)
Contract Construction	(23)	(24)	(24)	(25)	(25)	(177)	(892)	(1,282)	(405)	(51)
DISTRIBUTIVE INDUSTRIES	371	387	403	418	428	432	469	504	664	919
Transportation, Communications and Public Utilities	(80)	(86)	(92)	(98)	(99)	(90)	(98)	(108)	(240)	(427)
Trade	(161)	(166)	(171)	(176)	(181)	(187)	(.201)	(213)	(227)	(260)
Finance, Insurance and Real Estate	(34)	(35)	(36)	(36)	(36)	(37)	(40)	(42)	(44)	(50)
Service	(96)	(100)	(104)	(108)	(112)	(118)	(130)	(141)	(153)	(182)
GOVERNMENT	404	408	412	417	421	427	441	454	469	509
TOTAL EMPLOYMENT	1,507	1,538	1,568	1,600	1,626	1,800	2,579	3,044	2,383	2,417
Employees Resident in Construction Camps	(--)	(--)	(--)	(--)	(--)	(150)	(861)	(1,247)	(367)	(--)
TOTAL POPULATION - CORDOVA CITY	2,455	2,506	2,555	2,607	2,649	2.688	2,799	2,928	3,285	3,938
CORDOVA AREA	3,014	3,076	3,136	3,200	3,252	3,300	3,436	3,594	4,032	4,834

INDUSTRY CLASSIFICATION/YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	991	982	995	1,024	1,048	1,067	1,082	1,095	1,110	1,125
Agriculture, Forestry and Fisheries	(485)	(492)	(499)	(506)	(514)	(522)	(530)	(538)	(546)	(554)
Mining	(45)	(24)	(24)	(40)	(50)	(55)	(56)	(56)	(56)	(57)
Manufacturing	(411)	(416)	(421)	(426)	(431)	(436)	(441)	(446)	(452)	(458)
Contract Construction	(50)	(50)	(51)	(52)	(53)	(54)	(55)	(55)	(56)	(56)
DISTRIBUTIVE INDUSTRIES	947	965	984	1,009	1,033	1,057	1,082	1,107	1,132	1,152
Transportation, Communications and Public Utilities	(440)	(445)	(446)	(448)	(449)	(451)	(452)	(453)	(454)	(448)
Trade	(267)	(273)	(282)	(292)	(304)	(314)	(325)	(336)	(347)	(358)
Finance, Insurance and Real Estate	(51)	(52)	(52)	(53)	(53)	(54)	(55)	(56)	(56)	(57)
Service	(189)	(195)	(204)	(216)	(227)	(238)	(250)	(262)	(275)	(289)
GOVERNMENT	512	512	516	523	530	535	540	545	550	556
TOTAL EMPLOYMENT	2,450	2,459	2,495	2,556	2,611	2,659	2,704	2,747	2,792	2,833
Employees Resident in Construction Camps	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
TOTAL POPULATION - CORDOVA CITY	3,992	4,006	4,065	4,166	4,254	4,332	4,406	4,479	4,549	4,616
CORDOVA AREA	4,900	4,918	4,990	5,114	5,222	5,318	5,408	5,498	5,584	5,666

Source: Alaska Consultants, Inc.

TABLE 141

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - CORDOVA AREA
1981 - 2000

Year	Service Base	Helicopter Service			Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
		Exploration	Development	Production								
1981		5										5
1982		10										10
1983		15										15
1984		20										20
1985		20										20
1986		9					150					159
1987		5	7				621	240				873
1988		2	16			25	229	993				1,265
1989			10					367		136		518
1990	15		15	15						272	68	385
1991	25		10	25						272	68	395
1992	30			30						272	68	400
1993	30			30						272	68	400
1994	30			30						272	68	400
1995	30			30						272	68	400
1996	30			30						272	68	400
1997	30			30						272	68	400
1998	30			30						272	68	400
1999	30			30						272	68	400
2000	27			27						272	68	394

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 142

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - CORDOVA
1981 - 2000

Year	Survey Rigs	Platforms: Development Drilling	Platforms: Operations	Supply/Anchor/Tug Boats: Exploration	Supply/Anchor/Tug Boats: Development	Supply/Anchor/Tug Boats: Production	Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
1981	75								75
1982	98								98
1983	151								151
1984	237								237
1985	219								219
1986	78								78
1987	70						467		537
1988	70	126					1,167	104	1,467
1989		414					600		1,014
1990		398	48			20	233		699
1991		238	80			33	234		585
1992			96			39			135
1993			96			39			135
1994			171			39			210
1995			221			39			260
1996			246			39			285
1997			246			39			285
1998			246			39			285
1999			246			39			285
2000			246			36			282

Source: Dames and Moore/Alaska Consultants, Inc.

will be demanded. A transitional period of overcrowded living conditions and inflated housing costs typical of boom growth cycles is likely to occur.

The OCS industry will eventually account for the livelihood of one-third of Cordova's families. The traditional economic supremacy of the fishing industry will be diluted by a large influx of new workers with different occupational characteristics, work habits and social expectations. This change in the economic orientation of Cordova will probably be accompanied by a reordering of the town's established socioeconomic and political relationships.

As with the mean scenario, the separation of OCS industrial facilities from Cordova's area minimizes the potential for physical conflicts between the fishing industry and oil and gas operations. However, wage inflation stimulated by labor shortages and high construction wages may erode the wage competitiveness of the labor-intensive fish processing 4
industry and undercut Cordova's economic viability as a processing center and as a home base for its fishing fleet. Predictably, any OCS development that threatens the health of Cordova's fishing industry will generate controversy and social conflict.

Impacts on Community Infrastructure

Housing and Residential Land. This scenario sees significant impact on the demand for housing (see Table 143). Demand is concentrated in the period 1987-1990, when nearly all of the extra 472 dwellings called for under this scenario are expected to be needed.

According to past residential patterns, an estimated extra 28 hectares (70 acres) of land would be demanded to accommodate this residential expansion (see Table 144). In actuality, Cordova would tend to shift toward a more urban pattern of land use and housing development to cope successfully with the boom in housing demand. Highly efficient patterns of land use would help to make optimal use of Cordova's mountain-pinched terrain. At the same time, it would permit more economic extension of utilities and allow fullest use of existing public facilities to moderate growth impacts.

Utilities. The 5 percent scenario presents the most acute growth planning and management choices to Cordova. Over the whole forecast, the increment of population growth due to OCS development is slightly less than that due to the non-OCS growth. But the critical feature of the OCS-related population growth is that it occurs almost all at once. Over 1,100 new residents and a demand for about 440 more dwellings with all necessary utilities are projected within a two-year span. The abruptness of this expansion poses special public works programming problems since the lead time needed to resolve the engineering, fiscal, environmental and similar issues common to major public works projects can exceed the time available to prepare for the growth impact.

The small service base setup at Cordova does nonmaterially change the utilities picture.

- Water. The fish processing industry is and presumably will remain the heaviest water user. This scenario does not imply any new industrial water consumption over the base case at Cordova; additional water use will be largely for domestic purposes. This scenario imposes only a 7 percent overall increase in water capacity requirements (see Table 145). As noted before, Cordova's water sources do not now deliver a reliably sufficient supply. Since occasional water shortages would likely result in use restrictions and economic hardship for the local fish processing industry, the imminence of this scenario would make development of additional water sources most urgent. Also, the water distribution system would have to be extended to serve about 470 new dwellings within a two-year period.

- Sewer. The earlier and high residential growth rate projected under the 5 percent scenario can be expected to accelerate Cordova's needs to take action to increase the effective capacity of its sewage treatment plant. This scenario projects a capacity requirement about 30 percent above the base case (see Table 146). It is doubtful that marginal actions to reduce water infiltration will reliably restore sufficient capacity to obviate plant expansion. Thus, Cordova must expect to add to its treatment plant capacity sometime between 1990 and 2000.

- Electric Power. Cordova can expect to add substantial generating capacity to meet this scenario's demands. Even if all units now in the planning stage are installed, bringing capacity to about 13,500 kw, this capacity will be exceeded by 1990 and total demand will reach an estimated 17,000 kw by 2000 (see Table 147).

- Solid Waste Disposal. After the surge of growth around 1990, the volume of disposable solid waste increases by about 30 percent over the base case (see Table 148). Apart from the operating costs for waste collection and disposal services, this scenario does not differ from the mean scenario.

- Communications. The telephone system now, in use will be fully used by about 1987 (see Table 149). Between then and 2000, demand for an estimated 1,100 additional telephone lines can be expected, with the greatest increase occuring during 1989-1990.

Public Safety.

- Police. Under the high scenario, Cordova should experience a demand for five more police officers and jail cells by 2000.

- Fire Protection. As long as residential growth occurs adjacent to currently built up areas, existing fire protection facilities should suffice.

Health and Social Services. By the mid-1980's, the Cordova hospital will be barely adequate to serve this scenario's estimated growth. About 20 hospital care beds will be demanded in 2000. The new 30-bed hospital recommended in the Cordova Comprehensive Plan should take care of the community's foreseeable needs if it is completed to coincide with the demands of growth.

Education. Cordova's present educational facilities should be adequate through about 1990. Subsequent enrollment growth would call for an estimated seven elementary and *seven* secondary classrooms by 2000 (see Table 150). While both school plants are in good condition and have an estimated useful life well beyond the forecast period, both schools are cramped on small sites with limited capacity for expansion. As a result, Cordova may find it advisable to look toward new school sites rather than major additions to the old plants.

Recreation. There are three types of recreational facilities that may need to be expanded due to the growth increment from OCS development. Residential expansion to serve an estimated 472 additional families can be expected to require a few more acres of neighborhood parks. Additional school-related recreational facilities will be demanded to accommodate larger school enrollments. Finally, expansion of harbor facilities for recreational boating is foreseen to handle a doubling of traffic over the forecast period. These improvements will be demanded for the most part by 1990.

Local Government Finances. Cordova's fiscal situation benefits significantly from the inclusion of the OCS industrial facilities to be installed on Hinchinbrook Island (see Tables 151 to 153). Between 1986 and 1989, local property tax revenues are projected to rise from $760,000 to $5,478,000, mainly from taxes on oil and gas properties. After 1989, Cordova levies the statutory limit of $1,500 per capita annually.

Since other revenue sources and City expenditures are estimated to grow proportionate to population growth, the excess revenues accruing from oil and gas properties have a positive effect on Cordova's overall fiscal position. At the close of the forecast period, this scenario increases Cordova's population by about 31% but its total general fund revenues increase by 79% over the corresponding base case figures.

Under the base case forecast, Cordova has a small margin of surplus revenue available for new capital projects and service programs. Thus, the timing of new revenues in relation to new capital requirements will be critical to Cordova's ability to respond expeditiously to growth needs.

CAUSE/EFFECT OF IMPACTS

The long-term growth stimulus under this scenario stems from the decision to man the oil and gas terminals on Hinchinbrook with a commuter workforce living in Cordova. Also, this separation of industrial activities from the established settlement and, especially, Cordova's port area mitigates the potential for clashes between the oil and gas industry and the fishing industry. It also serves to steer away from Cordova the brunt of the extreme physical and social effects associated with very large one-shot construction projects.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

Within a two year period, this scenario sees Cordova's permanent population increase by about 30 percent. This growth promises to overload Cordova's housing market and strain the basic water, sewer and 'power utilities. The constraint of land supply may also urge for a transition to a more urban style of residential development than Cordova is accustomed to.

While it appears that OCS development confers a favorable long-run balance of revenues over public cost on Cordova, the financial demands made upon the community to prepare for impact growth may be out of phase with revenue flows.

SUMMARY OF IMPACTS

Under the 5 percent scenario, socioeconomic impacts at Cordova stem from the need to accommodate a period of rapid population growth rather than from industrial development in itself. Due to its geographic location and harbor characteristics, Cordova is not a competitive alternative to Yakutat or Seward for support functions during exploration. For similar reasons, offshore oil and gas finds produced in Cordova's vicinity are routed to oil and gas facilities on Hinchinbrook Island for transshipment. Consequently, Cordova's role in OCS development under the premises of this scenario is as a bedroom community for the oil and gas terminals' operating work force which is stipulated to commute daily between Cordova and Hinchinbrook Island.

The operation of these two industrial facilities is forecast to generate about 675 jobs and 1,350 new residents at Cordova lasting over the second half of the forecast period, increasing the base case population forecast by about one-third. Since this OCS-related growth is compressed into a couple of years, it is anticipated to place severe temporary strains on local community facilities and services. The shortage of undeveloped but buildable land at Cordova combined with the demand for additional housing may contribute to a trend toward development at higher densities. The growth spurt is expected to accentuate Cordova's otherwise strained capacities for water supply, waste treatment, power supply and communications until new improvements are installed. It also appears that health, educational and recreational facilities may all need upgrading around 1990.

Ultimately, the lifestyle at Cordova may be influenced by a transition to a more urban style of settlement and a shift in the community economic base from primary reliance on the fisheries to a dependence on energy industries as well.

TABLE 143

FORECAST OF NET CHANGE IN HOUSING DEMAND
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	82	27	14	8	5
1980		10	5	3	2
1981	1:;	48	24	14	10
1982	62	21	11	6	4
1983	60	21	11	6	4
1984	64	22	11	6	5
1985	52	18	9	5	4
1986	48	15	8	4	3
1987	126	51	25	15	11
1988	158	43	22	12	9
1989	438	137		39	28
1990	802	302	1;:	86	62
1991	66	31	16	9	6
1992	18	27	14	8	5
1993	72	24	12	7	5
1994	124	27	14	8	5
1995	108	26	13	7	6
1996	96	27	14	8	5
1997	90	30	15	9	6
1998	90	30	15	9	6
1999	86	29	15	8	6
2000	82	26	13	7	6
TOTALS	2,238	992	505	284	203

Source: Alaska Consultants, Inc.

TABLE 144

ESTIMATED DEMAND FOR RESIDENTIAL LAND
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	19	2.7	1.1	3.8
Multifamily & Trailer	18	1.3	0.5	1.8
1981-85				
Single Family	66	9.5	3.7	13.2
Multifamily & Trailer	64	4.6	1.8	6.4
1986-90				
Single Family	279	40.2	15.6	55.8
Multifamily & Trailer	269	19.4	7*5	26.9
1991-95				
Single Family	69	9.9	3.9	13.8
Multifamily & Trailer	66	4.8	1.8	6.6
1996-2000				
Single Family	72	10.4	4.0	14.4
Multifamily & Trailer	70	5.0	2.0	7.0
TOTAL	992	107.8	41.9	149.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 145

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
5 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	281	984	,265
1979	290	,014	,304
1980	292	,024	,316
1981	307	,070	,377
1982	313	,088	,401
1983	319	,106	,4,25
1984	326	,125	,451
1985	331	1,143	1,474
1986	336	1,163	1,499
1987	350	1,184	1,534
1988	366	1,205	1,571
1989	411	1,226	1,637
1990	492	1,247	1,739
1991	499	1,272	1,771
1992	501	1,298	1,799
1993	508	1,3.24	1,832
1994	521	1,352	1,873
1995	532	1,380	1,912
1996	542	1,409	1,951
1997	551	1,441	1,992
1998	560	1,472	2,032
1999	569	1,504	2,073
2000	577	1,540	2,117

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 146

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
5 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978- 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	281	35.1
1979	290	36.2
1980	292	36.5
1981	307	38.4
1982	313	39.1
1983	319	39.9
1984	326	40.8
1985	331	41.4
1986	336	42.0
1987	350	43.8
1988	366	45.8
1989	411	51.4
1990	492	61.5
1991	499	62.4
1992	501	62.6
1993	508	63.5
1994	521	65.1
1995	532	66.5
1996	542	67.8
1997	551	68.9
1998	560	70.0
1999	569	71.1
2000	577	72.1

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 147

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	6,905
1979	7,252
1980	7,467
1981	7,987
1982	8,305
1983	8,624
1984	8,960
1985	9,268
1986	9,570
1987	10,136
1988	10,782
1989	12,096
1990	14,502
1991	14,700
1992	14,754
1993	14,970
1994	15,342
1995	15,666
1996	15,954
1997	16,224
1998	16,494
1999	16,752
2000	16,998

Source: Alaska Consultants, inc.

TABLE 148

ESTIMATED DISPOSABLE SOLID WASTES
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
8 00

Annual Tonnage a/	Annual Volume (cubic yards) b/
2,750	16,700
2,890	17,500
2,980	18,000
3,130	19,000
3,260	19,800
3,390	20,500
3,540	21,500
3,670	22,300
3,060	18,600
3,950	23,900
4,170	25,300
4,720	28,600
5,750	34,800
5,830	35,300
5,850	35,400
5,940	35,900
6,090	36,800
6,210	37,600
6,330	38,300
6,440	38,900
6,540	39,600
6,640	40,200
6,740	40,800

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 149

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	1.25	640	800	--
1979	1.26	667	840	40
1980	1.27	677	860	20
1981	1.28	725	928	68
1982	1.29	746	962	34
1983	1.30	767	997	35
1984	1.31	789	1,034	37
1985	1.32	807	1,065	31
1986	1.33	822	1,093	28
1987	1.34	873	1,170	77
1988	1.35	916	1,237	67
1989	1.36	1,053	1,432	195
1990	1.37	1,355	1,856	424
1991	1.38	1,386	1,913	57
1992	1.39	1,413	1,964	51
1993	1.40	1,437	2,012	48
1994	1.40	1,464	2,050	38
1995	1.40	1,490	2,086	36
1996	1.40	1,517	2,124	38
1997	1.40	1,547	2,166	42
1998	1.40	1,576	2,206	40
1999	1.40	1,606	2,248	42
2000	1.40	1,632	2,285	37

Source: Alaska Consultants, Inc.

TABLE 150

SCHOOL ENROLLMENT FORECAST
5 PERCENT PROBABILITY SCENARIO
CORDOVA AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	331	221	552
1979	341	228	569
1980	345	229	574
1981	362	241	603
1982	369	246	615
1983	376	251	627
1984	384	256	640
1985	390	260	650
1986	396	264	660
1987	412	275	687
1988	431	288	719
1989	484	322	806
1990	580	387	967
1991	588	392	980
1992	590	394	984
1993	599	399	998
1994	614	409	1,023
1995	627	417	1,044
1996	638	426	1,064
1997	649	433	1,082
1998	660	440	1,100
1999	670	447	1,117
2000	680	453	1,133

Source: Alaska Consultants, Inc.

TABLE 151

FORECAST OF CORDOVA SCHOOL DISTRICT REVENUES
5 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	552	$ 205	$1,638	$25	$1,868
1979	569	224	1,789	27	2,040
1980	574	239	1,913	29	2,181
1981	603	266	2,131	33	2,430
1982	615	288	2,303	35	2,626
1983	627	311	2,489	38	2,838
1984	640	337	2,695	41	3,073
1985	650	363	2,901	44	3,308
1986	660	388	3,102	47	3,537
1987	687	430	3,443	53	3,926
1988	719	478	3,821	58	4,357
1989	806	568	4,539	69	5,176
1990	967	722	5,773	88	6,583
1991	980	776	6,202		7,073
1992	984	825	6,601	1:7	7,527
1993	998	888	7,098	108	8,094
1994	1,023	964	7,710	118	8,792
1995	1,044	1,043	8,342	127	9,512
1996	1,064	1,127	9,010	138	10,275
1997	1,082	1,215	9,714	157	11,086
1998	1,100	1,309	10,467	160	11,936
1999	1,117	1,384	11,069	169	12,622
2000	1,133	1,515	12,115	185	13,815

Source: Alaska Consultants, Inc.

TABLE 152

GENERAL FUND
REVENUE FORECAST
5 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 381	$ 191	$ 545	$ 403	$1,520
1979	415	208	595	404	1,658
1980	445	223	637	471	1,776
1981	494	248	708	523	1,973
1982	534	269	765	566	2,134
1983	578	291	827	612	2,308
1984	625	315	895	662	2,497
1985	673	339	964	713	2,689
1986	760	362	1,030	762	2,914
1987	2,090	402	1,144	846	4,482
1988	3,444	446	1,269	938	6,097
1989	5,478 b/	530	1,509	1,116	8,633
1990	5,907 b/	674	1,917	1,418	9,916
1991	5,988 b/	724	2,061	1,524	10,297
1992	6,009 b/	770	2,192	1,621	10,592
1993	6,098 b/	828	2,358	1,744	11,028
1994	6,249 b/	899	2,561	1,894	11,603
1995	6,381 b/	974	2,772	2,051	12,178
1996	6,498 b/	1,051	2,992	2,213	12,754
1997	6,609 b/	1,133	3,226	2,387	13,355
1998	6,718 b/	1,221	3,476	2,571	13,986
1999	6,824 b/	1,291	3,677	2,720	14,512
2000	6,924 b/	1,414	4,026	2,978	15,342

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.
b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

TABLE 153

FORECAST OF REVENUES AND OPERATING EXPENDITURES
5 PERCENT PROBABILITY SCENARIO
CITY OF CORDOVA
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements
	Property Tax	Other Revenues a/	Total	City Operations	School Support	Total	
1978	$ 381	$1,139	$1,520	$1,261	$ 205	$1,466	$ 54
1979	415	1,243	1,658	1,376	224	1,600	58
1980	445	1,331	1,776	1,474	239	1,713	63
1981	494	1,479	1,973	1,637	266	1,903	70
1982	534	1,600	2,134	1,771	288	2,059	75
1983	578	1,730	2,308	1,914	311	2,225	83
1984	625	1,872	2,497	2,072	337	2,409	88
1985	673	2,016	2,689	2,231	363	2,594	
1986	760	2,154	2,914	2,384	388	2,772	1:;
1987	2,090	2,392	4,482	2,647	430	3,035	1,447
1988	3,444	2,653	6,097	2,819	478	3,297	2,800
1989	5,478 b/	3,155	8,633	3,492	568	4,060	4,573
1990	5,907 b/	4,009	9,916	4,437	722	5,159	4,757
1991	5,988 b/	4,309	10,297	4,768	776	5,544	4,753
1992	6,009 b/	4,583	10,592	5,072	825	5,897	4,695
1993	6,098 b/	4,930	11,028	5,457	888	6,345	4,683
1994	6,249 b/	5,354	11,603	5,926	964	6,890	4,713
1995	6,381 b/	5,797	12,178	6,415	1,043	7,458	4,720
1996	6,498 b/	6,256	12,754	6,924	1,127	8,051	4,703
1997	6,609 b/	6,746	13,355	7,466	1,215	8,681	4,674
1998	6,718 b/	7,268	13,986	8,044	1,309	9,353	4,633
1999	6,824 b/	7,688	14,512	8,508	1,384	9,892	4,620
2000	6,924 b/	8,418	15,342	9,316	1,515	10,831	4,511

a/ Includes sales taxes, intergovernmental revenues and miscellaneous other revenues.
b/ Property tax revenues limited to $1,500 annually per resident as required by AS 29.53.045(b).

Source: Alaska Consultants, Inc.

COMMUNITY FORECASTS

Significant Factors Affecting Growth

Under the 5 percent scenario, development impacts upon Seward are similar in pattern though larger in scale than in the mean scenario. Because of the greater commitment of material and equipment to field exploration and development, growth impacts arrive a little earlier, peak a little higher and last a little longer. Construction and operation of the marine service base and pipecoating yard bring jobs and people to Seward. As production of oil and gas begins, Seward's support role fades and is overshadowed by other economic developments which gradually take up the slack left by the decline in OCS activities.

Future Employment 4

Through the exploration phase, Seward acquires altogether less than 100 new resident jobs due to OCS development (see Tables 154 to 156). Construction of the expanded marine service base gives a boost to the local secondary economy. The base swings into full operation during 1988-1991, and its direct employment and the multiplier effects of the OCS industries add almost 400 jobs to the local economy before tapering off. By the end of the forecast, there remain about 50 jobs in the Seward area attributed to the offshore oil and gas industries.

Future Population

OCS population impacts at Seward are felt mainly during the four year span (1988-1991) of intense activity as a shoreside support base for field development and submarine pipeline installation. OCS-related population mounts to about 750 residents during these years. Within a few years thereafter, the population impact falls off to about 100 residents or less than 3 percent of the Seward area total population. Seward is forecast to experience a net population loss for a few years.

Construction of the marine service base around 1984-85 would briefly bring in a sizable construction workforce but, as these workers are expected to be housed in a work camp, they are not expected to have a major impact on Seward's resident population and its capital facilities.

IMPACT ASSESSMENT

Social Impact

This scenario accelerates Seward's growth and prompts a mild boom/bust cycle during and after the peak of development activities. The downside of the cycle may entail higher unemployment and some economic distress. It is assumed that many of the jobs gained and lost in the cycle will be filled by newcomers with higher job mobility than long-term Seward residents, which should help expedite an economic readjustment.

TABLE 154

FORECAST OF EMPLOYMENT AND POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
SEWARD AREA
1981 - 2000

INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	256	257	280	688	503	410	405	466	[illegible]	604	582	581	587	587	594	599	606	612	618	625
Agriculture, Forestry and Fisheries	(103)	(104)	(120)	(140)	(152)	(156)	(160)	(168)	(184)	(204)	(216)	(218)	(220)	(222)	(224)	(226)	(228)	(230)	(232)	(234)
Mining	(3)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(8)	(8)	(9)
Manufacturing	(121)	(100)	(126)	(152)	(201)	(201)	(202)	(203)	(256)	(308)	(311)	(312)	(315)	(316)	(320)	(322)	(325)	(328)	(331)	(334)
Contract Construction	(29)	(49)	(30)	(392)	(146)	(49)	(38)	(90)	(86)	(87)	(49)	(45)	(46)	(42)	(43)	(44)	(45)	(46)	(47)	(48)
DISTRIBUTIVE INDUSTRIES	518	534	558	601	610	629	720	900	942	952	991	892	876	863	885	923	968	1,015	1,064	1,113
Transportation, Communications and Public Utilities	(78)	(87)	(97)	(113)	(113)	(121)	(184)	(319)	(338)	(333)	(342)	(235)	(185)	(158)	(142)	(141)	(144)	(147)	(150)	(150)
Trade	(237)	(240)	(248)	(264)	(266)	(273)	(287)	(308)	(321)	(329)	(344)	(348)	(365)	(372)	(390)	(409)	(429)	(450)	(472)	(495)
Finance, Insurance and Real Estate	(22)	(23)	(24)	(27)	(26)	(26)	(28)	(33)	(34)	(35)	(36)	(35)	(37)	(36)	(38)	(40)	(42)	(44)	(46)	(48)
Service	(181)	(184)	(189)	(203)	(205)	(209)	(221)	(240)	(249)	(255)	(269)	(274)	(289)	(297)	(315)	(333)	(353)	(374)	(396)	(420)
GOVERNMENT	417	423	432	453	454	462	479	507	520	528	539	533	542	538	549	560	571	582	594	602
TOTAL EMPLOYMENT	1,187	1,214	1,270	1,748	1,567	1,501	1,604	1,878	1,993	2,084	2,112	2,006	2,005	1,988	2,028	2,082	2,145	2,209	2,279	2,343
Employees Resident in Construction Camps	(--)	(--)	(--)	(357)	(112)	(15)	(--)	(44)	(29)	(29)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
TOTAL POPULATION - SEWARD CITY	2,051	2,094	2,153	2,311	2,383	2,392	2,531	2,829	2,993	3,083	3,118	2,905	2,900	2,871	3,002	3,008	3,096	3,188	3,285	3,380
SEWARD AREA	2,726	2,784	2,862	3,072	3,167	3,180	3,364	3,761	3,978	4,098	4,144	3,861	3,855	3,816	3,991	3,995	4,116	4,238	4,366	4,493

Source: Alaska Consultants, Inc.

TABLE 155

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Service Base	Helicopter Service			Service Base Construction	Onshore Pipeline Construction	Oil Terminal Construction	LNG Plant Construction	Pipe Coating	Oil Terminal Operations	LNG Plant Operations	Total Onshore Onsite
		Exploration	Development	Production								
1981	10											10
1982	17											17
1983	25											25
1984	35				357							392
1985	35				112							147
1986	40								15			55
1987	96											96
1988	215								44			259
1989	233								29			262
1990	223								29			252
1991	229											229
1992	128											128
1993	78											78
1994	53											53
1995	34											34
1996	30											30
1997	30											30
1998	30											30
1999	30											30
2000	28											28

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 156

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA - SEWARD
1981 - 2000

Year	Survey	Rigs	Platforms		Supply/Anchor/Tug Boats			Platform Installation	Offshore Pipeline Construction	Total Employment Offshore Onsite
			Development Drilling	Operations	Exploration	Development	Production			
1981	21				26					47
1982	35				46					81
1983	46				70					116
1984	54				110					164
1985	50				102					152
1986	31				32	32				95
1987	25				32	57				114
1988	23				11	151				185
1989	15					133				148
1990	4					136	19			159
1991						113	32			145
1992						43	39			82
1993							39			39
1994							39			39
1995							39			39
1996							39			39
1997							39			39
1998							39			39
1999							39			39
2000							35			35

Source: Dames and Moore/Alaska Consultants, Inc.

Impacts on Community Infrastructure

Housing and Residential Land. The housing forecast is for an initial period of mild stimulation of demand, followed by a boom in demand and then a period of contracting demand as Seward adjusts to a lower level of OCS employment. There will be a sharp rise of about 220 units in the demand for new housing in 1987-1988 as the new marine service base swings into peak operation. A few years later, beginning about 1992, the decline in service base employment results in a net population loss and excess housing capacity for a few years until surplus units are reabsorbed by ongoing population growth.

By the end of the forecast period, there is only a minor net increase in demand for housing and residential land (see Tables 157 and 158).

Utilities. With the exception of electric power and the earlier installation of residential utilities, the impact of OCS-related growth is not effectively different under this scenario than under the mean scenario (see Tables 159 to 163).

- Water. The forecast water demand can be supplied by the improvements the City is now completing.

- Sewer. Completion of the proposed sanitary waste treatment plant will equip Seward with adequate capacity for foreseeable needs.

- Electric Power. In order to supply the peak power demands of new residents and the marine service base, an estimated 4,000 kw capacity will be demanded by 1988.

- Solid Waste Disposal. The scenario is not importantly different from the base case.

- Communications. The scenario is not significantly different from the base case.

Public Safety

- Police. The forecast of need for the 5 percent scenario does not differ from the base case, except that the time for hiring additional police officers might be moved ahead to the late 1980's.

- Fire Protection. There is no change over the base case forecast in the demand for fire protection facilities.

Health and Social Services. The impact of the 5 percent scenario is effectively similar to the base case.

Education. The enrollment increases forecast for the 5 percent scenario can be fitted into the existing educational facilities (see Table 164).

Recreation. The Ions run recreational demands of Seward are not significantly increased over the base case, although those demands should be felt earlier since the OCS scenario climbs at a faster rate during the first decade but more slowly during the second.

Local Government Finances. The net. effect of this scenario upon the equilibrium of Seward's revenues and expenditures is small (see Tables 165 to 167). Due to the temporary boost the marine service base lends to property tax income, it is projected that the City might benefit for a couple of years from a slight surplus of revenues over expenditures attributable to OCS development. Since the City government's fiscal flexibility is hampered by high property tax and indebtedness rates, these extra revenues may be critical to equip the City to manage the costs of community development programs for the impact population.

CAUSE/EFFECT OF IMPACTS

Seward's waterfront could be very active during development of the oil and gas fields discovered in the northeast Gulf of Alaska, particularly the Middleton Shelf fields. For four years, up to 229 workers are engaged at the large marine service base set up at Seward to provide the various services and logistic support for the offshore enterprise. Impact population peaks at about 750 residents, then population declines almost to the level that prevails in the base case.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

The short-term high rate of growth at Seward under this scenario should aggravate existing shortcomings in Seward's power system and supply of land for residential development. Maintaining decent housing conditions may prove to be the most troublesome problem in view of the age of Seward's housing stock and the low vacancy rates. Seward does not have a reservoir of unoccupied standard housing to absorb new residents.

The City may also confront financial difficulties in gearing up for impacts because of its historic weak fiscal situation.

SUMMARY OF IMPACTS

OCS development in the 5 percent scenario will stimulate a temporary spate of growth at Seward, amounting to about 400 jobs and 750 residents at its peak during offshore field development. Thereafter, Seward's role in offshore activities diminishes to a minor scale. Essentially, Seward can expect to see its growth curve advanced by 5 to 10 years along with the schedule for completion of the public mprovements that would in any case be called for to serve base case expansion. Over the long run, OCS development has little lasting effect upon the City's population, economy and infrastructure.

TABLE 157

FORECAST OF NET CHANGE IN HOUSING DEMAND
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978- 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	0	0	0	0	0
1979	12	5	3	2	0
1980	46	17	11	5	1
1981	67	26	18	7	1
1982	59	23	15	7	1
1983	78	30	20	9	1
1984	174	68	45	19	4
1985	131	49	33	14	2
1986		2	1	1	0
1987	17;	71	47	20	4
1988	377	151	101	43	7
1989	219	85	57	24	4
1990	110	41	27	12	2
1991	46	18	12	5	1
1992	-271	-109	- 73	- 31	- 5
1993	- 46	- 20	- 13	- 6	- 1
1994	33	11	7	3	1
1995	53	19	13	5	1
1996	104	39	26	11	2
1997	121	46	31	13	2
1998	122	46	31	13	2
1999	128	49	33	14	2
2000	129	49	33	14	2
TOTALS	1,877	716	478	204	34

Source: Alaska Consultants, Inc.

TABLE 158

ESTIMATED DEMAND FOR RESIDENTIAL LAND
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

	Net New Housing Units	Net New Residential Land Use (acres) a/	Public Rights of Way (acres) a/	Gross New Residential Land Use (acres) a/
1978-80				
Single Family	14	2.2	0.8	3.0
Multifamily & Trailer	8	0.6	0.2	0.8
1981-85				
Single Family	131	18.9	7.3	26.2
Multifamily & Trailer	65	4.7	1.8	6.5
1986-90				
Single Family	233	33.6	13.0	46.6
Multifamily & Trailer	117	8.4	3.3	11.7
1991-95				
Single Family	- 54	- 7.8	- 3.0	- 10.8
Multifamily & Trailer	- 27	- 1.9	- 0.8	- 2.7
1996-2000				
Single Family	154	22.2	8.6	30.8
Multifamily & Trailer	75	5.4	2.1	7.8
TOTAL	716	86.1	33.3	119.4

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 159

PROJECTED CAPACITY REQUIREMENTS
WATER SUPPLY SYSTEM
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(1,000 gallons per day) a/

Year	Domestic Capacity	Industrial Capacity	Total Capacity
1978	245	1,369	1,614
1979	246	1,375	1,621
1980	250	1,400	1,650
1981	256	1,419	1,675
1982	262	1,438	1,700
1983	269	1,467	1,736
1984	289	1,526	1,815
1985	298	1,602	1,900
1986	299	1,607	1,906
1987	316	1,614	1,930
1988	354	1,621	1,975
1989	374	1,707	2,081
1990	385	1,782	2,167
1991	390	1,799	2,189
1992	363	1,817	2,180
1993	362	1,871	2,233
1994	359	1,927	2,286
1995	375	1,986	2,361
1996	376	2,046	2,422
1997	387	2,110	2,497
1998	398	2,175	2,573
1999	411	2,242	2,653
2000	422	2,314	2,736

a/ Multiply by 3.785 to obtain number of liters per day.

Source: Alaska Consultants, Inc.

TABLE 160

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000

Year	Daily Treatment Capacity 1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	245	30.6
1979	246	30.8
1980	250	31.3
1981	256	32.0
1982	262	32.8
1983	269	33.6
1984	289	36.1
1985	298	37.2
1986	299	37.4
1987	316	39.5
1988	354	44.2
1989	374	46.8
1990	385	48.1
1991	390	48.8
1992	363	45.4
1993	362	45.2
1994	359	44.9
1995	375	46.9
1996	376	47.0
1997	387	48.4
1998	398	49.8
1999	411	51.4
2000	422	52.8

a/ Multiply by 3.785 to obtain liters.
b/ Multiply by .06308 to obtain number of liters per minute.

Source: Alaska Consultants, Inc.

TABLE 161

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw's
1978	6,500
1979	6,601
1980	6,911
1981	7,224
1982	7,517
1983	7,870
1984	8,602
1985	9,026
1986	9,222
1987	9,924
1988	11,283
1989	11,934
1990	12,294
1991	12,432
1992	11,583
1993	11,565
1994	11,448
1995	11,973
1996	11,985
1997	12,348
1998	12,714
1999	13,098
2000	13,479

Source: Alaska Consultants, Inc.

TABLE 162

ESTIMATED DISPOSABLE SOLID WASTES
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	2,590	15,700
1979	2,650	16,100
1980	2,750	16,700
1981	2,840	17,200
1982	2,950	17,900
1983	3,090	18,700
1984	3,410	20,700
1985	3,580	21,700
1986	3,630	22,000
1987	3,870	23,400
1988	4,360	26,400
1989	4,650	28,200
1990	4,880	29,500
1991	4,930	29,900
1992	4,590	27,800
1993	4,590	27,800
1994	4,540	27,500
1995	4,750	28,800
1996	4,750	28,800
1997	4,900	29,700
1998	5,040	30,600
1999	5,200	31,500
2000	5,350	32,400

a/ Multiply by .907 to obtain metric tons.
b/ Multiply by .7646 to obtain cubic meters.

Source: Alaska Consultants, Inc.

TABLE 163

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Average Number of Phones per Dwelling	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	.25	990	1,238	--
1979	.26	995	1,254	16
1980	.27	1,012	1,285	31
1981	.28	1,038	1,329	44
1982	.29	1,061	1,369	40
1983	.30	1,091	1,418	
1984	[illegible]	1,159	1,518	[illegible]
1985	1.32	1,208	1,595	77
1986	1.33	1,210	1,609	14
1987	1.34	1,281	1,717	108
1988	1.35	1,432	1,933	216
1989	1.36	1,517	2,063	130
1990	1.37	1,558	2,134	71
1991	1.38	1,576	2,175	41
1992	1.39	1,467	2,039	-136
1993	1.40	1,447	2,026	- 13
1994	1.40	1,458	2,041	15
1995	1.40	1,477	2,068	27
1996	1.40	1,516	2,122	54
1997	1.40	1,562	2,187	65
1998	1.40	1,608	2,251	64
1999	1.40	1,657	2,320	69
2000	1.40	1,706	2,388	68

Source: Alaska Consultants, Inc.

TABLE 164

SCHOOL ENROLLMENT FORECAST
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	312	168	480
1979	313	169	482
1980	319	172	491
1981	328	176	504
1982	335	180	515
1983	344	185	529
1984	369	199	568
1985	381	205	586
1986	382	206	588
1987	405	217	622
1988	452	244	696
1989	478	258	736
1990	493	265	758
1991	498	269	767
1992	464	250	714
1993	464	249	713
1994	459	247	706
1995	480	258	738
1996	480	259	739
1997	495	266	761
1998	510	274	784
1999	525	283	808
2000	540	297	831

Source: Alaska Consultants, Inc.

TABLE 165

FORECAST OF SEWARD SCHOOL DISTRICT REVENUES
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD a/
1978 - 2000
(in $1,000's)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$ 515	$1,157	$28	$1,700
1979	482	548	1,231	30	1,809
1980	491	591	1,329	32	1,952
1981	504	642	1,447	35	2,124
1982	515	695	1,566	38	2,299
1983	529	757	1,706	41	2,504
1984	568	862	1,942	47	2,851
1985	586	943	2,124	51	3,118
1986	588	997	2,245	54	3,296
1987	622	1,124	2,532	61	3,717
1988	692	1,334	2,987	72	4,393
1989	736	1,495	3,367	81	4,943
1990	758	1,632	3,675	89	5,396
1991	767	1,751	3,943	95	5,789
1992	714	1,721	3,891		5,706
1993	713	1,829	4,119	1::	6,048
1994	706	1,919	4,322	105	6,346
1995	738	2,127	4,790	116	7,033
1996	739	2,257	5,083	123	7,463
1997	761	2,464	5,550	134	8,148
1998	784	2,690	6,059	147	8,896
1999	808	2,888	6,504	157	9,549
2000	831	3,205	7,218	175	10,598

a/ The City of Seward does not raise any direct revenues for school purposes. The Kenai Peninsula Borough funds and operates a boroughwide school system. This table presents Seward's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes.

Source: Alaska Consultants, Inc.

TABLE 166

GENERAL FUND
REVENUE FORECAST
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 536	N/A	$ 354	$ 649	$1,539
1979	571	N/A	377	691	1,639
1980	616	N/A	407	745	1,768
1981	777	N/A	442	811	2,030
1982	837	N/A	478	878	2,193
1983	910	N/A	522	956	2,388
1984	1,165	N/A	593	1,089	"2,847
1985	1,298	N/A	649	1,190	3,137
1986	1,331	N/A	686	1,258	3,275
1987	1,779	N/A	774	1,419	3,972
1988	2,017	N/A	917	1,682	4,616
1989	2,180	N/A	1,028	1,886	5,094
1990	2,324	N/A	1,123	2,059	5,506
1991	2,430	N/A	1,204	2,208	5,842
1992	2,408	N/A	1,189	2,180	5,777
1993	2,209	N/A	1,258	2,308	5,775
1994	2,302	N/A	1,320	2,521	6,043
1995	2,519	N/A	1,463	2,684	6,666
1996	2,654	N/A	1,552	2,848	7,054
1997	2,871	N/A	1,696	3,110	7,677
1998	3,105	N/A	1,851	3,394	8,350
1999	3,310	N/A	1,986	3,643	8,939
2000	3,642	N/A	2,205	4,044	9,891

a/ "Other" includes license fees, permits, interest earnings, sale and rental of municipal property and miscellaneous other revenues.

Source: Alaska Consultants, Inc.

a

TABLE 167

FORECAST OF REVENUES AND OPERATING EXPENDITURES
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(in $1,000's)

Year	General Fund Revenues			Operating Expenditures			Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total	City Operations	School Support b/	Total b/	
1978	$ 536	$1,003	$1,539	$1,432	$ 515	$1,947	$ 107
1979	571	1,068	1,639	1,525	548	2,073	114
1980	616	1,152	1,768	1,646	591	2,237	122
1981	777	1,253	2,030	1,788	642	2,430	242
1982	837	1,356	2,193	1,934	695	2,629	259
1983	910	1,478	2,388	2,109	757	2,866	279
1984	1,165	1,682	2,847	2,400	862	3,262	447
1985	1,298	1,839	3,137	2,624	943	3,567	513
1986	1,331	1,944	3,275	2,773	997	3,770	502
1987	1,779	2,193	3,972	3,129	1,124	4,253	843
1988	2,017	2,599	4,616	3,709	1,334	5,043	907
1989	2,180	2,914	5,094	4,158	1,495	5,653	936
1990	2,324	3,182	5,506	4,541	1,632	6,173	965
1991	2,430	3,412	5,842	4,868	1,751	6,500	974
1992	2,408	3,369	5,777	4,808	1,721	6,559	969
1993	2,209	3,566	5,775	5,088	1,829	6,917	687
1994	2,302	3,741	6,043	5,338	1,919	7,257	705
1995	2,519	4,147	6,666	5,918	2,127	8,045	748
1996	2,654	4,400	7,054	6,278	2,257	8,535	776
1997	2,871	4,806	7,677	6,858	2,464	9,322	819
1998	3,105	5,245	8,350	7,484	2,690	10,174	866
1999	3,310	5,629	8,939	8,031	2,888	10,919	908
2000	3,642	6,249	9,891	8,917	3,205	12,122	974

a/ Includes intergovernmental revenues and miscellaneous other revenues.
b/ The City of Seward does not make any direct expenditures for school support. The Kenai Peninsula Borough funds and operates a boroughwide school system. The figure for school support represents Seward's projected pro rata share of the Kenai Peninsula Borough school expenditures but is not actually to be included in the City's budget.

Source: Alaska Consultants, Inc.

APPENDIX

Methods, Standards and Assumptions

The following assumptions and standards have been developed for local government services and revenues for the Northern Gulf of Alaska communities of Yakutat, Cordova and Seward. These methods, standards and assumptions were refined and modified during the course of this study as additional inputs were made by other subcontractors and as additional data were developed by this subcontractor. Therefore, the methods, standards and assumptions which follow are the basis for the preceding impact analysis.

ECONOMY AND POPULATION

There are several commonly used planning techniques employed to estimate future growth (or decline) in the economy and population of local areas. Perhaps the simplest method is by the projection or projections of past growth or decline. However, this technique is practical only in areas of size which have shown steady growth or decline and where major fluctuations have not been evidenced in the past.

A second method involves projections based upon relationships to growth in other areas. Projections for industries and population for a region, the State or the nation are related to the local area. However, although this method provides a valuable check against projections evolved by other methods, in small local areas subject to sudden change it is not a desirable means of forecasting.

The third method which is often used in communities of scale is a projection based upon net migration and natural growth. This method of forecasting is commonly called the cohort-survival method due to the technique of projecting the natural increase element of population. However, this method is most properly utilized where natural growth is expected to be the main source of change.

A fourth method is to derive future population estimates from future employment estimates. This method assumes that the employable age population in the labor force remains in fairly constant proportion to the total population. Therefore, population forecasts can be derived directly as a statistical proportion of the future employment figure. The simplest means of carrying out this technique can fail to consider such variables as production expansion, market changes and the exhaustion or increase of extractive industries. However, the ratio of total community employment to total community population is an important factor in forecasting population which is utilized in the economic base method.

Unquestionably, the most sophisticated method employed to define and measure an economic structure of a community as the basis for forecasting future population is the input-output approach. The input-output methods clearly are well suited to comparative statics and, through the use of models, can be adapted to dynamic problems. Although this method is ideally suited to distribute and measure the effects of major industrial impacts, the information necessary to effectively employ this method is not available in a suitable form for the communities under study.

The method of forecasting growth (or decline) in the base case (or non-OCS case) which serves as a basis for the forecasts of population in this report is the economic base method. This method stresses the importance of export activity as a determining factor in regional and community economic growth. Regions or cities within a specialized economy must import goods and services to survive. To pay for these imports, these regions or communities must in turn exPort to other regions. Therefore, a basic sector of regional or community activity will be the production of goods and services for export. The other sector (secondary) of regional or community activity, which because of convenience and comparative cost, will take place within the region or community.

This method is derived from modern theories of international and interregional trade and it makes use of such economic concepts as the multiplier. The method is clearly restricted since, among other reasons, difficulties are encountered in allocating activities to basic and secondary sectors, external money flows into a region are not generally accounted for and the handling of indirect effects is necessarily unclear. However, the sensitivity to fluctuations of an export base will be greater, the smaller the area. (In populous areas of the nation, the multiplier approximates that of the nation). Thus, it provides an adequate explanation of economic development in small communities where the flow of goods and services within the community is limited.

Although to varying degrees economic base studies have used units of measure such as jobs, payroll, value added, value of production and dollar income and expenditure accounts, most studies have involved employment as a sole or primary unit of measure. In this study, employment is used as the primary unit of measure and as the basis for forecasting the magnitude of future economic and population growth or decline.

In this economic base forecast, the activities of certain employers are classified as basic (exogenous). This group is composed of employees working in export industries or performing labor based upon fortunes determined by forces outside the city or region. All other employees are classified as secondary (endogenous). The fortunes of the employees of these industries are determined by internal forces which are represented by a multiplier linking the export sector to total regional or community employment.

In a simple economic model, secondary employment is shown as a function of total employment

$$Ys = f(Yt)$$

and

$$Yt = Ys + E$$

where: Y_t = total community or regional employment

Y_s = total community or regional secondary employment

E = total community or regional basic employment. This is the sum of all basic employment as arrayed in the Standard Industrial Classification Manual by the following divisions: Agriculture, Forestry and Fishing; Mining; Contract Construction; Manufacturing; Transportation, Communications and Public Utilities; Trade; Finance, Insurance and Real Estate; Service; and Government.

Furthermore, this analysis hypothesizes simple homogeneous relationships expressing secondary employment as a constant proportion, k, of total employment

i.e.: $Y_s = kY_t$

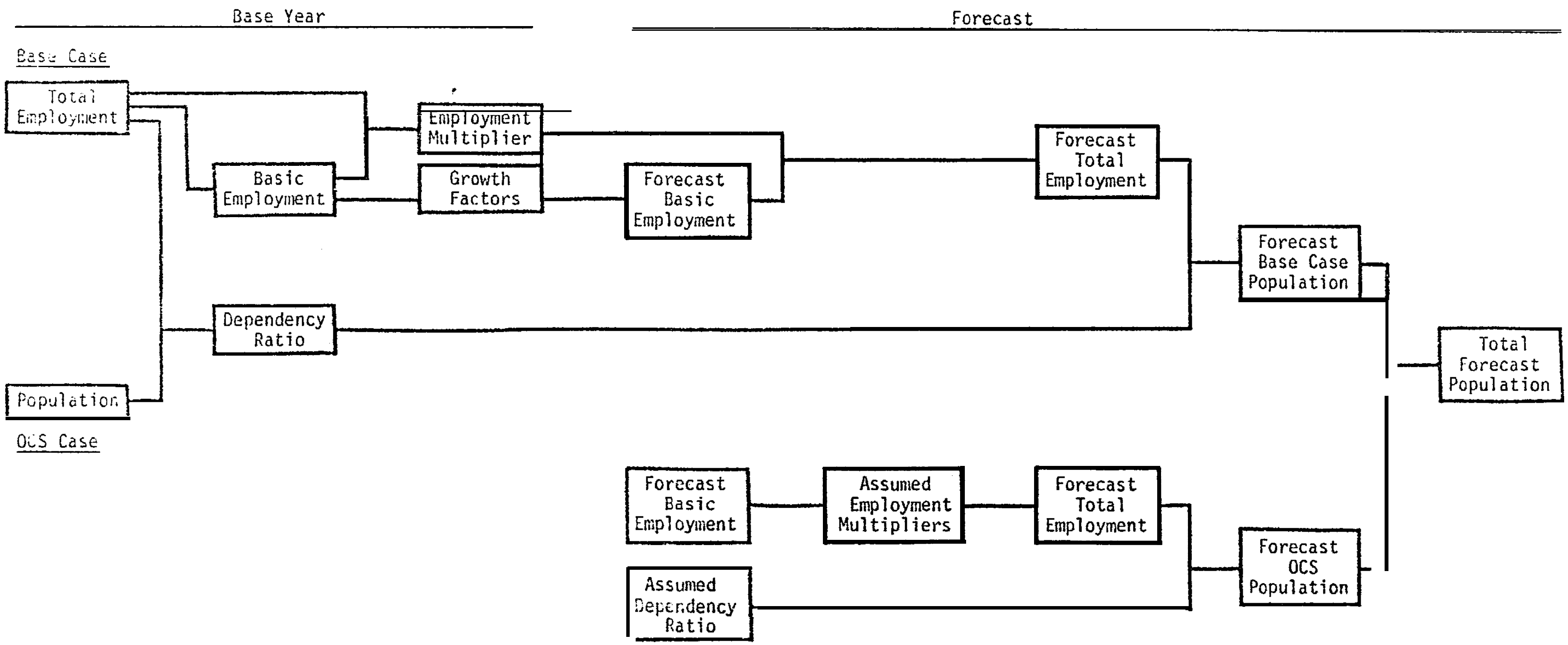
so that: $Y_t = \left(\frac{1}{1-k}\right)E = mE$

and so that m, the multiplier, $\frac{1}{1-k} = \frac{1}{1-\left(\frac{Y_s}{Y_t}\right)} = \frac{Y_t}{E} = \frac{Y_s + E}{E} = 1 + \frac{Y_s}{E}$.

The multiplier is estimated by observing the historic relationship between the activities of the export sector and total regional activities. Then given the estimates of the future magnitude of basic employment as foreseen in each SIC division resulting from export activity, the application of the multiplier yields a forecast of total employment as a reflection of total regional or community economic activity. Furthermore, total regional or community employment multiplied by a population

FIGURE A-1

SIMPLIFIED DIAGRAM OF EMPLOYMENT/POPULATION FORECASTING METHODOLOGY



Source: Alaska Consultants, Inc.

dependency ratio gained by observing the historic relationship of total employment to total population produces a forecast of total population.

Present Employment Estimates. As a result of research into economic prospects of the State, region and local economies from published materials, a precise definition of the areas to be studied was determined. The areas of study are defined as the Yakutat portion of the Skagway-Yakutat Census Division, the Cordova portion of the Cordova-McCarthy Census Division and the Seward Census Division. These Census Divisions conform by definition to the statistical areas utilized by the Alaska Department of Labor. The Yakutat portion of the Skagway-Yakutat Census Division is defined as including the area northwest of a line drawn between the Canadian border at Mt. Fairweather and Cape Fairweather. The Cordova portion of the Cordova-McCarthy Census Division is defined as including the area north of a line drawn east-west through the center of Port Fidalgo. And the Seward Census Division remains as defined in the U.S. Census of 1970.

Within these areas of study, informal interviews of employers and other knowledgeable individuals were conducted. From a review of written materials and the interviews, the basis of the present economic activities and the potential for future growth or decline of the Yakutat, Cordova and Seward areas are assessed. The process of investigation is carried out for each sector of these local economies.

Since the areas of study are not populous, informal interviews of all employers are conducted. Among the information obtained is the following:

- The number of full-time and part-time salaried employees.
- The number of months worked by the employees.
- The product(s) or services(s) produced or delivered.
- The quantities of product produced by major manufacturers such as fish processing plants.
- The months during which the product is produced.
- The suppliers to the major manufacturing plants such as the number and type of fishing vessels (to estimate the number of jobs in fishing).
- The percent of the firm's business (revenues) resulting from activities (sales) related to firms and individuals outside the region or the local area.
- The plans of the firms regarding expansion or retrenchment which would result in increased or decreased employment.
- The views of the owners or operators of the firm regarding future prospects of their firm and their industry, estimates and timing of major growth or decline in terms of employment and opinions on future seasonality.

The information collected for these areas coupled with published and unpublished employment data provided by the Employment Security Division of the Alaska Department of Labor provide the basis for current employment estimates.

The employment in each of these geographic areas is then arrayed by major industrial divis on in conformance with the Office of Management and Budget's Standard Industrial Classification. The SIC Manual defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. The following base year data necessary for the forecasting process is produced:

- The distribution of basic and secondary employment by industrial sector.
- The basic, secondary and total employment.
- The employment multiplier.

For example, in a hypothetical community, the base year annual full-time employment is as follows:

Industry Classification	Number	% Basic	Basic Number	Secondary Number	Secondary Distribution
Agriculture, Forestry and Fishing	100	100	110	0	0.0
Mining	5	80	4	1	0.5
Contract Construction	15	33	5	10	4.5
Manufacturing	100	97	97	3	1.4
Transportation, Communication & Public Utilities	30	40	12	18	8.2
Trade	70	35	24	46	20.9
Finance, Insurance & Real Estate	15	15	2	13	5.9
Service	55	30	16	39	17.7
Government	150	40	60	90	40.9
TOTAL	550	60	330	220	100.0

Thus, the multiplier is derived as follows:

$$m = \frac{Yt}{E} = \frac{550}{330} = 1.6667 \text{ or } 1.67$$

Although it is assumed that the employment multiplier and the distribution of service employment among the various employment sectors will remain constant throughout the planning period in the mode?, it should be recognized that there are factors which affect the multiplier and the distribution of service employment. Among these factors which can be taken into account in the forecast are the following:

- A lag which often occurs in service employment, especially during rapid growth or decline in basic industry.
- Changes in consumer habits which result in greater or lesser purchases locally. Often the scale of retail and service facilities can act as an attraction or detraction for greater or lesser purchases.

The structure of employment in communities which have experienced rapid growth or decline in the past will be reviewed, as will communities' retail and service structures during various periods of growth. Adjustments in the structure of service employment can be made based upon these comparisons.

<u>Forecast of Non-OCS Employment.</u> With the significant factors which would affect future growth or decline in the regional or community industries identified and basic employment by industry sector for the

base year estimated, basic employment by industry as translated into SIC industry sectors is forecast by industry sector. In the hypothetical community example, the following abbreviated assumptions regarding growth in basic employment in percentage form are shown as follows:

Industrial Classification	Base Year Basic Employment	Forecast Growth %	Year 1 Basic Employment Forecast
Agriculture, Forestry and Fishing	110	5	116
Mining	4	2	4
Contract Construction	5	4	5
Manufacturing	97	5	102
Transportation, Communication, and Public Utilities	12	5	13
Trade	24	4	25
Finance, Insurance and Real Estate	2	4	2
Service	16	4	17
Government	60	3	62
TOTAL	330		346

The sum of the basic employment forecasts by industry sector in any given year equals total basic employment in that year. And, if the multiplier is assumed to remain constant over time, the employment multiplier times total basic employment equals total employment. In this forecast, for example, the following results for 1980:

$$Yt = mE = 1.67 \times 346 = 478.$$

Secondary employment is then derived through the following formula:

$$Ys = Yt - E = 578 - 346 = 232.$$

In terms of presenting employment by industrial sector, secondary employment, if it is assumed to have a constant distribution over time, is distributed as in the base year. Thus, the following distribution would take place:

Industry Classification	Base Year Secondary Employment Distribution	Forecast Secondary Employment	Forecast Basic Employment	Forecast Total Employment
Agriculture, Forestry and Fishing	0.0	0	116	116
Mining	0.5	1	4	5
Contract Construction	4.5	10	5	15
Manufacturing	1.4	3	102	105
Transportation, Communication & Public Utilities	8.2	19	13	32
Trade	20.9	49	25	74
Finance, Insurance & Real Estate	5.9	14	2	16
Service	17.7	41	17	58
Government	40.9	95	62	157
TOTAL	100.0	232	346	578

Present Non-OCS Population Estimates. A population in the base year is established from published reports such as the U.S. Bureau of the Census estimates for revenue sharing, a special census, local population counts or other local estimates. To assure a reasonable base year figure, an investigation is made of past population figures and interviews are held with city and/or borough officials and other sources with knowledge of recent changes in population. Population within the cities of Yakutat, Cordova and Seward was estimated for the base year as well as the unincorporated areas outside. In Yakutat and Cordova, the population outside town resides along the road-connected areas extending out from the cities. And in the case of Seward, the population outside of the City of Seward includes everyone living within the Seward Census Division.

The base year non-OCS population estimate is then divided by the base year non-OCS employment estimate. The product of this division is a dependency ratio for estimating total non-OCS population from total non-OCS employment in future years.

In the hypothetical community example, if the population is assumed to be 1,200 people, the following dependency ratio is arrived at:

$$\frac{\text{Estimated Base Year Population}}{\text{Estimated Base Year Employment}} = \frac{1,200}{500} = 2.2 \text{ Dependency Ratio}$$

Although this ratio can be employed as a constant throughout the planning period, it should be recognized that it is subject to change. Factors can be statistically identified in similarly situated communities at various levels of growth which evidence different ratios. Some of these factors are as follows:

- Changes in the composition of population as a result of birth rates, death rates and migration.
- Variations in the pattern of seasonality of employment resulting in a greater or lesser year-round population.
- Entry into or withdrawal from the workforce and employment of household members, especially wives.
- Changes in the rates of unemployment and underemployment.

Therefore, if changes in dependency ratios are assumed, one or more of the above factors is assumed to have caused the change.

<u>Forecast of Non-OCS Population.</u> The dependency ratio produced by dividing total non-OCS employment in the base year into total non-OCS population in the base year is employed to forecast total non-OCS population on an annual basis throughout the planning period. Although dependency ratios are subject to change based upon a number of factors, a constant dependency ratio can be used throughout the forecast period.

An example of the application of the dependency ratio in the hypothetical community for the initial year forecast is as follows:

$$\text{Total Non-OCS Employment Forecast} \times \text{Dependency Ratio} = 578 \times 2.2 = 1{,}272 \ \text{Total Non-OCS Population Forecast}$$

Forecast of OCS Employment and Population

The OCS petroleum scenarios (or cases) which form the basis of the socioeconomic impact assessment were selected by the U.S. Bureau of Land Management and developed by Dames and Moore from U.S. Geological Survey resource estimates. The cases are as follows:

- 5 Percent Probability Resource Level Scenario
- Statistical Mean Resource Level Scenario
- 95 Percent Probability Resource Level Scenario - Exploration Only

Although reasonably precise locations, quantities, methods of operation, facilities and time frames are necessary to the development of plausible scenarios, the scenarios and their impacts should not be interpreted as forecasts of what is actually going to happen. There is far too much uncertainty in oil and gas exploration and development for this type of precision. However, an indication is given of the type and scale of activities which could impact Northern Gulf of Alaska communities and the extent to which individual communities would logically be impacted.

An understanding of pertinent information in the petroleum scenarios such as the size and location of the offshore fields and a forecast of onshore activities such as the general location of facilities and a measure of the quantities and timing involved are imperative.

In regard to onshore impact on the Northern Gulf of Alaska coastal area and the communities of Yakutat, Cordova and Seward contained within the coastal area, the following information is required for each community on a yearly or, preferably monthly, basis:

- The OCS oil related facilities to be located there, such as marine service bases, pipe coating plants, helicopter facilities and oil terminals.
- The employment required to construct these facilities.
- The operating employment in these facilities during the exploration, development and production phases.
- The employment desired is onsite employment which disregards those workers rotated offsite. Onsite employment is used since workers engaged in onshore activities within the Northern Gulf of Alaska coastal area would not be rotated if they were resident in the coastal area. Thus, it can be assumed that all onshore employment rotated in this coastal area will leave the area upon rotation.

In regard to onshore impact on the Northern Gulf of Alaska coastal area as a result of employment offshore beyond this coastal area, the following information is required for each scenario in each community on an annual basis:

- Survey vessel employment operating from specific ports performing geophysical and geological surveys.
- Supply/anchor/tug boat employment operating from specific ports during the exploration, deve opment and production phases.

- Rig employment during the exploration phase.
- Platform installation and offshore pipeline employment during the development phase.
- Platform employment during the development and production phases.
- Offshore-onsite and the offshore-offsite employment for the above activities.

In order to process employment data by the onshore and offshore categories mentioned, it is first necessary to aggregate onshore and offshore employment by task. The complete array of tasks developed by Dames and Moore is aggregated by Alaska Consultants, Inc. in Table A-1. A computation of employment by task group was requested by Alaska Consultants, Inc. and provided by Dames and Moore.

However, since the data aggregated by category provides only employment by lease sale area for each scenario, it is necessary to disaggregate the computer model by task, duration of employment, crew size and the number of shifts worked per day to allocate employment to onshore facilities. In the case of construction employment and operating employment in LNG plants and oil terminals, scaling factors developed for the model must be employed. Also, assumptions must be made as to the offshore areas and activities serviced from the shore based facilities in communities within each lease sale area for each scenario.

TABLE A-1

AGGREGATION OF ONSHORE AND OFFSHORE EMPLOYMENT BY TASK
NORTHERN GULF OF ALASKA

ONSHORE (Functions requiring onshore employment)

Service Base

- Exploration Well Drilling
- Geophysical and Geological Survey
- Supply/Anchor/Tug Boat for Rigs
- Development Drilling
- Steel Jacket Installations and Commissioning
- Concrete Platform Installation and Commissioning
- Pipeline Offshore, Gathering, Oil and Gas
- Pipeline Offshore, Trunk, Oil and Gas
- Supply/Anchor/Tug Boat for Platform
- Supply/Anchor/Tug Boat for Lay and Bury Barge
- Longshoring for Platform Installation
- Longshoring for Lay and Bury Barge
- Maintenance and Repairs for Platform and Supply Boats
- Longshoring for Platform Operations

Helicopter Service

- Helicopter for Rigs
- Helicopter Support for Platform Installation
- Helicopter Support for Lay and Bury Barge
- Helicopter for Platform Operations

Construction

- Temporary or Advance Service Base
- Permanent Service Base
- Pipe Coating
- Onshore Trunk Pipeline
- Marine Oil Terminal
- LNG Plant

Oil Terminal Operations

- Oil Terminal and Pipeline Operations

LNG Plant Operations

- LNG Plant and Pipeline Operations

OFFSHORE (Functions requiring offshore employment)

Survey

- Geophysical and Geological Survey

Rig

- Exploration Well Drilling

Platform

- Development Well Drilling
- Platform Operations
- Workover and Well Stimulation

Platform Installation

- Steel Jacket Installation and Commissioning
- Concrete Platform Installation and Commissioning

Pipelaying and Burying

- Offshore Oil and Gas Gather Pipeline Laying and Burying
- Offshore Oil and Gas Trunk Pipeline Laying and Burying

Supply/Anchor/Tug Boat

- Supply/Anchor Boat for Rigs
- Supply Boat for Platform Development Drilling
- Supply/Anchor Boat for Lay Barge and Bury Barge
- Tugboat for Platform Installation and Towout
- Tugboat for Lay Barge Spread
- Supply Boat for Platform Operations

Source: Dames and Moore/Alaska Consultants, Inc.

The jobs associated with offshore oil and gas development do not submit easily to the application of a general regional multiplier. There are extreme differences in employment sectors relating to petroleum development. For example, construction employment of the magnitude associated with onshore petroleum development will reside in construction camps, work long hours (probably 12 hours per day) and be on the job continuously (7 days per week) until rotated for leave. Since most of these employees will reside outside the community, their off duty hours will be spent outside the community while on leave. Thus, the impact on the local economy from this activity will be small.

On the other hand, the manufacturing employment in LNG or oil terminals will have considerably greater impact since these people will be year-round residents of the community. Thus, for purposes of estimating total employment in each of the communities for each of the scenarios, a series of multiplier values is developed for each employment category.

A study of each employment category is then completed and employment assumptions which are reflected in the multiplier values are applied to each category. The assumptions reflected in the multiplier values for each employment category are listed in Table A-2.

With direct OCS-related employment calculated for each community during each development scenario, total employment, both direct and indirect (basic and service), added to each community as a result of the OCS scenarios is derived by applying multiplier values. The difference

TABLE A-2

EMPLOYMENT ASSUMPTIONS REFLECTED IN MULTIPLIER VALUES
NORTHERN GULF OF ALASKA - COASTAL AREA

ONSHORE

Service Base. All service base employees (with minor exceptions) providing support to offshore platform installation and commissioning and pipe laying and burying will be permanent employees resident in the Northern Gulf of Alaska (NGA) coastal area.

These service base employees will include the onshore employment required to support the following offshore activities:

- Exploration Well Drilling
- Geophysical and Geological Survey
- Supply/Anchor/Tug Boat for Rigs
- Development Drilling
- Steel Jacket Installations and Commissioning
- Concrete Platform Installation and Commissioning
- Pipeline Offshore, Gathering, Oil and Gas
- Pipeline Offshore, Trunk, Oil and Gas
- Supply/Anchor/Tug Boat for Platform
- Supply/Anchor/Tug Boat for Lay and Bury Barge
- Longshoring for Platform Construction
- Longshoring for Lay and Bury Barge
- Maintenance and Repairs for Platform and Supply Boats
- Longshoring for Platform Operations

Helicopter Service. During the exploration phase few helicopter pilots, mechanics or operations personnel will be permanent residents in the NGA coastal area. Essentially the entire helicopter work force will be rotated between the NGA coastal area and their permanent residences outside. In the development phase with long term employment in the NGA coastal area assured, a portion of this work force will assume permanent residence in the coastal area and, during the production phase, the helicopter service work force is seen as being essentially permanent employees and residents of the NGA coastal area. This could involve either an employee whose residence is in the coastal area or an extended rotation pattern enabling the location of employees and families in the coastal area.

Service Base Construction. Employees engaged in service base construction are assumed to be temporary employees housed in construction camps with periodic rotation outside the NGA coastal area to their permanent places of residence. Furthermore, the service base construction camps are assumed to have a reasonable range of amenities for comfortable living within the camps. Thus, these excellent camps coupled with limited leisure time and scheduled rotation outside the coastal area during long periods of time off are assumed to reduce impacts upon the coastal communities affected.

However, because of the relatively small scale of service base construction, the range of amenities provided at the construction camps will be somewhat limited. Therefore, a greater impact per construction employee is assumed from service base construction than from larger construction projects such as LNG plants or oil terminals.

Oil Terminal, LNG Plant and Onshore Pipeline Construction. Onshore gas or oil pipeline construction will take place in conjunction with oil terminal or LNG plant construction. Also, since the pipelines which terminate at the oil terminal or LNG plants will be accessible from construction camps located at the oil terminal or LNG plant construction sites, pipeline construction employees will reside in these construction camps.

The employees engaged in these construction activities are assumed to be temporary employees who will reside in construction camps. These camps are assumed to contain a wide range of amenities for comfortable living. Thus, the excellent camps coupled with limited leisure time and scheduled rotation for employees are assumed to minimize impacts in the coastal communities affected.

Pipe Coating. Employees engaged in the coating of pipe for emplacement offshore are assumed to be temporary employees housed in construction camps with periodic rotation outside the NGA coastal area to their permanent places of residence. Like the service base construction work forces, these construction employees will be housed in small construction camps offering reasonable amenities. Therefore, although their impact upon the NGA coastal communities will be limited, it is assumed that the per construction employee impact will be greater than the major construction projects.

Oil Terminal and LNG Plant Operations. All oil terminal and LNG plant operations employees will be permanent employees resident in the NGA coastal area.

OFFSHORE

Survey. Offshore crews of vessels engaged in geophysical and geological survey are assumed to be composed of transient workers who are rotated through the NGA coastal area to their permanent residences outside the coastal area. No offshore survey employees are assumed to be employed or to be resident in the NGA coastal area despite their activities on the Outer Continental Shelf beyond the coastal area and occasional visits to port.

Therefore, the direct and indirect impact of this employment upon the coastal area is assumed to be negligible.

Rigs. Offshore rig crews engaged in exploration drilling are assumed to be composed of transient workers who are rotated through the NGA coastal area to their permanent residences outside the coastal area. No offshore rig employees are assumed to be employed or to be resident in the NGA coastal area despite their activities on the Outer Continental Shelf beyond the coastal area and their rotation through coastal area airports. Therefore, the direct and indirect impact of rig employees upon the coastal area is assumed to be negligible.

Platforms. Although the vast majority of offshore employment during the development phase is assumed to be composed of transient workers who are rotated through the NGA coastal area to their permanent residence outside the coastal area, it is assumed that 5 percent of those employees engaged in development drilling will elect to reside in the coastal area.

During the production phase, it is estimated that 10 perent of those employees engaged in platform operations will elect to reside in the coastal area.

Therefore, there will be a direct and indirect impact in the coastal area based upon those employees electing to reside there. The impact of the remaining transient employees is deemed to be negligible.

Supply/Anchor/Tug Boats. During the exploration phase, offshore boat crews are assumed to be composed of transient workers who are rotated through the NGA coastal area to their permanent residences outside the coastal area. However, during the development phase, 5 percent of the boat crews will elect to reside in the coastal area, while during the production phase 10 percent are assumed to be local residents. Therefore, there will be a direct and indirect impact in the coastal area based upon those employees electing to reside there. The impact of the remaining transient employees is deemed to be negligible.

Platform Installation and Offshore Pipeline Construction. The offshore crews engaged in platform installation and pipeline construction which takes place during the development phase are assumed to be transient workers who are rotated through NGA coastal areas to their permanent residences outside the coastal area. No offshore platform installation or pipeline construction employees are assumed to be employed or to be resident within the NGA coastal area despite their activities on the Outer Continental Shelf beyond the coastal area and their rotation through the coastal area airports. Therefore, the direct and indirect impact of offshore platform installation and pipeline construction employees upon the coastal area is assumed to be negligible.

Source: Alaska Consultants, Inc.

between direct OCS employment and total employment added as a result of OCS activities is indirect (service) employment. The following separate multipliers set forth in Table A-3 are applied to elicit total employment and indirect employment added as a result of the OCS scenarios.

To apply the direct and indirect employment to the long range sectoral analysis of the economy, the direct OCS employment by category is classified by standard industrial classification (see Table A-4).

Direct OCS employment by standard industrial classification can then be added directly to the non-OCS employment matrix by year for each of the OCS scenarios.

Indirect employment, on the other hand, is to a large extent based upon the lifestyles and consumption habits of the direct OCS employees and their families and, to a lesser extent, upon the indirect employees providing services and their families. It is assumed that these service employees will be distributed among the standard industrial classification sectors for each year forecast as listed in Table A-5.

This distribution is based upon the assumption that, as a group, the employees added as a result of OCS activities and their families will exhibit expenditure patterns more like "Lower 48" communities of a similar size and function.

TABLE A-3

EMPLOYMENT MULTIPLIER VALUES FOR THE COASTAL AREAS a/
OF YAKUTAT, CORDOVA AND SEWARD

ONSHORE (Applied to onshore-onsite employees in the Coastal Area) b/

Service Base	1.50
Helicopter Service - Exploration	1.10
Development	1.20
Production	1.50
Service Base Construction	1.10
Onshore Pipeline Construction	1.05
Oil Terminal Construction	1.05
LNG Plant Construction	1.05
Pipe Coating	1.10
Oil Terminal Operations	1.50
LNG Plant Operations	1.50

OFFSHORE (Applied to offshore employees assumed to be resident in in the Coastal Area) c/

Survey	(Nil)	
Rigs	(Nil)	
Platforms - Development Drilling	(5%)	1.50
Operations	(lo%)	1.50
Supply/Anchor/Tug Boats - Exploration	(Nil)	
Development	(5%)	1.50
Production	(lo%)	1.50
Platform Installation	(Nil)	
Offshore Pipeline Construction	(Nil)	

a/ The coastal areas are the Census Divisions of Cordova-McCarthy and Seward and the western portion of the Skagway-Yakutat Division. These areas do not include the Northern Gulf of Alaska OCS areas which are in federal waters.

b/ The employment multiplier values are applied to the direct onshore-onsite employment in the coastal areas.

c/ The employment multiplier values are applied only to the estimated portion of total offshore employment resident in the coastal areas.

Source: Alaska Consultants, Inc.

TABLE A-4

CLASSIFICATION OF ONSHORE AND OFFSHORE EMPLOYMENT
NORTHERN GULF OF ALASKA

e,

ONSHORE	
Service Base	Transportation
Service Base Construction	Construction
Helicopter Service	Transportation
Pipe Coating	Construction
Oil Terminal Construction	Construction
LNG Plant Construction	Construction
Oil Terminal Operations	Transportation
LNG Plant Operations	Manufacturing
OFFSHORE	
Survey	Service
Rig	Mining
Platform	Mining
Supply/Anchor/Tug Boat	Transportation
Platform Installation	Construction
Pipe Laying and Burying	Construction

Source: Standard Industrial Classification Manual. Office of Management and Budget, Executive Office of the President.

Thus, direct and indirect OCS employment is added to non-OCS employment by industrial sector for each year forecast from 1981-2000 for each OCS scenario. The various sectors are then added on a yearly basis and the product is total annual average employment.

Since the Northern Gulf of Alaska coastal area is reasonably isolated and is a frontier petroleum development area, the petroleum related jobs are assumed in large part to be filled by young persons. Furthermore, it is assumed that many households will be composed of single unrelated individuals so that OCS-related employees will exhibit a reasonably low dependency ratio. Therefore, a dependency ratio of 2.0 persons per employee is assumed for all OCS-related employees. The dependency ratio is applied to total employment resulting from offshore OCS activities in the Yakutat, Cordova and Seward areas to obtain population added here as a result of offshore OCS activities. However, where direct onshore construction employment is involved, this population (direct employment) is added without application of the dependency ratio.

The allocation of population is closely tied to historical distribution patterns. In the Yakutat area for example, 50 percent is allocated to the City of Yakutat, and 50 percent to the remaining area outside town.

The population for the various petroleum scenarios is then added to the base case in the forecast years of 1981 through 2000 to produce forecasts of population which include OCS activity during the exploration only scenario, statistical mean resource level scenario and 95 percent probability resource level scenario.

TABLE A-5

PERCENT DISTRIBUTION
BY ECONOMIC SECTOR
INDIRECT EMPLOYMENT

Industry Classification	Percent of Indirect Employment
Commodity Producing Industries	13
Agriculture, Forestry and Fisheries	--
Mining	--
Manufacturing	(3)
Contract Construction	(lo)
Distributive Industries	57
Transportation, Communication and Public Utilities	(lo)
Trade	(22)
Finance, Insurance and Real Estate	(5)
Service	(20)
Government	30
TOTAL	100

Source: Alaska Consultants, Inc.

The extent of the impact upon the communities of Yakutat, Cordova and Seward is then elicited by comparing the base case forecasts of population with the population forecasts which include the OCS cases.

LAND

The major uses of land required in the existing communities under study as a result of growth are lands in public (principally rights-of-way, parks and recreation areas), industrial and residential uses. The future demand for other public, commercial and semi-public land uses will be comparatively minor.

In the communities where land uses have recently been quantified, land availability and suitability will be equated against estimates of future total land use requirements. In communities where existing land use has not already been quantified, rough estimates will be developed for land capability and the lands required to be added in major public industrial and residential uses. Minor public, commercial and semi-public uses are estimated as a percentage of the lands in residential and industrial use where relevant, based upon land uses in communities of comparable size and industrial mix.

In forecasting the use of residential land, the following factors are assumed:

- The new residents forecast will desire to reside within the cities of Yakutat, Cordova and Seward or within the metropolitan areas of these communities.
- The types of housing desired by the new population will approximate current usage as determined in the housing forecasts of the communities under study.
- Although some infilling may occur, most development will occur on virgin land or on land suitable for residential development of size.
- The development or redevelopment of the land will adhere roughly to present standards established in zoning ordinances for the respective communities.
- It is assumed that the development of raw land and the redevelopment of land for residential purposes will result in approximately 28 percent of the gross land area being devoted to street rights-of-way (Simpson, Usher, Jones, Inc., June 1977).
- An average right-of-way width will be established based upon current standards in the zoning ordinances applicable to the respective communities.
- The lineal footage of sewer and water lines is roughly equivalent to the lineal footage of the street rights-of-way. (Simpson, Usher, Jones, Inc., June 1977).

To estimate the amount of land required for residential use in the future, a density of development for one and two family units, multifamily units and mobile homes must be derived from the zoning ordinances applicable to each community.

Using .4 hectares or 1 acre of land as a common measure, 28 percent (1 ,333.1 square meters or 12,197 square feet) would be in rights-of-way. Thus, the remaining 72 percent (2,913.6 square meters or 31,363 square feet) would be available for residential use.

The method of calculating the amount of land required is as follows:

- One acre minus 28 percent in street rights-of-way provides the developable land per acre.
- The developable land per acre divided by the minimum lot size allowable as per the locally applicable zoning ordinance provides the number of lots per acre allowable.
- The number of lots allowable times the maximum allowable housing units per lot provides the number of housing units which can be accommodated on an acre.
- The number of housing units forecast to be added divided by the maximum allowable housing units per acre provides the number of acres required to accommodate the housing units and street rights-of-way forecast to be added throughout the planning period.
- The number of acres required multiplied by 72 percent provides a gross forecast of residential land required to accommodate the housing units forecast to be added.

- The number of acres required multiplied by 28 percent provides a gross forecast of lands needed for street rights-of-way.

Once the land requirements for one and two family, multifamily and mobile homes have been determined, these quantities are aggregated to produce a gross forecast of residential and street rights-of-way land needs.

The remaining uses which place heavy demands upon a community are public lands in park and recreation use and industrial lands. Major industrial land requirements will be estimated based upon the Impact Analysis of the Fishing Industry by the University of Alaska's Sea Grant Program and the Petroleum Development Scenarios prepared by Dames and Moore. The future requirements or parks and recreation lands are specified in the recreation standards elsewhere in this appendix.

The total of lands in the major public uses of parks, recreation and street rights-of-way plus the land requirements for housing and industrial uses and, to a lesser extent, minor public, commercial and semi-public uses are used to assess the pressures on developable land within the communities under study.

HOUSING

A distinction is made in the forecast of populations to be housed onshore in the future. Total forecast population is divided into households (i.e. a mix of family and unrelated individual households) and those living in group quarters (i.e. the number of people living in bunkhouses, construction camps, military compounds and other group circumstances). The population forecast to be living in households is divided by the estimated family size (the average number of persons per unit) to produce the total number of housing units forecast to satisfy household demands. A subtraction of units in the base year from units forecast in a succeeding year produces the yearly requirement of new housing units.

The number of structures is of little relevance in group housing. The building of group housing is generally assumed by the employer and is most often modular construction. Therefore, group housing is shown as places for persons which is equivalent to group housing population. A subtraction of the number of persons in group housing in the base year from the number of persons forecast to be living in group housing the succeeding year produces the yearly requirement for new places to be provided in group housing.

Group housing has resulted in large part from the seasonality inherent in the past exploitation of fishery resources. However, recent trends in the fishing and fish processing industry have been toward a year-round fishery. The fishing industry which processed essentially only salmon during the summer season has since added king crab, tanner crab and other fisheries products resulting in fishing and fish processing being a more year-round enterprise. It is assumed that the addition of bottomfish will serve further to abate the seasonality in this industry since it is essentially a year-round fishery requiring a permanent year-round resident labor force. Thus, it is assumed that with reduced seasonal variations in the demand for labor, an increased demand for group quarters of a permanent nature will not be needed or desired in the non-OCS case.

In order to obtain an indication of land requirements, the number of housing units forecast are estimated as to one and two family units, multifamily units and mobile homes. It is assumed that the relative proportion as measured in the most recent inventory or estimate on types of housing units for a given community will be maintained throughout the planning period.

The forecast of housing to accommodate persons added as a result of OCS oil and gas activities will utilize the same methodology employed for the non-OCS case. However, an important assumption in the OCS cases is that the construction employees engaged in building or fabricating major OCS facilities onshore will be housed onsite in construction camps throughout the period of construction.

COMMUNITY FACILITIES AND SERVICES

A series of assumptions has been made and standards developed for assessing future needs for a range of community facilities and services in the communities under study in both the non-OCS and OCS cases. These assumptions and standards and the methodology for each are contained in the following pages.

Public Safety

Police. The following basic assumptions have been made for police protection:

- Police protection services will continue to be provided by the cities of Cordova and Seward for areas within their corporate limits and the City of Yakutat will, according to its mayor, once again assume this responsibility in the near future.
- Law en orcement in the road-connected areas outside these commun ties will continue to be provided by State troopers.

To arrive at reasonable standards for police protection, commonly used nationwide standards for the number of law enforcement officers and jail cells needed to serve a given number of people were obtained. These standards were then reviewed in relation to existing conditions in all three communities under study and special situations in particular communities were noted.

Nationwide, the desired ratio of law enforcement officers to population is one for every 500 people. In relatively small isolated communities such as Yakutat, a single officer is typically required to work regular hours and be on call at other times. However, according to the Alaska Department of Public Safety, when a community reaches a size where it becomes desirable to have an officer on duty 24 hours per day, 7 days per week, a minimum of 6 officers (mathematically, 5.75) must be hired when factors such as annual leave, sick leave and others are taken into account. A similar situation exists with support personnel. The population threshhold at which an on-duty officer is required around the clock can vary considerably but is assumed generally by the Alaska Department of Public Safety to be approximately 1,000.

According to the Alaska Department of Public Safety, a commonly used standard for jail cells is one for every 500 people. However, since State law requires that male, female and juvenile offenders be separated during incarceration, a minimum sized jail in Alaska should have at least three cells.

A review of existing conditions in the communities under study indicates that while Yakutat and Cordova approximate national standards, Seward has more police officers than would ordinarily be considered necessary. Additional officers are needed to provide police protection services to this community's summer tourists and transient fishing boat crews. Nevertheless, despite Seward's larger than normal complement of police personnel, the number of jail cells provided is generally consistent with national standards.

On the basis of the foregoing, the following standards were derived for policemen and jail cells in the non-OCS case:

- A total of one police officer needed for the first 500 people in a community, three for the first 1,000 and six for the first 1,500. Thereafter, one additional officer to be required for each successive growth of 500 population. This standard to apply universally in the cases of Yakutat and Cordova.
- For the City of Seward, existing relationships between population and the number of police officers will be utilized as the base case, with an additional officer to be required for each successive growth of 500 population.
- One jail cell for every 500 people except that a minimum sized jail will have three cells.

In the various OCS cases, offshore personnel are assumed not to have any significant impact on local law enforcement requirements as it is assumed that these people will be shuttled directly in and out of the region with essentially no layover time. However, all onshore personnel, including construction crews in camps, are assumed to have an impact on local police protection capabilities comparable to the non-OCS case, i.e. one additional officer and one additional jail cell for each successive growth of 500 in population.

Fire Protection. Fire protection is a normal responsibility of Alaska cities and one which is exercised by the communities under study. In addition, unincorporated areas may form volunteer fire departments while, if they are within organized boroughs, they may elect to have this service provided by the borough on a service area basis. The airport areas of Yakutat and Cordova both have their own fire protect" on capabilities, while the Bear Creek area outside Seward has fire protection services provided by the Kenai Peninsula Borough on a serv· ce area basis.

The State has no established qualitative fire protection standards except that an individual fire department must be registered with the Division of Fire Prevention to be eligible to receive State revenue sharing funds for firefighting purposes. However, the Insurance Services Office, on behalf of fire insurance companies and as an aid to the underwriting of fire insurance premiums, publishes comprehensive fire protection guidelines to enable the classification of communities throughout the United States in relation to the adequacy of their fire defenses and their physical characteristics. Based upon the extent to which local fire departments meet these standards, individual communities are graded on a class 1 (best) to a class 10 (worst) scale and local insurance rates are adjusted to reflect these differences in fire protection capability. Present ratings for the communities under study range from 5 for Seward, to 6 for Cordova and 10 for Yakutat, although Yakutat is soon expected to receive an improved rating.

According to the Insurance Services Office, the minimum criteria fora recognized fire department are as follows:

- Organization: The department shall be organized on a sound, permanent basis under applicable state and/or local laws. The organization shall include one person (usually with the title of Chief) responsible for the operation of the department.
- Membership: The department shall have an active membership which provides a response of at least 4 members to alarms.
- Training: Training shall be conducted for all active members.
- Apparatus: Response to any alarm or fire shall be with at least one piece of apparatus suitably designed and equipped for fire service. Provisions shall be made for the housing and maintenance of apparatus.
- Alarm Notification: Means shall be provided for 24-hour receipt of alarms and immediate notification of members.

In addition to minimum criteria for fire departments, the Insurance Services Office also establishes minimum criteria for water supplies for firefighting purposes, quoted as follows:

> "A minimum recognized water supply usually contemplates a network of mains and hydrants capable of delivering at least [15.77 liters per second] 250 gallons per minute (over and above normal consumption) for a period of at least two hours. Where there are numerous commercial buildings, this minimum might be converted to at least [31.54 liters per second] 500 gpm for one hour (the same total quantity of water but available at a greater flow rate for a shorter period of time).
>
> . . . the small settlement of a few hundred people and comprised of the usual number of small mercantile structures in a central commercial district would require [31.54 liters per second] 500 gpm in residential sections (well spaced or scattered small single family dwellings). In the commercial district, water in the range of [63.08 to 189.24 liters per second] 1,000 to 3,000 gpm would be required. A school complex serving the settlement and the surrounding territory probably would need something on the order of [189.24 to 315.4 liters per second] 3,000 to 5,000 gpm if there is a large building such as a gymnasium."

A great deal of flexibility is built into guidelines developed by the Insurance Services Office. This is necessary since firefighting requirements for individual communities vary greatly depending on population densities, land use patterns and the natural terrain, all of which affect running distances and response times for firefighting equipment. In addition, water requirements vary according to the character and scale of an area to be served. For example, the flow of water required to service low density residential areas is much less than that needed in a typical waterfront industrial area.

Recognizing that precise standards for fire protection are not generally applicable, the following standards are nevertheless offered. The communities under study generally meet these standards.

- All communities to have at least one fire station with at least two fire trucks. The capacity of the fire trucks and the need for additional equipment will be determined primarily by fire flow requirements.
- Additional fire stations (each with at least two fire trucks) to be required where areas of concentrated development are beyond a 3.2 to 6.4 kilometer (2 to 4 mile) radius of existing fire stations. (The actual distance to vary according to possible response time).
- Established fire flow requirements for various areas of each community are assumed to remain approximately the same except in developing residential areas where a water flow minimum of 1,892.5 liters (500 gallons) per minute is assumed.

In both the non-OCS and OCS cases, future demands for land will be estimated and additional firefighting capabilities needed to service population growth will be determined. In the OCS cases, it is assumed that major onshore oil and gas-related facilities such as an LNG plant or an oil terminal would provide their own fire protection capabilities, as was the case in Valdez. However, facilities with relatively low inherent fire r· sks, such as service bases, wound depend on municipal fire protection services.

Heal th

Two of the communities under study (Cordova and Seward) currently have operating hospitals. Yakutat is presently too small to warrant the construction of a hospital facility. The standards used to determine existing and future needs for medical facilities and services in the communities under study are those developed by South Central Health Planning and Development, Inc. These standards have been adopted and are used by the State of Alaska.

*

The standards summarized in the Tables A-6 and A-7 indicate that Cordova and Seward are at "Level Three". Yakutat is presently at "Level Two" although it has transportation and communications services which are superior to most other Alaska communities of its class.

The most critical element involved in health care is the presence ofa physician. On average, it is assumed that one physician requires a

TABLE A-6

INDICATORS OF HEALTH CARE AVAILABILITY

l One	Level Two	Level Three	Level Four
inerant public alth nurse a/	1 mid-level practitioner	1 primary care M.D. per 3,500 people (no less than 2)	1.3 physicians per 1,000 (less than half specialists) people
alth aide and ternate b/	1 public health nurse	3 acute care beds per 1,000 people	3 acute inpatient beds per 1,000 people
IIC space	1 EMT II c/	community mental health center and psychologist	paramedics and advanced life support c/ d/
trained person	1 dentist extender	1 dentist per 4,000 people	inpatient psychiatric beds*
al itinerant al visits	diagnostic X-ray capability	X-ray technician	long term alchol-ism treatment beds c/
hly itinerant vioral health er visits	1 behavioral health counselor or social worker	detox capability c/	neonatal beds/ live births d/
unications em	medical laboratory capability (micro-scope and refrigerator)	Class 4 emergency room (AMA) c/	therapeutic radiation capability d/
al itinerant care	home health aide or long term care alternative	mobile e.m.s. capacity with EMT trained attendants	surgical capacity
esentative health ision-making group		medical technologist	1 CAT Scanner per 250,000 residents
		1 optometrist	pathology and autopsy capability
		short term shelter care	blood bank
		itinerant M.D. special-ist visits	specialists/population

Definition to include audiologic testing, immunization.
Range of services provided by-health aide as described in Guidelines for Primary Health Care
SCHPD will emphasize, during the first AIP, the development of additional and specific manpower, facilities and equipment standards -- particularly in the areas of behavioral health and emergency medical services (as relate to our highest health problem areas).
Federal guidelines have been issued related to these areas of medical care services but the Board of Directors has not made specific recommendations regarding them.

rce: South Central Health Planning and Development, Inc. n.d. Health Systems Plan Overview.

practice of a minimum of 1,500 people. However, physicians are reluctant to work alone since there are occasions when back-up assistance is required and time is also needed away from the practice for vacations, conferences, education and other purposes. Therefore, physicians in isolated Alaska communities commonly practice in pairs. To support these two physicians, a population base of 3,500 people is generally required.

In some areas, the practice need not be confined to permanent residents nor need it be precisely 3,500. It may be economically feasible to have a practice for two physicians with a population base of closer to 3,000 people. A portion of the patient load in Cordova, for example, is made up of fishermen, cannery workers and other people who are not permanent residents but are a part of the physician's load. Thus, this coastal community currently supports two physicians.

In the case of Yakutat, a mid-level practitioner who can carry out the majority of the functions of the physician is assumed to be required when the community's population reaches 1,000 people. It is further assumed that a coastal community such as Yakutat with a population of 3,000 would warrant the presence of two physicians. Each addition of an increment of 1,500 people above a population of 3,000 would require another physician in all of the communities under study.

In regard to hospital beds (used as a measure of hospital facility needs) acute care beds are used as an index. Acute care beds are

TABLE A-7

COMMUNITY LEVELS FOR
ASSESSMENT OF HEALTH RESOURCES

Criteria	Level I Village	Level II Subregional	Level III Regional	Level IV Urban	Level V Metropolis
Population	25 - 800	500 - 2,500	2,000 - 200,000	100,000 - 500,000	500,000 +
Isolation/Transportation Network	Distances from other communities resources great; transportation alternatives and reliability limited	Semi-regular transportation network to: 1) outlying villages & 2) regional center	Moderately reliable transportation network to: 1) subregional center & outlying villages 2) urban centers	Continuously reliable statewide transportation center	National and international network
Communications	Unreliable radio contact; one or no phone services	Reliable radio; minimal phone service	Reliable radio, some television, statewide phone network	Radio, television, statewide phone network	All communications media; statewide phone network
Economic Development	Minimal or no services	Basic commercial services to outlying villages	Service and commercial center for majority of villages in the region	Statewide, financial & commercial center	Statewide, financial & commercial center
Examples	Eek, Egegik	Unalaska	Bethel, Homer	Anchorage	Seattle

Source: South Central Health Planning and Development, Inc.

general hospital beds as distinguished from long-term care or nursery beds. South Central Health Planning and Development, Inc. estimates the maximum capable of being adequately funded to be 3 to 3.5 acute care beds per 1,000 people in communities of at least 3,000 persons where the services of a physician are available.

In the non-OCS case and the OCS cases, 3.5 acute care beds per 1,000 people will be used as a standard for projection for communities with a population of more than 3,000. Given the high incidence of injury inherent in large scale construction projects and the more hazardous offshore operations such as loading and unloading supply boats and driving, the upper range of the standard for hospital beds is deemed to be warranted. In addition, the threat of fire or explosion is present with any activity involving fuels, and toxic materials are often intentionally or unintentionally handled.

Education

It is assumed that education facilities in the communities under study will continue to be provided by existing authorities, i.e. the cities of Yakutat and Cordova and the Kenai Peninsula Borough (Seward).

Generally, students make up a reasonably consistent proportion of a community's population, although recently a declining one due to the nationwide drop in birth rates. A comparison of school enrollment as a proportion of total population for five boroughs in Southeast and

Southcentral Alaska (Ketchikan Gateway Borough, City and Borough of Sitka, Kenai Peninsula Borough, Kodiak Island Borough and Matanuska-Susitna Borough) indicated that students accounted for an average of 27.2 percent of the total population of these areas in 1970. By 1977, this had declined to 23.2 percent and would have declined even more significantly had it not been for the inclusion of the Kodiak Island Borough (where the closure of the Naval Station during this period resulted in an increase in the proportion of students to total population). Some further decline in the student to total population ratio is anticipated. For example, students accounted for only 18.3 percent of Anchorage's population and for 19.8 percent that of the Ketchikan Gateway Borough in 1977. However, continued declines should be much less dramatic and student to population ratios are then expected to stabilize.

For purposes of forecasting school enrollment in the non-OCS case, the following assumptions have been made:

- The current average ratio for selected Southeast and Southcentral Alaska boroughs of approximately 23 percent of the population being enrolled in school is assumed to apply to Cordova and Seward. This ratio is then assumed to decrease by 1 percent per year until students account for 20 percent of total forecasted population, with that ratio to remain constant thereafter.
- The current ratio for Yakutat is significantly higher with 29 percent of the road-connected area s population now enrolled

in school. This is typical of predominantly Alaska Native communities. However, Alaska Native birth rates have also been declining rapidly and an increasing share of the Yakutat area's population is non-Native. Consequently, Yakutat's ratio of students to population is assumed to decline at a rate of 1 percent per year until students here also account for 20 percent of total forecasted population, with that ratio to remain constant thereafter.

In the various OCS cases, assuming that offshore populations plus construction camp personnel and helicopter crews (the latter until the production phase) are discounted, no significant changes in ratios of students to total population are anticipated.

Once total school enrollment has been forecasted, allocation of students between elementary and high school grades is necessary since standards for the number of students per classroom normally differentiate between the two levels. Approximately 60 percent of school students in Alaska are usually enrolled in the elementary grades. This proportion has been slightly lower recently as the "peak" student years are now in high school. However, the normal 60/40 ratio should again hold true in the near future.

According to the National Education Association, there are no established national or State standards for the number of students per classroom. Nevertheless, a standard used by many Alaska school districts is 25 students per classroom for the elementary (K-6) grades and 20 students per classroom for the high school grades. In school districts like Yakutat with small total enrollments, current standards generally call for fewer students per classroom, partly because there are fewer students per grade and also because even small school districts must offer their students a variety of courses in order to be accredited. However, as growth in enrollment occurs, local standards tend to be changed to more closely approximate norms in larger communities.

To determine future classroom needs in the non-OCS case, the following assumptions have been made:

- Student enrollment will be divided on a 60 percent elementary (K-6) and 40 percent high school (7-12) basis throughout the forecast period.
- Standards of 25 students per classroom for elementary grades and 20 students per classroom for high school grades will apply throughout the forecast period. However, at least one classroom will be provided for each grade taught.

For the various OCS cases, if offshore populations plus construction camp personnel and helicopter crews (the latter until the production phase) are discounted, no significant changes in the assumptions made for the non-OCS case are anticipated ˉn forecasting future school requirements.

Recreation

Recreation is a power which has been retained by the City of Seward (i.e. not transferred to the Kenai Peninsula Borough) as well as being a normal local government function in Yakutat and Cordova. However, as elsewhere in Alaska, much of the recreation function in these communities is associated with the schools. Thus, recreation facilities and services in Seward are also provided by the Kenai Peninsula Borough.

The following standards suggested by the National Recreation and Park Association are basic standards which are slightly modified to apply to the communities of Yakutat, Cordova and Seward:

- Neighborhood Parks: 1.01 hectares (2.5 acres) per 1,000 people serving a population of 500 to 10,000 people.
- Play Lots and Other Neighborhood Recreation Areas: 0.2 hectares (0.5 acres) per 1,000 people serving a population of 250 to 2,500 people.

Therefore, a total of 1.2 hectares (3 acres) per 1,000 people is assumed to be required in outdoor neighborhood park and recreation areas. These outdoor areas are assumed to accommodate all outdoor basketball courts, baseball or softball diamonds, tennis courts, jungle gyms, etc. However, while national standards provide adequate guidelines for local parks and recreation, the combination of isolation, geography, climate and local desires for parks and recreation facilities in Alaska must also be taken into account.

Most isolated Alaska communities feel deprived without a reasonably full range of parks and recreation facilities. For example, the national standard for 50 meter swimming pools is one per 20,000 people. However, almost every coastal Alaska coastal community of 2,0'00 people now has a swimming pool as well as almost every major high schoo in the urban areas of the State. Perhaps a more extreme deviation rom national standards occurs with indoor basketball courts where most Alaska communities of any size have an indoor facility of some description.

Thus, in addition to outdoor recreation facilities, indoor basketball courts and swimming pools are needed and desired recreation facilities in the communities under study. These facilities provide recreation alternatives, especially during the long inclement Alaska winters. Also, swimming pools permit the local populations to learn to swim and to develop swimming skills. In areas where a large proportion of the people work on boats or on the waterfront, these skills may be necessary for survival and they cannot be easily learned in the frigid ocean waters, streams or lakes of Alaska.

Therefore, the following minimum standards are assumed to apply to the communities under study:

- <u>Indoor Basketball Courts:</u> One for every 2,000 people.
- <u>Swimming Pools:</u> One for every 5,000 people.

There must also be some indoor recreation provision for those not desiring strenuous indoor recreation. In most Alaska communities, this formof recreation is provided through a community center or, as they are often called, a community hall. Thus:

- Community Center: One for every 25,000 people.

These standards will be applied to both the non-OCS and the OCS cases. However, it is assumed that the onshore OCS construction workforces located in camps will have recreation facilities provided at the camps, similar to the camps during the Alyeska pipeline project.

Utilities

Water. Water usage in the coastal communities under study is separated into two basic classes of service. These are industrial which is the major consumer, and domestic. However, since water is not metered in these coastal communities, it is difficult to accurately estimate the consumption of each user class.

Present rates of water usage in coastal communities such as those under study are estimated by the U.S. Public Health Service to be approximately 454 liters (120 gallons) per person per day in domestic use. The local utilities estimate usage at approximately 473 liters (125 gal ions) per person per day. This higher figure is believed to be warranted as the communities under study receive significant numbers of visitors for purposes of recreation, fishing and others. Thus, in the non-OCS case, the estimate of future water consumption for domestic purposes is calculated by multiplying the estimated annual average population by 473 liters (125 gallons) per person per day by the number of days in the year to arrive at estimated total annual domestic water use.

Industrial water use, estimated to be total water usage minus water used for domestic purposes, is forecast to maintain its current proportion of water estimated to be required in the non-OCS case for each community. Thus, it is assumed in the non-OCS case that added industrial activity, such as expansion in fishing and fish processing, results in water usage proportionate to the water usage resulting from the added population derived from the expanded industrial activity.

Forecast increases in population in the non-OCS case are based upon growth in existing economic sectors, and the distribution of employment (and therefore population) among these economic sectors was not significantly altered in forecasting future employment (and population). Therefore, it is assumed that the increase in domestic water consumption in the future provides an indication of potential industrial water consumption.

In the OCS cases, however, due to extreme fluctuations in demand during the exploration and development phases and the diversity of demands possible in the manufacturing and transportation processes during the production phases, forecasts of water requirements call for estimates based upon assessments of water usage of individual industrial activities as well as resulting domestic demands.

In the OCS cases, it is assumed that the per capita usage of water for domestic purposes will remain at 473 liters (125 gallons) per person per day. It is also assumed that normal water usage in all of the onshore OCS facilities will be 473 liters (125 gallons) per day per onsite employee. Offshore requirements on all boats, barges, rigs and platforms for general use are assumed to be 378.5 liters (100 gallons) per day per onsite employee. On the other hand, the water requirements for exploration wells drilled from rigs and development wells drilled from platforms were scaled from the estimates provided by the Gulf of Alaska Operators Commitee. (Alaska Consultants, Inc., July 1976). Workover well drilling was assumed to require only 12.5 percent of normal platform consumption on average during the workover periods established by Dames and Moore.

Although the supply of water to offshore activities and to onshore service bases and pipe coating plants during construction and operations is assumed, the onshore oil terminals and LNG plants are assumed to provide their own water requirements. Given the remote location of these facilities, the extension of existing systems appears economically infeasible. For the same reason, water requirements for the oil terminal and LNG construction camps and sites are not included in the water demands for the community systems.

Sewer. According to the U.S. Public Health Service, the quantities of domestic wastewater can be assumed to equal domestic water use and, since industrial wastes are not run through the sewage collection

system and treatment plants in the communities under study, domestic wastewater can be assumed to equal total wastewater. Therefore, given a per capita consumption of 473 liters (125 gallons) per day of water usage and a peak flow being an estimated three times the average flow, a treatment plant would be required to have the capacity to process 9
approximately 59.16 liters (15.63 gallons] per person per hour or:

- 473 liters (125 gallons)/day ÷ 24 hours/day = 19.72 liters (5.21 gallons)/hour x 3 = 59.16 liter (15.63 gallon) capacity to accommodate peak loads.

Therefore, it is assumed that sewage treatment plants must have the capacity to accommodate 59.16 liters (15.63 gallons) of wastewater per person at a given time.

In the non-OCS case, it is also assumed that industrial wastes will continue to be processed by the industries generating the industrial waste.

In the OCS cases, service bases and pipe coating plants are assumed to be on the community sewer system during the construction and operation phases. However, due to the remote locations of the oil terminals and LNG plants, it is assumed that all sewage will be collected and treated by the industry at the respective plants. It is further assumed that all wastewater from offshore rigs, boats, barges and platforms will be treated onboard.

Electric Power. Electric power is generated locally in Yakutat and Cordova while Seward purchases its power from Chugach Electric. Present demands amount to somewhat less than 2.5 kw per person of installed capacity for all uses. These uses with rare exceptions do not include heating.

In calculating future demands for the non-OCS case, it is assumed that an installed capacity of 2.5 kw per person will be required initially for each person added, increasing yearly by .05 until there are 3.0 kw per person of installed capacity. This assumption is based upon servicing the same basic household functions currently being serviced and an industrial mix within each community that is similar to the present industrial distribution.

In the OCS cases, 3 kw per person of installed capacity is demanded for each new resident. It is also assumed that construction site and construction camp activities will require 3 kw per person. However, it is assumed that only the construction sites and camps related to service bases and pipe coating plants and the resulting operating facilities will be served by existing community power systems. The LNG plant and oil terminal construction sites and camps are remote from the communities of Yakutat and Cordova and require large blocks of power but only for a relatively short period of time. When the facilities are completed, the power demands will be extremely large. Furthermore, the oil or gas processed in these facilities is often used as fuel for electric generation. Therefore, although the electric demands will be estimated by scaling from existing Alaska facilities, these facilities are not assumed to be requirements of the local electric systems. However, the possibilityof a combined generating facility is considered.

<u>Communications.</u> Telephone service in the communities under study is currently provided by private companies except for Cordova where it is provided by an REA Cooperative. The Alaska Public Utilities Commission, the Municipality of Anchorage's Telephone Utility and the Southeast Alaska Telephone Company were contacted in an attempt to derive standards for future levels of telephone service which are likely to be demanded in these communities.

According to the Anchorage Telephone Utility, in order to determine future levels of demand, the number of lines (i.e. excluding extensions) is estimated by using past trends and applying them to forecasts of population growth. The consulting engineers for the Southeast Alaska Telephone Company employ a linear trend equation based upon past lines installed.

Both means of forecasting are short range and depend upon yearly installation figures. A relationship, however, was found between telephone lines in use and housing units. In the three communities under study, the average number of lines per housing unit was between 1.1 and 1.2. Using Anchorage as a comparison, Anchorage has approximately 2 telephone lines per housing unit. On the other hand, in 1970 Anchorage had only 0.57 telephone lines per housing unit (or with the military housing units totally discounted 0.89). This represents a growth rate of over 15 percent per year. However, Anchorage's unique function as the hub of Alaska's communications and transportation and its Statewide appeal as a retail and services area must be taken into account.

In both the non-OCS and the OCS cases, it is assumed that 1.25 lines will be required initially for each housing unit added, increasing yearly by .01 until there are 1.40 lines per housing unit. However, housing units do not include group housing such as construction camps or cannery barracks as a basis for calculating future requirements. It is also assumed that telephone equipment and services will be provided by the existing telephone utility companies.

Solid Waste Disposal. The standards for solid waste disposal are based upon disposal records of the Municipality of Anchorage and trends of solid waste generation in Anchorage. According to the Solid Waste Division of the Public Works Department, the average Anchorage resident during 1977 generated 2.4 kilograms (5.35 pounds) of solid waste per day. This has been projected to increase at an average rate of 2 percent per year through 1985, then at an average rate of 1 percent through 1990. Thereafter, it is assumed that no increase in the per person rate of solid waste generation will take place.

In terms of sanitary landfills, the Municipality records an average density of 196 kilograms per cubic meter (330 pounds per cubic yard) delivered and 475 kilograms per cubic meter (800 pounds per cubic yard) in place. These standards are assumed for the forecast of the non-OCS cases in the communities under study.

In the OCS cases, the same standards as the non-OCS case are assumed. In addition, it is assumed that all onshore facilities will generate 2.9 kilograms (6.5 pounds] per day per employee of non-toxic solid waste.

Offshore, all combustible materials are assumed to be incinerated and only noncombustible materials are returned to shore for disposal. This is estimated to be .907 metric tons (one ton) per week per rig, platform or barge operation including any refuse from supporting boats. Furthermore, the average density of this solid waste is estimated to be approximately 2,373 kilograms per cubic meter (4,000 pounds per cubic yard) since it is composed in large part of steel items such as used drill bits.

In terms of *tonnage* and density, there is a limited amount of toxic solid waste returning to shore for disposal. Generally, this is in the form of used oil or oiled materials. Onshore some used oil plus sediment materials, sludge, scum and other wastes from the manufacture of LNG and the treatment of crude oil are toxic. The quantities are small and can be disposed of by the community in an environmentally sound manner on a small, specially prepared site.

LOCAL GOVERNMENT REVENUES

Where possible, the following standards, methods and assumptions will be employed to forecast community revenues and expenditures. The resulting surplus or deficit calculated provides an indication of the community's ability to fund capital improvements or upgrade services employing current rates and measures to capture revenues.

The following assumptions are made:

- Forecasts of revenues are made using current rates and measures as a basis for projection. A 5-year average or an average appropriate to reflect recent circumstances will be utilized.
- The existing level of service is used as the basis for projection. Despite a level of service which may be less than desired, proportionate expenditures for services are maintained at current levels.
- An annual inflation rate of 6 percent will be applied to all revenues and expenditures with the exception of debt service where the inflation factor has already been discounted in the market place.
- Current State statutory limitations on taxation of certain oil and gas properties by local governments will continue to be in force. Although local governmental units theoretically have the power to levy property taxes of up to 30 mills, in reality their taxing ability may fall far short of this because of limitations on the taxation of certain oil and gas properties as defined in Title 43.56 of the Alaska Statutes. These

limitations are set forth in Section 29.53.045 of the Alaska Statutes, which is quoted in part:

> "(a) A municipality may levy and collect taxes on taxable property taxable under AS 43.56 only by using one of the methods set out in (b) or (c) of this section.
>
> "(b) A municipality may levy and collect a tax on the full and true value of taxable property taxable under AS 43.56 as valued by the Department of Revenue at a rate not to exceed that which produces an amount of revenue from the total municipal property tax equivalent to $1,500 a year for each person residing within its boundaries.
>
> "(c) A municipality may levy and collect a tax on the full and true value of that portion of taxable property taxable under AS 43.56 as assessed by the Department of Revenue which value, when combined with the value of property otherwise taxable by the municipality, does not exceed the product of 225 percent of the average per capita assessed full and true value of property in the State multiplied by the number of residents of the taxing municipality."

Title 29.53.055 of the Alaska Statutes states that there is no limitation on taxes levied or pledged to pay or secure the payment of the principal and interest on bonds. In this regard, Chapter 94 SLA 1977 stressed that the per capita limitation did not include debt service. AS 29.53.055 is quoted as follows:

> NO LIMITATION ON TAXES TO PAY BONDS. The 1 imitations provided for in Sec. 45 or 50 of this chapter do not apply to taxes levied or pledged to pay or secure the payment of the principal and interest on bonds. Taxes to pay or secure the payment of principal and interest on bonds may be levied without limitation as to rate or amount, regardless of whether the bonds are in default or in danger of default.

Therefore, at the extreme, AS 43.56 serves only to limit municipal operating budgets.

- The limitation imposed in AS 29.53.045(b) is used in this study as the upper limit of municipal property tax revenues. Therefore, total property tax equivalents to $1,500 a year for each person residing within the municipal boundary are assumed as the upper limit of property tax revenues.

- It is also assumed that the excise tax limitation imposed in AS 43.56.030 cited below will remain in effect throughout the planning period.

  AS 43.56.030(2): . ..all other taxes imposed by a municipality on or with respect to the property subject to tax under this chapter or exempted from taxation by Section 20 of this chapter, including, but not limited to,

  (A) taxes on the retail sale or use of the property except for the retail sales tax on the first $1,000 of each sale;
  (C) taxes on the sale or use of services used in or associated with the property or in its maintenance or operation except for the sales tax on the first $1,000 of each sale;
  (E) any license, excise, fee, charge or other tax on or pertaining to the property or services.

  As a result of this limitation, significant revenues are not forthcoming from oil and gas activities. Therefore, a projection of current sales tax revenues on a per capita basis is assumed to be representative of the future receipts from this revenue source.

- It is assumed that current federal law prohibiting State or local government taxation of properties beyond the three mile limit or revenue sharing from oil and gas development on the Outer Continental Shelf will remain in effect throughout the planning period.

Revenues

Revenues are grouped and forecast under the headings of property taxes, sales taxes, intergovernmental revenue and other revenue. School district revenues are forecast as to funds forthcoming from local, State and federal sources.

Property Tax Revenues. The non-OCS property tax revenue estimates are based upon per capita additions to assessed valuation. Thus, each new resident is assumed to add to the assessed value of the community an amount equal to the total assessed value in the base year divided by the total population. The total assessed value is then multiplied by the current millage rate to obtain the forecast of uninflated property tax revenue for each year. The property tax revenue is then inflated by the 6 percent inflation factor assumed.

In the OCS cases, property tax revenue estimates are based upon per capita additions to assessed valuation as the estimates are in the base case. However, the increase in assessed value due to major capital investment in onshore oil and gas facilities is factored in, based upon the investment costs and schedules provided by Dames and Moore in the petroleum development scenarios.

An exception to the per capita calculation is construction employment living in construction camps. Outside of the assessed valuation of the construction camp which is included in the cost of the construction of major onshore oil and gas facilities, these workers' contribution to the assessed valuation of the community is small. Therefore, the estimated per capita additions do not include workers on major construction projects living in construction camps.

Also, the limitation of total property tax equivalents to $1,500 a year for each person residing within the municipal boundary in AS 29.53.045(b) is employed as a indicator of the limitation under State law. However, this should not be construed as the maximum estimate of property tax revenues since the formula developed with the State Department of Revenue under AS 29.53.045(c) may prove more remunerative. The limitation under the formula cannot be derived for this study since the formula requires a determination of assessed value by the State.

Sales Tax Revenues. Sales tax revenues in the non-OCS case are based upon the current per capita additions to sales tax receipts. Thus, each new resident is assumed to add to the total sales tax receipts of the community an amount equal to the tota" sales tax receipts in the base year divided by the total population. Total uninflated sales tax receipts are then mu" tiplied by the inflation factor to produce total sales tax estimates.

In the OCS cases, sales tax revenue estimates are based upon per capita additions to sales tax receipts as the estimates are in the base case. However, in the OCS cases where major construction activities take place onshore, it is assumed that the construction workers will live in camps in accommodations of excellence. It is assumed on average that an employee residing in a camp will spend only 1/10 as much as an employee with a permanent residence outside the construction camp. Therefore, in the calculation of sales tax revenues only 10 percent of the workers resident in construction camps will be counted.

Intergovernmental Revenues. In the non-OCS case and the OCS cases, future intergovernmental revenues estimates are based upon per capita additions to intergovernmental revenues. Thus, each new resident is assumed to add to the intergovernmental revenues transferred to the community an amount equal to the total value of intergovernmental revenues in the base year divided by the population. Intergovernmental revenues are then inflated by the 6 percent inflation factor assumed.

Other Revenues. In the non-OCS case, future "other" revenues estimates are based upon per capita additions to the total of other revenues such as license fees, permits, interest earnings, rentals, etc. Thus, each new resident is assumed to add to other revenues of the community an amount equal to the total value other revenues in the base year divided by the total population. The total uninflated value of other revenues is then multiplied by a 6 percent inflation factor to produce the total other revenue figure by year.

In the OCS cases, future "other" revenues estimates are based upon per capita receipts as are the estimates in the base case. However, in the OCS case where major construction activities take place onshore, it is assumed that the construction workers will live in construction camps of excellence with a wide range of recreation facilities and services. Thus, it is assumed that on average an employee residing within a camp will contribute little to the generation of these revenues. Therefore, in the calculation of other revenues on a per capita basis, only 10 percent of the workers resident in construction camps will be counted.

School District Revenues. School district revenues are forecast on a per student basis for local, State and federal revenues. It is assumed that approximately the same proportion of revenues from these three governmental divisions will continue throughout the planning period. The 6 percent inflation factor will be applied to produce the school district revenue forecasts in future years.

Expenditures

Operating Expenditures. In the non-OCS case, the operating budget is forecast on a per capita basis with an annual inflation factor of 6 percent.

In the non-OCS cases, the operating budget is also forecast on a per capita basis with the same inflation factor. However, where major construction activities take place onshore, it is'' assumed that construction workers in camps will not require the same expenditures as those resident in the community outside the camps. It is estimated that the expenditures required per employee resident in the construction camps will be approximately 1/5 as much as a worker residing outside the camp. Therefore, in calculating operating expenditures on a per capita basis 20 percent of the workers resident in construction camps will be counted.

Debt Service. Debt service is the amount necessary to pay or secure the payment of the principal and interest of bonds. In all cases only existing debt service requirements to maturity will be listed. Furthermore, the 6 percent inflation factor assumed in all other projections is not required for existing debt service requirements since the gross bonded debt is scheduled and has been discounted in the market place.

School Support. Funds provided to support local school districts are calculated on a per student basis. It is assumed that a proportionate share of the support of schools will be maintained for local, State and Federal support throughout the planning period. Therefore, the local support for schools is the local share with a 6 percent annual inflation factor therein.

Surplus or Deficit. In the non-OCS case and the OCS cases, the total of revenues is subtracted from the total of expenses to produce a surplus or a deficit of funds at current rates and measures. A surplus represents funds available for additional capital improvements or additional operating expenditures. A deficit indicates the inability to provide for the same level of community services and to provide added capital improvements at current rates and measures.

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