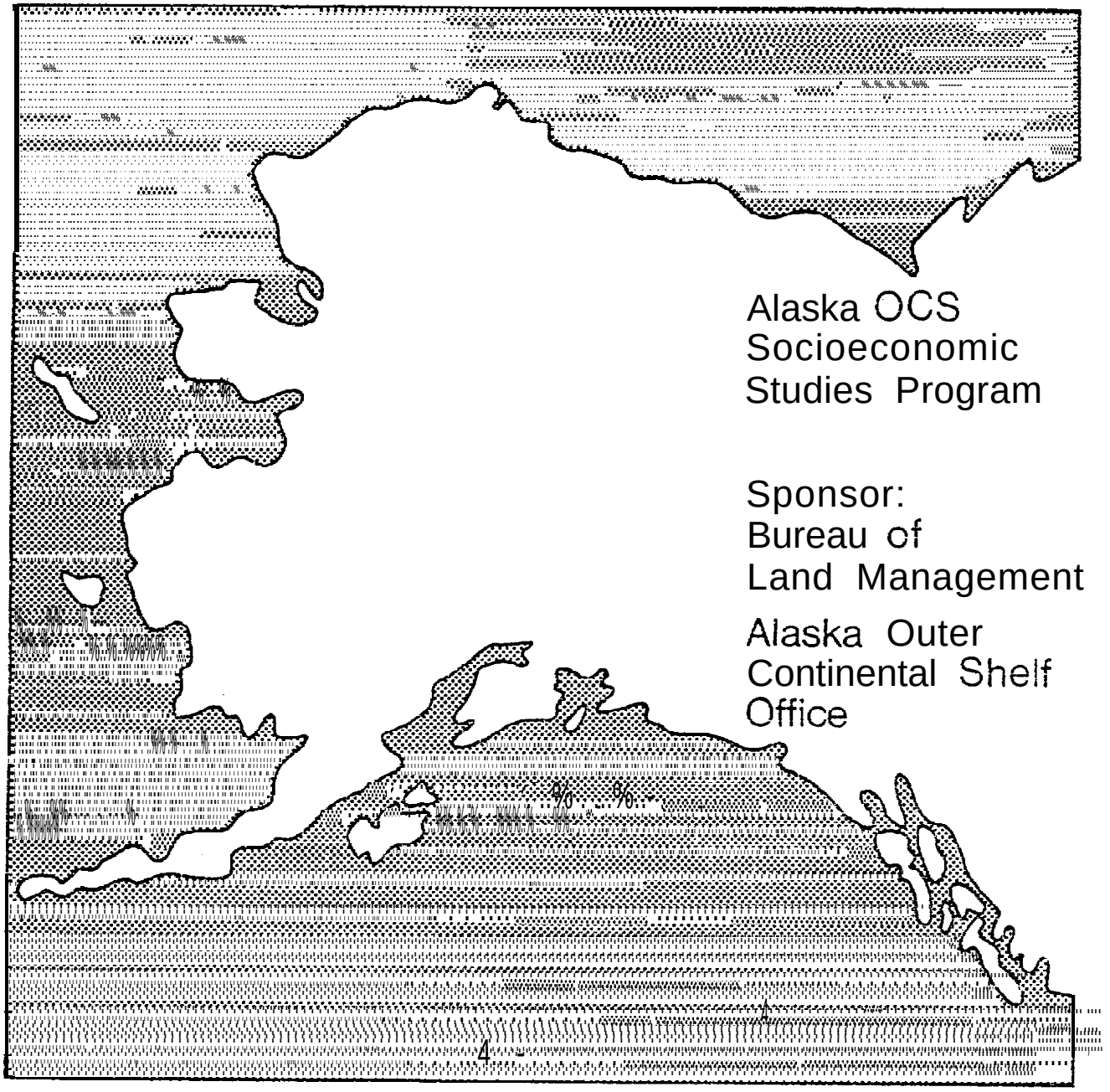
Technical Report Number 40



Alaska OCS Socioeconomic Studies Program

Sponsor:
Bureau of Land Management

Alaska Outer Continental Shelf Office

Western 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 ieasing 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.

Alaska OCS Socioeconomic Studies Program

WESTERN GULF OF ALASKA
PETROLEUM DEVELOPMENT SCENARIOS
LOCAL SOCIOECONOMIC IMPACTS

Prepared for

Bureau of Land Management

Alaska Outer Continental Shelf Office

September 1979

NOTICE

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Alaska OCS Socioeconomic Studies Program
Western Gulf of Alaska
Petroleum Development Scenarios
Local Socioeconomic Impacts

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

September 1979

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INTRODUCTION

Technical Report Number 32, "Northern and Western Gulf of Alaska Local Socioeconomic Baseline" presented detailed baseline data about existing community conditions at Seward and Kodiak. The objective of this report is to analyze how the growth and community infrastructure of these settlements might be affected as a consequence of proposed Western Gulf of Alaska OCS Lease Sale #46. Figure 1 illustrates the genera? location of the petroleum basins containing the tracts being considered for Sale #46.

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 case without the Western Gulf of Alaska Lease Sale 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. Technical Report Number 32 contains these descriptions.

- 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 and for each of three OCS 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 were developed.

- Finally, the standards and assumptions were used to quantify population-related community impacts of the various scenarios for purposes of comparative 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 of the forecast methodology is given in the Appendices to this report.

Petroleum Development Scenarios

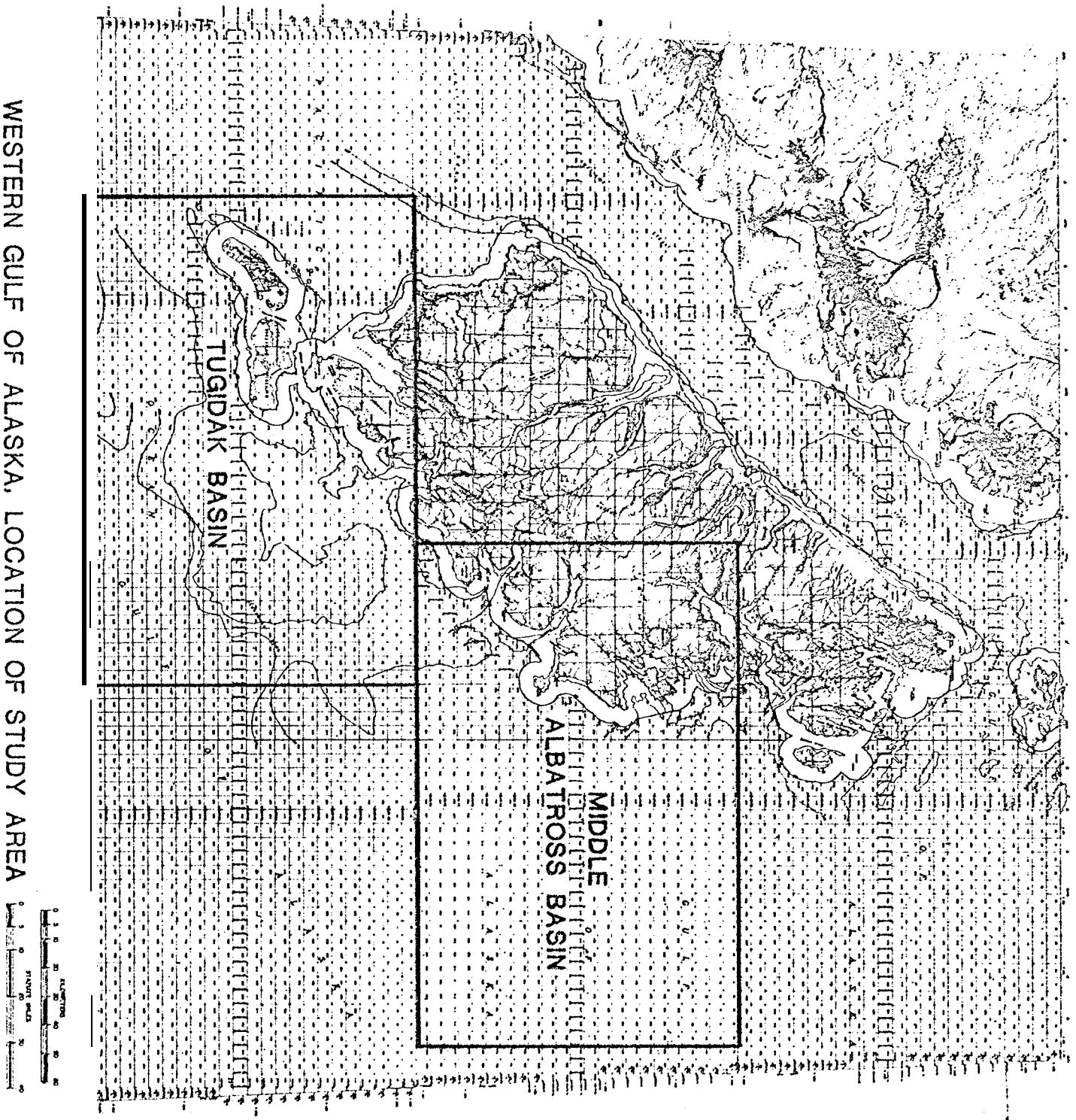
The outcome of the search for oil and gas is by nature highly speculative and it is thus impossible to advance any definitive single forecast about the community development impacts of a particular OCS lease sale. At the time of the lease sale and, indeed, for some years after, resource estimates and 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 o-F potential socioeconomic impacts upon nearby communities of the proposed OCS Lease Sale to match the different assumptions about ultimate reserves and development decisions.

This report characterizes the socioeconomic impacts on Seward and Kodiak of a base case and of three different OCS petroleum development scenarios:

FIGURE 1

WESTERN GULF OF ALASKA
LOCATION OF STUDY AREA



WESTERN GULF OF ALASKA, LOCATION OF STUDY AREA

Source: Dames and Moore.

TABLE 1

MAJOR ONSHORE FACILITIES AND ACTIVITIES
BY SCENARIO AND PHASE
WESTERN GULF OF ALASKA
LEASE SALE #46
SEWARD AND KODIAK

	Seward	Kodiak
95% Scenario		
1. Exploration only	temporary service base	helicopter services
Mean Scenario		
1. Exploration	temporary service base	helicopter services
2. Development	expanded service base support	permanent service base, helicopter service
3. Production	no facilities	small service base operation
5% Scenario		
1. Exploration	temporary service base	temporary, then permanent service base, helicopter services
2. Development	expanded service base support, pipecoating yard	expanded service base support, LNG plant construction, oil terminal construction
3. Production	small service base operation	service base and helicopter services, LNG plant operation (.576 Bcfd, 50 jobs), oil terminal operation (384,000 bpd, 200 jobs)

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

- Base Case. This is a forecast of how the two settlements would most likely evolve were there no Western Gulf of Alaska OCS lease sale. It 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. Under reasonable economic assumptions, the 95% resource level is not commercially profitable and is thus not produced.

- 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 for the Western Gulf of Alaska Lease Sale 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 Seward and Kodiak 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-sale case describes the likely course of community growth, assuming a continuation of current economic trends, that is, 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; electric power; solid waste disposal; telephone); public safety; health and social services; education and recreation. Emphasis was given to those services and facility needs customarily provided by 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 stress 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 was required to obtain community employment forecasts:

- First, regional OCS employment was disaggregate and jobs were assigned to Seward or Kodiak.

- 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, pipe coating 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 develop their own primary or backup utility systems, because they would find it more timely, economical and reliable to do so whenever existing excess local capacity was not 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 its forecast of public service and facility needs for the basec case and the OCS scenarios.

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 which 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, this 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 which 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%. In terms of purchasing power, local property tax revenues were kept at a constant per capita level by ignoring inflation, 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 debatable 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., assumption of additional functions by Kodiak Island Borough) or State tax policies (i.e., revision of the statutes governing local taxation of oil and gas property) or many other factors which 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 which 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 cannot allow 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.

Finally, a major but necessary omission from the forecasts of local government revenues and expenditures is a projection of a long term capital requirements to finance major capital improvements. In order to present such information, a complete needs assessment of the range of community facilities and services for each community would be required, a local assessment of the relative priority for improvement or replacement of various projects would then be made, and cost estimates and the means

for financing such projects would be developed. Such information is not available for either Seward or Kodiak and its development is well beyond the scope of this study. Nevertheless, it is needed to present a complete picture of the probable financial demands on communities under conditions of a non-OCS and several OCS scenarios and its absence from this report and the reasons for it are hereby noted.

PROJECTIONS OF GROWTH - BASE CASE

Seward

COMMUNITY FORECASTS - BASE CASE

Significant Factors Affecting Growth

The Seward base case adopted for the Western Gulf of Alaska lease sale is the base or non-OCS case previously developed for the Northern Gulf of Alaska lease sale analysis, augmented by the growth increment contributed by the mean scenario 'For Northern Gulf of Alaska OCS petroleum development. The rationale for this approach is that it acknowledges that the developmental impact of the Western Gulf of Alaska sale follows and builds upon two previous sales within Seward's service region. The hypothetical mean scenario for the Northern Gulf of Alaska lease sale was chosen rather than the exploration only scenario or 5 percent scenario as the most probable frame of reference for assessing the incremental impacts accruing from the Western Gulf of Alaska lease sale scenarios.

Under the Western Gulf of Alaska base 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. Additionally, the service requirements for the Northern Gulf of Alaska offshore oil and gas operations contribute significantly, if erratically, to Seward's employment base through construction and operation of the marine service base and pipe coating yard established there.

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 groundfish 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 partly provide locally, 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 fishery 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, build-up of the bottomfishery and bottomfish processing capacity

may lead at times to production conflicts disruptive to the traditional 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 heavily 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 1 arger.

In the OCS-related sectors, the main contributing factors to Seward's growth 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 undertaken when justified by the discovery of oil and gas fields in the Northern Gulf of Alaska lease area 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 is typical of such 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 pipe yard shuts down and the service base slows down, and Seward's growth returns to the basic pattern that underlies the OCS-stimulated economy.

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 emp" oyment is projected to grow, its rate of growth will be outpaced by expans· on in the private sector.

Finally, forestry and mining industries, which at present acccount for a minor share of Seward's economy, will in all likelihood continue as small-scale employers.

In reference to the employment and population forecasts which follow, it should be noted that the most reliable series data concerning employment and population in the Seward area have been collected by the U.S. Census Bureau and the Alaska Department of Labor for the Seward Census Division, which comprises, in addition to Seward, 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 not materially 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 City of 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 107 percent during the forecast period, from 1,117 jobs in 1978 to 2,311 jobs in 2000 (see Table 2 and Figure 2). 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 sectors of trade and services which together are forecast to grow by 125 percent from 404 jobs in 1978 to an estimated 910 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.

For a period, oil-related employment becomes a significant component of Seward's economic base. Seward's initial low level of involvement in offshore exploration in the Northern Gulf of Alaska adds less than 50 local jobs during the first half-dozen years of this scenario. 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.

Local OCS-related employment. peaks during 1988-1991, when the various tasks of offshore field development create between 105 and 251 total jobs. 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 o-F the economy.

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 by absorbing part of Seward's labor force surplus and by attracting new residents who, as a group might be expected to exhibit a higher labor force participation rate.

Differently put, population will grow more slowly than employment, increasing by about 70 percent over the forecast period. This 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 3,332

by 2000 while the fringe area adjacent to Seward grows from 644 to 1,097 residents (see Table 2 and Figure 2).

Over the long run, Seward's permanent population is negligibly affected by OCS-related activities in the Northern Gulf of Alaska. Only for the period 1985-1991 is a significant portion (between 5 percent to 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.

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

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. Inasmuch 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.

TABLE 2

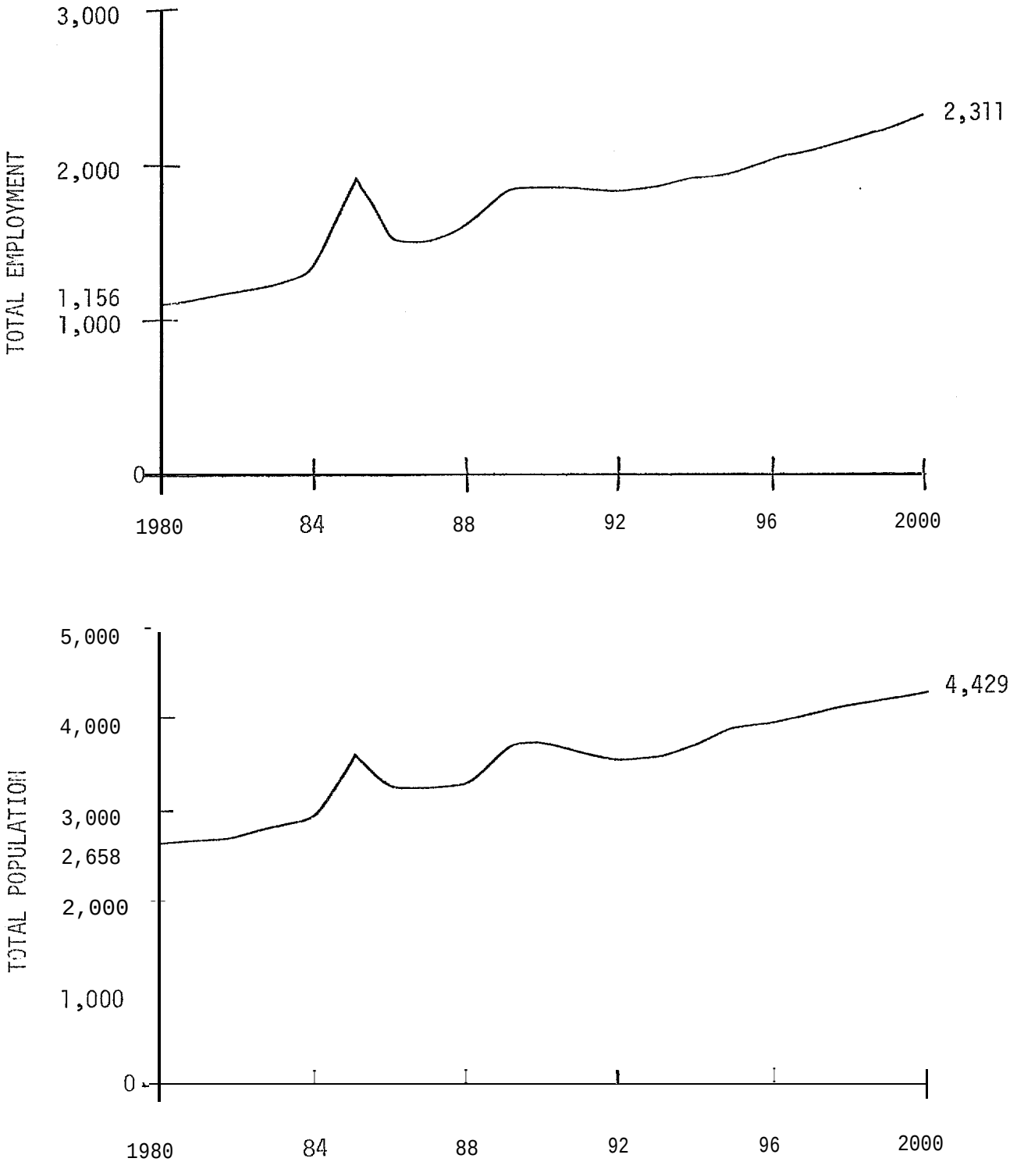
FORECAST OF EMPLOYMENT AND POPULATION
BASE CASE
WESTERN GULF OF ALASKA - SEWARD AREA
1978 - 2000

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	20
COMMODITY PRODUCING INDUSTRIES	242	247	254	256	257	279	326	830	444	401	441	552	567	571	574	579	586	592	598	605	611	617	6
Agriculture, Forestry and Fisheries	(100)	(101)	(102)	(103)	(104)	(120)	(140)	(152)	(156)	(160)	(168)	(184)	(204)	(216)	(218)	(220)	(222)	(224)	(226)	(228)	(230)	(232)	(2
Mining	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(8)	(9)	(
Manufacturing	(121)	(121)	(121)	(121)	(100)	(125)	(151)	(202)	(201)	(201)	(201)	(254)	(306)	(308)	(310)	(313)	(316)	(319)	(322)	(325)	(328)	(331)	(3
Contract Construction	(18)	(22)	(28)	(29)	(49)	(30)	(31)	(472)	(83)	(35)	(67)	(110)	(52)	(41)	(40)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(
DISTRIBUTIVE INDUSTRIES	487	493	498	515	526	552	571	619	631	651	699	792	801	770	755	777	808	849	892	937	984	?,033	1,08
Transportation, Communications and Public Utilities	(63)	(64)	(65)	(75)	(81)	(92)	(97)	(108)	(121)	(127)	(154)	(215)	(211)	(161)	(123)	(113)	(110)	(113)	(116)	(119)	(122)	(125)	(12
Trade	(230)	(232)	(234)	(237)	(239)	(247)	(254)	(273)	(274)	(281)	(291)	(308)	(315)	(325)	(336)	(352)	(369)	(387)	(406)	(426)	(447)	(469)	(49
Finance, Insurance and Real Estate	(20)	(21)	(21)	(22)	(23)	(24)	(25)	(28)	(26)	(27)	(29)	(31)	(32)	(32)	(33)	(34)	(35)	(37)	(39)	(41)	(43)	(45)	(
Service	(174)	(176)	(178)	(181)	(183)	(189)	(195)	(210)	(210)	(216)	(225)	(238)	(243)	(252)	(263)	(276)	(242)	(312)	(331)	(351)	(372)	(394)	(41
GOVERNMENT	388	396	404	413	421	431	440	463	463	471	483	502	510	512	516	525	534	545	556	567	578	590	60
TOTAL EMPLOYMENT	1,117	1,136	1,156	1,184	1,204	1,262	1,337	1,912	1,538	1,523	1,623	1,847	1,870	1,853	1,845	1,881	1,928	1,986	2,046	2,109	2,173	2,240	?,31
TOTAL POPULATION - SEWARD AREA	2,600	2,612	2,658	2,720	2,764	2,846	2,964	3,645	3,235	3,202	3,320	3,686	3,744	3,626	3,539	3,607	3,696	3,907	3,923	4,044	4,166	4,294	4,42
City Of Seward	1,956	1,965	2,000	2,046	2,079	2,141	2,230	2,850	2,446	2,409	2,505	2,787	2,817	2,728	2,662	2,714	2,781	2,939	2,951	3,042	3,134	3,230	3,33
Permanent Residents	(1,956)	(1,965)	(2,000)	(2,046)	(2,079)	(2,141)	(2,230)	(2,414)	(2,397)	(2,409)	(2476)	(2,729)	(2,817)	(2,728)	(2,662)	(2.714)	(2,781)	(2.939)	(2,951)	(3,042)	(3,134)	(3,230)	(3.
Construction Camp Residents	(--)	(--)	(--)	(--)	(--)	(--)	(- -)	(4 3 6)	(4 9)	(- -)	(2 9)	(5 8)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(--)	(
Remaining Seward Area	644	647	658	674	685	705	734	795	789	793	815	899	927	898	877	993	915	968	972	1,002	1,132	1,064	1,09

Source: Alaska Consultants, Inc.

FIGURE 2

Seward Area
Total Employment and Total Population
Base Case/Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

Impacts on Community Infrastructure

Housing and Residential Land. The general pattern of housing demand under the base 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 in support of the Northern Gulf of Alaska oil and gas development. The slowdown of service base activities after 1990 might produce, for a period, some excess capacity in the housing stock.

The housing forecast estimates that there will be a net increase of 694 dwellings needed in the Seward area by 2000 to house additional residents (see Table 3). 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 47 hectares (?16 acres) will have to be developed for new residences (see Table 4). 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 located west of the Seward Highway beyond the small boat basin.

  When these various improvements, now partially installed, are completed, the City's water system will be basically well prepared to meet the water supply needs of the growth forecast under the base case, even without implementation of the long-range recommendations of Stages Three and Four of the Comprehensive Plan (see Table 5).

Possibly, some additions to the distribution system may be expected 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 6).

  The sewage collection system also has defects. In cold weather, an estimated 40 percent of the wastewater volume accrues from bleeding water of taps 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, some incremental extensions of the sewage collection system to service newly developed residential areas and industrial facilities may be considered.

Electric Power. The cost and reliability 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 for 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 for present and near future needs. The City fully recognizes this problem and has recently initiated a number of projects and studies aimed at immediate problems. Two new substations are scheduled for construction in 1980 which, together with improvements now being engineered to modernize 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's demand for power will again reach the new peak power capacity of 10,000 kw by 1985 (see Table 7).

For the longer term, a review of the estimated power demand through the year 2000 indicates that further system improvements, especially to the basic power supply, ought be considered to maintain a reliable system with adequate reserve capacity, By 1985, largely due to the power consumption estimated for the service base and construction site at Seward's waterfront, the estimated capacity requirements will again exceed the peak power capacity that will be achieved at the conclusion of the current program of improvements. About 2,500 kw of additional generating capacity are likely to have to be installed by 1985 to take care of these industrial users and further population growth through 1995.

- 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 use rate of .6 hectares per year (1.5 acres), the unused part of the 16 hectare (40 acre) landfill site has a remaining useful life estimated at about 15 years (see Table 8). 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 9).

Public Safety

- Police. It is estimated that Seward should expect 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 need 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. Currently, the City's fire rating is 5, a relatively good rating for a small city with a volunteer fire department.

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, regardless of any OCS-related growth, the hospital may need replacement or major remodeling within a decade or so.

Education. Seward, 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 plant.

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 desirable in future years.

The school enrollment forecast envisions relatively slow and steady growth for the duration of the base case forecast. Net growth in enrollment is about 71 percent, to about 532 elementary students and 287 secondary students by 2000 (see Table 10).

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 and refurbished in 1978. It 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 needed to satisfy current and future demand. 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. Two features of the City of Seward's fiscal situation which should be noted at the outset. 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. Intergovernmental transfers from the State and federal governments contribute the remaining 23 percent. Since Seward, unlike most Alaskan municipalities, does not assess a local sales tax. it has no revenue from that. source.

Over the period of the forecast, general fund revenues are estimated to increase by about 78 percent, from about $1,455,000 in 1978 to about $2,580,000 by 2000 (see Table 12). These forecast figures are in 1978 dollars and are not adjusted for inflation. The forecast does include the additional property tax revenues arising from the port facilities built to service Northern Gulf of Alaska offshore operations.

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 $515,000 in 1978 and would rise thereafter roughly at the same rate as other expenses and revenues (see Table 11). In actuality, because the Borough's industrial property tax base is 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.

According to 1977 actual data, a relatively small proportion (about 7 percent of Seward's revenues were in excess of general fund expenditures and available for additional debt service, capital improvements or other purposes. Furthermore, Seward had 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 of $12,361 is well below the Statewide municipal average of $38,004. This suggests that Seward may face fiscal difficulties in meeting future capital facility needs within its existing fiscal framework, even under the base case (see Table 13). Unless the City is able to finance new facilities largely with State and federal grant funds, it may 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 over recent years in Seward's fortunes, based on expansion in diverse economic sectors. The fisheries and fish processing industry is predicted to thrive. Tourism and recreational industries are expected to grow and to engender a healthier trade and services sector. The port of Seward also attracts some of the offshore support activities for the Northern Gulf of Alaska lease area. The OCS 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.

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 at a slower rate 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 until 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 in demand for the retreational boating industry. Population growth ought to stimulate new residential construction, including some replacement of Seward's relatively aged existing housing stock. The brief spurt of growth from Northern Gulf of Alaska OCS operations is likely to strain the supply of housing and residential land for new construction. Because Seward already has high property tax and bonded indebtedness rates, it may encounter "Sea" limits upon its ability to fund community development projects

SUMMARY OF IMPACTS

In contrast to its recent economic sluggishness, the picture for Seward's future economy is positive with employment forecasted to more than double and population to grow by 70 percent between 1978 and the year 2000. However, Seward presently faces a number of major capital projects for water, sewer and power utilities at a time when its per capita debt ratio is relatively high above and its per capita valuation is below State averages. As a result, the community is likely to be forced to depend heavily on State and federal assistance for needed capital projects unless it either defers some projects or adds new non-property tax revenue sources such as a sales tax.

TABLE 3

FORECAST OF NET CHANGE IN HOUSING DEMAND
BASE 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	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	1,823	694	463	198	33

Source: Alaska Consultants, Inc.

TABLE 4

ESTIMATED DEMAND FOR RESIDENTIAL l-AND
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	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	1?5.7

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 5

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

Year	Domestic Capacity	Industrial Capacity	Ocs 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	29	1,704
1982	260	1,438	33	1,764
1983	268	1,467	73	1,808
1984	279	1,526	87	1,892
1985	302	1,602	156	2,060
1986	300	1,607	109	2,016
1987	301	1,614	81	1,996
1988	310	1,621	99	2,030
1989	341	1,707	173	2,221
1990	352	1,782	184	2,318
1991	341	1,799	179	2,319
1992	333	1,817	110	2,260
1993	339	1,871	42	2,252
1994	348	1,927	7	2,282
1995	367	1,986	7	2,360
1996	369	2,046	12	2,427
1997	380	2,110	12	2,502
1998	392	2,175	12	2,579
1999	404	2,242	12	2,658
2000	416	2,314	12	2,742

a/ Multiply by 3.785 to obtain liters.

Source: Alaska Consultants, Inc.

TABLE 6

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
BASE 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	31.2
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 liters per minute.

Source: Alaska Consultants, Inc.

TABLE 7

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
BASE CASE
SEWARD AREA
1978 - 2000

Year	Community Requirements in kws	OCS Industrial Requirements		Total
		Marine Service Base	Construction Camp & Sites	
1978	6,500			6,500
1979	6,661			6,661
1980	6,911			6,911
1981	7,208	650		7,858
1982	7,463	650		8,113
1983	7,832	650		8,482
1984	8,299	650		8,949
1985	9,146	650	1,308	11,104
1986	9,239	1,300	627	11,166
1987	9,446	650		10,096
1988	9,873	650	525	11,048
1989	10,884	1,300	525	12,709
1990	11,232	650		11,882
991	10,878	650		11,528
992	10,617	650		11,267
993	10,821	650		11,471
994	11,088	650		11,738
995	11,721	650		12,371
996	11,769	650		12,419
997	12,132	650		12,782
1998	12,498	650		13,148
1999	12,882	650		13,532
2000	13,287	650		13,937

Source: Alaska Consultants, Inc.

TABLE 8

ESTIMATED DISPOSABLE SOLID WASTES
BASE CASE
SEWARD AREA
1978 - 2000

Year	Community Solid Wastes (annual tonnage) a/	Marine Service Base (annual tonnage) a/	Construction Camp & Site (annual tonnage) a/	Total (annual tonnage) a/	Total (cubic yards) b/
1978	2,590			2,590	15,700
1979	2,650			2,650	16,100
1980	2,750			2,750	16,700
1981	2,870	61		2,931	17,500
1982	2,980	65		3,045	18,200
1983	3,130	127		3,257	19,200
1984	3,320	131		3,451	20,300
1985	3,670	188	510	4,368	25,600
1986	3,680	171	57	3,908	23,000
1987	3,740	144		3,884	23,000
1988	3,880	188	34	4,102	24,200
1989	4,320	301	68	4,689	27,500
1990	4,500	340		4,840	28,200
1991	4,360	332		4,692	27,000
1992	4,250	212		4,462	26,000
1993	4,340	113		4,453	26,500
1994	4,440	32		4,472	27,000
1995	4,700	32		4,732	28,600
1996	4,710	32		4,742	28,600
1997	4,860	32		4,892	29,500
1998	5,010	32		5,042	30,400
1999	5,160	32		5,192	31,400
2000	5,320	32		5,352	32,300

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

Source: Alaska Consultants, Inc.

TABLE 9

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
BASE CASE
SEWARD AREA
1978 - 2000

Year	Total Number of Dwellings	Total Number of Telephones	Annual Change
1978	990	1,238	--
1979	995	1,254	16
1980	1,012	1,285	31
1981	1,036	1,326	41
1982	1,053	1,358	32
1983	1,084	1,409	51
1984	1,129	1,479	70
1985	1,224	1,616	137
1986	1,214	1,615	- 1
1987	1,219	1,633	18
1988	1,252	1,690	57
1989	1,381	1,878	188
1990	1,425	1,952	74
1991	1,379	1,903	- 49
1992	1,346	1,871	- 32
1993	1,372	1,921	50
1994	1,406	1,968	47
1995	1,448	2,027	59
1996	1,492	2,089	62
1997	1,538	2,153	64
1998	1,584	2,218	65
1999	1,633	2,286	68
2000	1,684	2,358	72

Source: Alaska Consul tants, Inc.

TABLE 10

SCHOOL ENROLLMENT FORECAST
BASE 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	327	176	503
1982	332	179	511
1983	343	184	527
1984	356	192	548
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	445	239	684
1995	470	253	723
1996	472	254	726
1997	486	262	748
1998	501	270	771
1999	516	278	794
2000	532	287	819

Source: Alaska Consultants, Inc.

TABLE 11

FORECAST OF KENAI PENINSULA BOROUGH SCHOOL DISTRICT REVENUES a/
BASE CASE
SEWARD AREA
1978 - 2000
(in $1,000s)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$ 515	$1,157	$ 28	$? ,700
1979	482	517	1,161	28	1,706
1980	491	527	1,183	28	1,738
1981	503	539	1,212	29	1,780
1982	511	548	1,231	30	1,809
1983	527	565	1,269	30	1,864
1984	548	588	1,320	32	1,940
1985	594	639	1,430	34	2,103
1986	589	632	1,419	34	2,085
1987	592	635	1,426	34	2,095
1988	609	653	1,467	35	2,155
1989	671	720	1,616	39	2,375
1990	693	743	1,669	40	2,452
1991	671	720	1,616	39	2,375
1992	655	703	1,578	38	2,319
1993	667	715	1,607	39	2,361
1994	684	734	1,648	40	2,422
1995	723	775	1,741	42	2,558
1996	726	779	1,749	42	2,570
1997	748	802	1,802	43	2,647
1998	771	827	1,857	45	2,729
1999	794	852	1,912	46	2,810
2000	819	878	1,973	47	2,898

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 the Seward area's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes. Expenditures are assumed to equal revenues.

Source: Alaska Consultants, Inc.

TABLE 12

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

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 507	N/A	$ 333	$ 612	$1,452
1979	509	N/A	334	615	1,458
1980	518	N/A	340	626	1,484
1981	638	N/A	348	640	1,626
1982	646	N/A	353	651	1,650
1983	663	N/A	364	670	1,697
1984	686	N/A	379	698	1,763
1985	733	N/A	410	756	1,899
1986	837	N/A	407	750	1,994
1987	840	N/A	410	754	2,004
1988	857	N/A	421	775	2,053
1989	923	N/A	464	854	2,241
1990	946	N/A	479	882	2,307
1991	923	N/A	464	854	2,241
1992	797	N/A	453	833	2,083
1993	811	N/A	461	849	2,121
1994	828	N/A	473	870	2,171
1995	869	N/A	500	920	2,289
1996	872	N/A	502	924	2,298
1997	896	N/A	517	952	2,365
1998	920	N/A	533	981	2,434
1999	945,	N/A	549	1,011	2,505
2000	971	N/A	566	1,043	2,580

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
BASE CASE
CITY OF SEWARD
1978 - 2000
(in .$1 ,000s)

Year	General Fund Revenues			Operating Expenditures b/	Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total		
1978	$ 506	$ 946	$1,452	$1,351	$ 101
1979	508	950	1,458	1,357	101
1980	517	967	1,484	1,382	102
1981	619	989	1,608	1,413	195
1982	628	1,005	1,633	1,436	197
1983	644	1,035	1,679	1,479	200
1984	667	1,078	1,745	1,540	205
1985	715	1,167	1,882	1,728	154
1986	800	1,159	1,959	1,663	296
1987	803	1,165	1,968	1,664	304
1988	821	1,197	2,018	1,714	304
1989	886	1,319	2,205	1,893	312
1990	909	1,362	2,271	1,946	325
1991	886	1,319	2,205	1,884	321
1992	779	1,287	2,066	1,839	227
1993	792	1,312	2,104	1,875	229
1994	810	1,344	2,154	1,921	233
1995	850	1,421	2,271	2,030	241
1996	854	1,427	2,281	2,038	243
1997	877	1,471	2,348	2,101	247
1998	901	1,515	2,416	2,165	251
1999	926	1,562	2,488	2,231	257
2000	952	1,611	2,563	2,302	261

a/ Includes sales taxes, 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.

Source: Alaska Consultants, Inc.

Kodiak

COMMUNITY FORECASTS - BASE CASE

Significant Factors Affecting Growth

Historically, fishing and fish processing have been the foundation of Kodiak's economy. At first, the Kodiak fishery concentrated on the salmon harvest. Over recent decades, however, the trend has been toward use of other available stocks of fish and shellfish. Now, halibut, herring and herring roe, king crab, tanner crab, Dungeness crab, shrimp and other species are all harvested. Kodiak's fishing industry has thus steadily evolved from a seasonal salmon fishery to a more diversified year-round industry with suitably diversified fishing fleets and processing plants.

The base case economic forecast assumes that this trend toward diversification will continue. Most notably, the forecast assumes that Kodiak will lead an expansion of fishing effort and processing capability for bottomfish that will make Kodiak the center of bottomfishing and processing across the Gulf of Alaska. A 1979 study done for the State of Alaska by Denconsult estimated a potential annual domestic harvest of 149,000 metric tons of groundfish in the Kodiak and Chirikof sectors of the Gulf of Alaska. Kodiak is already the region's premier fishing port. Kodiak is advantageously located in relation to the Kodiak grounds and the grounds off the Alaska Peninsula and in the Gulf of Alaska.

Compared to competing ports, Kodiak is a large settlement with an existing community infrastructure and a relatively large labor force. These various factors favor Kodiak's emergence as the region's leading port for the bottom fishing fleet and for bottomfish processing.

It is also expected that the traditional established fishing industry will gradually increase and prosper during the forecast period. In particular, it is anticipated that better scientific understanding and improved resource management practices will enhance and stabilize yields, allowing more efficient use of gear, plant and labor force.

Another resource-based industry which is expected to prosper is the wood products industry. Under terms of the Alaska Native Claims Settlement Act, extensive timber lands will be transferred to private ownership of Native corporations and, presumably, harvested for revenue purposes.

The tourism and recreation industry is expected to show modest growth. Promotion of Kodiak's historical and recreational assets and improved visitor facilities should attract increased numbers of tourists, conventioneers and vacationers to the Kodiak area.

The Kodiak Coast Guard station, currently a major military installation with about 980 military personnel and an on-base population of about 2,500 people, is forecast to remain at about its current strength. However, a modest increase is foreseen in civilian employment at the base.

Kodiak already has an unusually well-balanced trade and services sector for a town of its size and it is anticipated that expansion of tourist and bottomfishing industries will reinforce the basic component of these sectors.

Future Employment

The base case future employment forecast for the Kodiak area estimates that employment will grow from 5,937 in 1978 to 10,628 by 2000 (see Table 14 and Figure 3). This is an overall increase of about 79 percent or equivalent to an average annual growth rate of about 2.7 percent. With the exceptions noted below, the structure of Kodiak's economy is expected to persist relatively unchanged.

The basic employment categories of manufacturing (largely logging and fish processing) and agriculture, forestry and fisheries (largely fishing) are projected to grow by about 75 percent, accounting for about 40 percent of all employment growth in the forecast period and setting the pace for the secondary economy. Trade and services exhibit the fastest growth rate, together generating about 36 percent of all new jobs. Together, these four economic sectors provide about three-quarters of the Kodiak area's economic growth.

Mainly because the Coast Guard station, the chief public employer is not expected to expand its operations, the overall role of public sector employment declines from 33 percent to 23 percent of total employment. In fact, government is the slowest growing economic sector.

The remaining sectors of contract construction, transportation, finance, insurance and real estate, and mining comprise a minor if essential share of about 10 percent of the baseline employment and maintain that share through -the forecast period.

The employment forecast is for the Kodiak area as a whole and does not yield separate breakdowns for the City of Kodiak and the rest of the road-connected area. Nevertheless, it seems reasonable to assume that most of the employment growth under the base case will be concentrated in or very close to the City itself, as that is where the seafood industry is already established.

Future Population

Compared to the other communities (Seward, Yakutat and Cordova) situated along the coastal arc bordering the Gulf of Alaska lease areas, Kodiak has a larger population base and a stronger economic base, with favorable prospects for continued economic growth. As a result, Kodiak far outpaces these other potentially impacted cities in absolute numbers of new jobs and residents forecast under base case conditions.

Excluding military personnel and their relatives, the population of the Kodiak urban area, also defined as the Kodiak road-connected area, increases by about 135 percent or 8,817 persons between 1978 and 2000 to a total civilian population of 15,344. This is equivalent -to an average annual growth rate of slightly more than 3 percent. Population, like

employment, is expected to grow at a fairly steady pace: slightly faster during the early years of expansion into the bottomfishing industry, more slowly in the later years.

As explained below, separate population estimates were calculated for the City of Kodiak and for the remaining road-connected area at. Kodiak. The City of Kodiak population is forecast to grow from 4,351 in 1978 to 10,229 in 2000, an increase of 5,878 residents. The remaining road-connected area is forecast to increase by about 2,939 residents from 2,176 persons to 5,115 by 2000.

The population forecast for the base case was estimated by means of an employment multiplier relating population growth to employment growth. As the basic employment forecast includes the entire Kodiak Census Division, the population forecast was first calculated for the whole census division and then allotted to geographic sub-units. In 1978, the ratio of population to employment was 1.71. As no radical shifts in Kodiak's employment structure are foreseen for the short run, this ratio was used through 1990 to estimate future population. After 1990 the population/employment ratio was assumed to rise slowly to 1.83 by 2000, consistent with a long-term trend toward reduced seasonality of employment and also fewer transient workers in fish processing industries.

Furthermore, it was assumed that the Kodiak urban area was more favorably situated to attract new industry and employment opportunities than the rural communities on Kodiak Island. Consequently, most of the population growth also is centered in the urban area. While the rural communities

TABLE 14

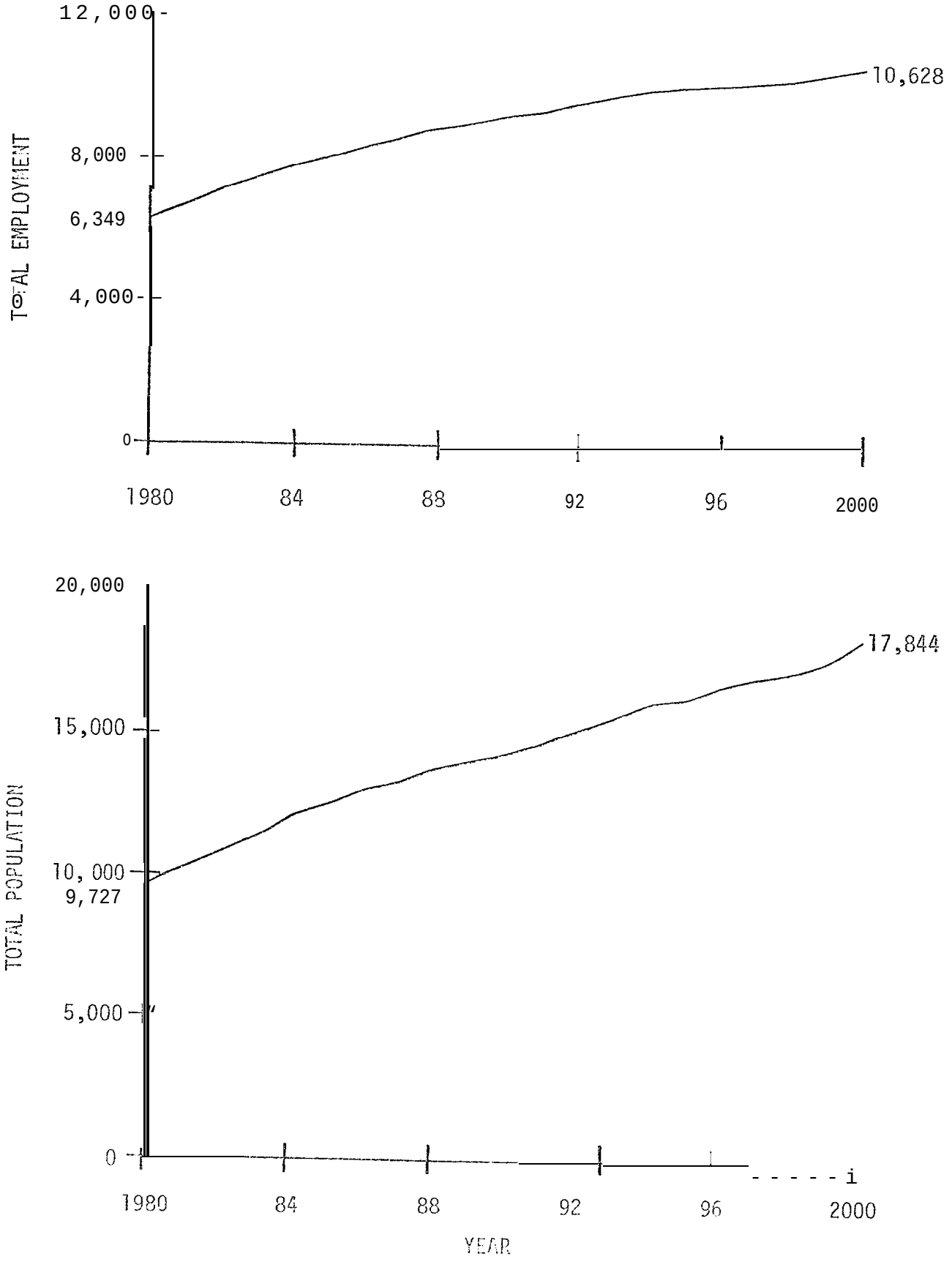
FORECAST OF EMPLOYMENT AND POPULATION
BASE CASE
WESTERN GULF OF ALASKA - KODIAK AREA
1978 - 2060

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	2,601	2,684	2,775	2,919	3,088	3,252	3,454	3,626	3,729	3,830	3,934	3,991	4,070	4,130	4,180	4,244	4,302	4,366	4,408	4,454	4,498	4,541	4>587
Agriculture, Forestry and Fisheries	(878)	(904)	(932)	(978)	(1,027)	(1,079)	(1,133)	(1,189)	(1,237)	(1,274)	(1,312)	(1,338)	(1,365)	(1,385)	(1,400)	(1,421)	(1,442)	(1,464)	(1,478)	(1,493)	(1,509)	(1,523)	(1,539)
Mining	(--)	(--)	(2)	(2)	(4)	(5)	(6)	(7)	(7)	(8)	(8)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Manufacturing	(1,496)	(1,540)	(1,587)	(1,666)	(1,749)	(1,837)	(1,929)	(2,025)	(2,106)	(2,169)	(2,234)	(2,279)	(2,324)	(2,359)	(2>384)	(2,420)	(2,456)	(2,493)	(2,517)	(2,543)	(2,569)	(2,594)	(2,620)
contract Construction	227)	(240)	(254)	(273)	(308)	(331)	(386)	(405)	(379)	(379)	(380)	(365)	(372)	(377)	(387)	(394)	(395)	(400)	(404)	(409)	(411)	(415)	(419)
DISTRIBUTIVE INDUSTRIES	1,398	1,448	1,543	1,676	1,820	1,984	2,148	2,290	2,438	2,551	2,656	2,719	-2,797	2,888	3,099	3,202	3,207	3,362	3,410	3,459	3,463	3,575	3,627
Transportation, Communications and Public Utilities	(215)	(228)	(241)	260)	(280)	(312)	(347)	(373)	(396)	(416)	(438)	(456)	(491)	(500)	(515)	(542)	(547)	(559)	(565)	(585)	(586)	(602)	(629)
Trade	(628)	(641)	(667)	733)	(805)	(882)	(953)	(1,026)	(1,095)	(1,137)	(1,179)	(1,185)	(1,197)	(1,226)	(1,398)	(1,439)	(1,447)	(1,491)	(1,522)	(1,540)	(1,541)	(1,575)	(1,589)
Finance, Insurance and Real [state	(107)	(117)	(127)	(133)	(140)	(147)	(154)	(162)	(168)	(174)	(179)	(182)	(186)	(189)	(191)	(196)	(196)	(200)	(202)	(205)	(206)	(208)	(210)
Service	(448)	(462)	(508)	(550)	(595)	(643)	(694)	(729)	(779)	(824)	(860)	(896)	(923)	(973!	(995)	(1,025)	(1,090)	(1,112)	(1,121)	(1.129)	(1,130)	(1,190)	(1,199)
GOVERNMENT	1,938	2,002	2,031	2,099	2.120	2,141	2,163	?,184	2,206	2,228	2,250	2,272	2,296	2,313	2,331	2,343	2,354	2,366	2,378	2,389	2,407	2,408	2,414
TOTAL EMPLOYMENT	5,937	6,134	6,349	6,694	7,078	7,377	7,765	8,100	8,373	8,609	8,840	8,982	9,163	9,331	9,610	9,78'9	9,944	10,094	10,196	10,302	10,363	10,524	10,628
RATIO OF POPULATION TO EMPLOYMENT	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.72	1.74	1.75	1.76	1.78	1.79	1. 80	1.82	1.82	1.83
TOTAL POPULATION - KODIAK CENSUS DIVISION	10,152	10,489	10,856	11,447	12,017	12,614	13,278	13,851	14,317	14>721	15,116	15,359	15,668	16,009	16,721	17,131	17,501	17.967	18,251	18,576	18,861	19, 159	1'2,556
Kodiak Road-Connected Area	9,027	9,362	9,727	10.282	10,817	11,376	12. 000	12,546	12,998	13,387	13,768	13,996	14, 291	14,670	15,234	15,649	16,017	16,379	16,659	16,949	17,160	17,552	17,844
Coast Guard Base	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	? ,500	2,500	2,500	2,500	2.500	2.5100	2,5oo	2,')00	2,500	2,500	2,500	2,500	2,500
Non-Military city of Kodiak	6,527 (4,351)	6,862 (4,575)	7,227 (4,818)	7,782 (5,188)	8,317 (5,545)	8,876 (5,917)	9,500 (*.333)	10,046 (6,697)	10,498 (6,999)	10,887 (7,258)	11,268 (79572)	11,496 (7,664)	11,791 (7,861)	12,170 (8,113)	12,743 (8,495)	13,149 (8,766)	13,517 (9,011)	13,879. (9,253)	14,159 (9,439)	14,449 (9,633)	14,660 (9.773)	15,0S2 (IO, 035)	15,344 (10 ,2??)
Remaining Road-Connected Area	(2,176)	(2.287)	(2.409)	(2.594)	(2,772)	(2,959)	(3,167)	(3,349)	(3.499)	(3.629)	(3,756)	(3,832)	(3,930)	(4.057)	(4,248)	(4,383)	(4,506)	(4,626)	(4,720)	(4.816)	(4,887)	(5,017)	(5,115)
Remainder Within Census Division	1,125	1,127	1,129	1,165	1,200	1,238	1,278	1,305	1,319	1,334	1,348	1,363	1,377	1,379	1,478	1,482	1,484	1,588	1,592	1,627	1,701	1,707	1,712

Source: Alaska Consultants, Inc.

FIGURE 3

Kodiak Area
Total Employment and Total Population
Base Case/Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

grow too, they do not as a group grow at as high a rate as the Kodiak urban area.

Within the Kodiak road-connected area, new non-military population growth was sub-al" ocated between the City of Kodiak and the remaining road-connected are a in the same proportion as prevailed in 1978, that is, about two-thirds to the City of Kodiak and one-third to the remaining road-connected area. The number of military personnel and families residing at the Coast Guard Base remains the same, it will be recalled, through the forecast period.

IMPACT ASSESSMENT

Social Impacts

The growth assumptions and forecasts for the base case do not imply any major departures from the existing economic or social structure of the Kodiak urban area. Kodiak's identity as an island fishing community is assumed to survive and thrive in the base case. The main change foreseen is one of scale, with civilian population more than doubling by 2000. This should result in a town more urban in physical organization and social character than is the case today.

Impacts on Community Infrastructure

Housing and Residential Land. The base forecast estimates that 3,098 additional dwellings will be demanded by 2000 just to house new population growth (see Table 15). This compares with a total existing dwelling unit count, excluding military, of 2,173 in 1978. This forecast assumes that the present ratio of three persons per dwelling unit will apply to the future population as well, It should be noted that the forecast demand does not include any new residential construction which may be undertaken to replace or upgrade the existing housing stock.

If the future mix of housing types resembles today's pattern, then about 58 percent (1,791 units) of the additional homes will be single-family units, about 26 percent (807) will be multifamily and about 16 percent (500) will be mobile homes.

Because the employment and population projections anticipate more rapid growth in the first half of the forecast period, the demand for additional housing likewise rises more steeply in the decade of the 1980s than during the 1990s.

As in many Alaska settlements, town development patterns and costs at Kodiak are powerfully shaped and constrained by considerations of terrain, natural hazards and unfavorable soils and drainage patterns. Despite these problems, a recent planning study (Kramer, Chin & Mayo, 1978) indicates that there are about 607 hectares (1,500 acres) of developable

land in the Kodiak vicinity, including 263 hectares (650 acres) that are highly suited for residential development.

According to the growth forecast, an estimated 198 hectares (490 acres) of undeveloped land will be demanded to accommodate residential expansion (see Table 16). Thus, it appears for the foreseeable future that there is sufficient land available to absorb residential expansion with an ample reserve for commercial and other uses. Nevertheless, continued town growth will likely bring about some changes in land use patterns, including higher residential densities in the central urban area and a spreading urban fringe.

Utilities. With sustained residential and industrial growth in the offing, the Kodiak area can anticipate a substantial increase in the demand for utility services. Certain public utilities (water supply, sewer and waste collection) are confined more or less to the City area. Electric power and telephone utilities cover the entire urban area. Water supply, critical to Kodiak's economic life, power supply and solid waste disposal are each present cause for concern. Substantial investment in utility distribution networks must also be considered to meet the demands of a service population expected to double over the forecast period.

- Water. The City of Kodiak's water supply system services the City, including the fish processing plants, and some of the adjacent areas. For purposes of forecasting, it was assumed

that the City system would continue to serve a constant share of the urban area's total population.

Kodiak's existing water system already performs at design capacity during the midsummer height of fish processing operations. Occasionally, during dry spells when stream flows are low, water shortages have occurred in the past and are prone to occur again.

Because the fish and shellfish processing industry is central to Kodiak's economy and is an intensive water consumer, Kodiak's economic well-being is inescapably tied to a reliable and ample supply of good quality water. At the height of the processing season, industrial water use can account for 90 to 95 percent of the total water consumption of 45,420 kiloliters (12,000,000 gallons) daily. While average water consumption levels are well below the seasonal peaks, it is the peak demand which sets the critical design limit.

The base case economic forecast for Kodiak is premised upon substantial expansion in the fish processing industry. Failure to guarantee a plentiful, reliable supply of water will certainly inhibit capital investment in new processing plant capacity, to the detriment of the area's economic growth. Thus, implicit in the forecast is a major addition to the capacity of Kodiak's water system. The estimated peak

capacity requirement for 2000 is 106,737 kiloliters (28,200,000 gallons), an increase of 135 percent over the 1978 peak consumption level (see Table 17).

There are four key features of the water supply system which would have to be improved to meet the forecast demand: water source development, storage capacity; transmission line; and distribution lines. Kodiak has plans for a reservoir construction project on the Monashka Creek drainage. Engineering has been completed for the new dam and a 61 centimeter (24 inch) transmission line has already been installed. Reservoir construction, however, awaits resolution of a land ownership dispute between the City of Kodiak and the Ouzinkie Native Village Corporation. The proposed improvements represent a 50 percent increase in storage capacity ancl should take care of projected water supply needs through the mid-1980s.

The City is also engaged in upgrading distribution mains in town, particularly to the heavy industrial consumers, a program that will need to be continued as growth in seafood the processing industry adds to water use in industrial areas.

Beyond 1985, further increases in water supply capacity may be called for and are feasible at the proposed Monashka Creek reservoir site. With additional improvements to the reservoir, the site's estimated storage capacity of 26,495,000 kiloliters

(7 billion gallons) could be developed, which would be more than adequate to secure Kodiak's water needs for the forecast period.

Throughout the entire forecast period, the City can expect to oversee a continuing program to extend water distribution lines to previously vacant tracts being developed for residential settlement. According to the housing forecast, an estimated 3,098 new dwellings on 198 newly developed hectares (490 acres) of residential land will be demanded in the Kodiak area for population growth. More than two-thirds of this increase will occur within the area served by the City of Kodiak's water system and will thus require water utility service lines.

- Sewer. The City of Kodiak sewage collection and treatment system serves the City and some tracts immediately adjacent to the City's eastern boundaries. The City has recently put into operation a new secondary sewage treattnent plant with a design capacity of 8,706 kiloliters (2.3 million gallons) per day. This new plant is designed to treat non-industrial sewage only. The enormous volume of industrial waste by-products from the seafood processing plants are not mingled with sewage but are trucked to the Bio-Dry plant for conversion to fertilizer and meal. The forecast prepared for the base case assumes that industrial wastes will continue to be disposed of separately from domestic sewage.

The future treatment plant capacity requirement was estimated to climb to about 6,056 kiloliters (1.6 millions gallons) per day by 2000 (see Table 18) compared with the present plant's design capacity of 8,706 kiloliters (2.3 million gallons). Thus, according to usual design standards, the new plant should have adequate capacity to the end of the base case forecast period. However, it should be noted that actual treatment volumes observed so far are somewhat in excess of the baseline estimates. This may be so partly due to the concentration of employment in town, adding to the daytime in-town population. Even so, the treatment plant's capacity appears sufficient for the base case.

In contrast to the treatment plant, the waste collection system would require significant improvements and additions to serve new residential areas. Presumably, tracts in the vicinity of Island Lake, Mill Bay and Spruce Cape will be connected to the sewage collection system as they become more developed for residential use. The Island Lake area is already reporting contamination of surface waters and water supplies due to failing on-site septic systems and installation of a public sewer system in the near future is likely to become necessary.

- Electric Power. The Kodiak Electric Association, an REA cooperative, supplies power to the Kodiak road-connected area excepting the Coast Guard Base which supplies its own power.

Despite recent additions to its generating capacity, the system faces the need for further expansion in capcity in the near future. The system's nominal capacity is about 24,000 kw but some of the plant equipment is in poor condition. As a result, after allowance is made for unreliable units, actual dependable capacity is closer to 13,500 kw. Present peak loads are close to the firm generating capacity of the system.

Plans are now underway to add another 7,200 kw diesel generating unit to the system. This step would raise actual capacity to about 20,700 kw and should take care of short-term needs. Still, it is clear that further expansion will be demanded to accommodate the power needs of the population growth forecast for the base case, possibly as early as 1985 (see Table 19).

For decades, a hydropower project at Terror Lake 40 kilometers (25 miles) southwest of Kodiak has been discussed and studied as a potential power source for Kodiak. To date, the project has been stymied by relatively high per-unit construction and transmission costs and an unfavorable cost-benefit ratio, but changing energy economics have again brought it under serious consideration. KEA today relies wholly upon diesel-powered generators for its power supply. Rising fuel prices have adversely affected operating costs and Kodiak's residential electric rates are more than triple Anchorage area rates. If the Terror Lake project proves feasible, it would satisfy

Kodiak's additional power needs over the forecast period. Alternatively, if the hydropower project is not built or is delayed, KEA would have to install additional costly diesel units, up to a total capacity of 46,000 kw by 2000, to keep pace with the estimated power requirements of its service area.

- Solid Waste Disposal. The environmentally safe disposal of solid waste has become an acute problem in the Kodiak area. The inadequacy of the established sanitary land-fill north of town in the Monashka Bay area has long been recognized. The site capacity is limited and the scarcity of soil cover necessitates the use of crushed rock for cover material. As a result, pollutants are leached out by rain and melt water and carried off into surface waters. Since the sewage treatment plant began operating in 1978, sewer sludge has also been disposed of at the landfill, compounding pollution problems.

A study done in 1976 recommended that a new landfill be developed at Swampy Acres near the State airport. Unfortunately, the availability of this site for public acquisition and development has become clouded and no alternative site has yet been identified. In the meantime, the existing landfill perforce continues to be used. The pollution problems accumulating at that site promise to worsen until the obstacles to acquisition of the Swampy Acres site are surmounted or an alternative site

is developed. The volume of solid waste, not including sewer sludge, is estimated to increase at a 5 percent to 6 percent annual rate in the next few years (see Table 20).

The waste collection service within the City of Kodiak is contracted to a private firm which is reported by the City to provide good service.

- Communications. The base case forecast anticipates an increase in the number of telephone hook-ups at Kodiak during the forecast period to about 7,200 hook-ups by 2000, an increase of about 160 percent over the estimated 2,716 in 1978 (see Table 21). It does not appear that Glacier State Telephone Company, which provides telephone service to the Kodiak area, should face any problems in maintaining adequate service levels. The local exchange system at present has a capacity for 3,100 lines and additional capacity can be easily added as needed. In the past, long distance service was very poor due to the capacity limits of the microwave relay system. However, RCA Alascom recently installed an earth satellite system with enlarged trunkline capacity which is satisfactory for Kodiak's present needs. Future provision of telephone utility service, then, appears likely to be a routine matter.

Public Safety

- Police. The City of Kodiak police department provides police services within the City's jurisdiction, while the Alaska State Troopers are responsible for law enforcement in the rest of the Kodiak area. Beyond existing staff and facilities, it is estimated that the city department can expect to add about 12 new officers along with support facilities and 12 additional jail cells at the rough rate of one each every other year in order to keep pace with population growth.

- Fire Protection. Provision of fire protection services in the Kodiak area is shared by City of Kodiak and the Coast Guard base. The City of Kodiak fire department serves the city and surrounding service area under contract to the Borough government. The Coast Guard fire department serves the base and also mans the firefighting equipment located at the nearby State airport. Under a mutual aid agreement, the different firefighting services can call upon each other for support in case of emergency. The City department also provides emergency medical services for the City and for the rest of the road-connected area.

The City of Kodiak has a respectable fire rating of class 5. In past years, the waterfront and boat harbor have been the major fire problem area. As the base case forecast assumes a

steady increase in the level of fishing activity and seafood processing based in Kodiak's harbor area, this particular fire problem will remain a concern.

Because of continuing town growth, particularly residential expansion into the Monashka Bay/Spruce Cape/Island Lake fringe area, the ability of the single centrally-located fire station to maintain a satisfactory response time is declining. Therefore, the need for a substation in the general Island Lake vicinity should become increasingly urgent in the next couple of years as that area continues to undergo development. This facility together with required fire personnel and equipment, should be adequate for the foreseeable future.

The Coast Guard base is also initiating a program to upgrade its fire protection facility and equipment over the next couple of years, which should enable it to maintain its services up to standard for the forecast period.

Health and Social Services. The Kodiak area is large enough to require and fortunate enough to enjoy a diverse mix of medical facilities and professional services.

Health facilities include: Kodiak Island Borough Hospital (25 beds) serving the general public; Coast Guard Base Hospital (16 beds) serving military personnel and dependents; and four medical clinics. The Borough

Hospital, built in 1969, is operated for the Borough by a non-profit corporation. Over recent years, the Borough hospital has had an occupancy rate around 50 percent which suggests that, with completion of a scheduled 19-bed new wing for nursing home care, the facility should have adequate capapcity for the general public for some years to come. The Coast Guard base hospital in a recent evaluation was judged to have a remaining useful life of about 10 years. If the base hospital is retired, then the Kodiak area can anticipate a demand for 20 to 25 new hospital beds by around 1990 to meet its needs throgh 2000. Otherwise, about 10 to 15 additional beds are likely to be demanded at Kodiak Island Borough Hospital.

In 1978, there were about 9 resident physicians in Kodiak, 5 in private practice and 4 with the base hospital. Additionally, medical specialists visit regularly or are on call for assistance from Anchorage and Elmendorf Air Force Base (Anchorage).

In general, by the standards adopted by the State of Alaska, the facilities and services available to the Kodiak area meet or exceed recommended levels and should be able to expand to meet new service loads as needed.

Education. As the City of Kodiak is located within the Kodiak Island Borough, it is not responsible for directly financing or administering the local elementary and secondary school system. The Kodiak Island Borough provides educational services on an areawide basis for the entire borough, including the dependents of Coast Guard Base

personnel and outlying villages. The forecast of school enrollment and expenditures here presented addresses the Kodiak urban area as a whole, as befits the administrative structure for delivery of educational services.

The local school system is organized into three grade groups: Kindergarten to Grade 5; Grades 7 - 8; Grades 9 - 12. The school enrollment forecast for the Kodiak area was similarly subdivided by grade groups, in the same proportion as actual enrollments over the period 1970-1978.

Generally, the school enrollment is projected to grow at about the same rate as the urban area population, that is, at a long-term average increase of about 3 percent annually. Over the 1978-2000 forecast period, enrollment about doubles from 1,805 students to 3,569 (see Table 22).

A comparison of the enrollment forecast with the capacity and condition of existing school facilities indicates that major school construction can be expected for the elementary and secondary school programs. Of the three elementary schools, two (East with 20 classrooms and Peterson with 25 classrooms) are in good condition and with proper maintenance should be of service until near the end of the forecast. Main Elementary School, with 20 classrooms serving the central area, is in deteriorating condition and in need of immediate renovation for continued use, with the likelihood of eventual replacement. Additionally, the forecast estimates a demand for 40 new classrooms to accommodate enrollment

growth over the next two decades. As the elementary school system is now operating at near capacity, two new elementary schools may be needed, most likely in the Monashka Bay and Bells Flats areas as the residential? population in those areas grows.

Kodiak Junior High School, with 20 classrooms, shares the same facility complex housing Main Elementary School. Its plant, too, is in poor condition and in need of renovation or replacement. For the forecast, it is estimated that 13 new classrooms may be needed, in addition to replacement of the existing facility. Thus, if Kodiak retains its present grade system, a replacement school and another new junior high school are likely to be needed.

Kodiak Aleutian High School, with a current enrollment of about 500 students, is a relatively new 28 classroom building in good physical condition. The main building, built in 1973, is large and designed to accommodate up to double current enrollment by installing partitions to create more classrooms. Thus, it appears that the basic facility is adequate for the forecast period, although some improvements and additions beyond routine maintenance may be demanded in connection with upgrading the educational curriculum.

Recreation. Kodiak area residents have the benefit of a good array of both organized and informal recreational opportunities. Within the City, the Parks and Recreation Department has an active year-round program and sponsors many different sport and recreational events. In

terms of recreational facilities, the town is satisfactorily equipped with playgrounds, gyms, swimming pools, basketball courts and other popular facilities, many of which are provided by the Borough School District. The Borough recently also took on areawide parks and recreation powers outside the City of Kodiak which should further upgrade the area's public recreational facilities. Kodiak residents also participate in large numbers in informal recreational activities such as sport fishing and hunting, boating, camping and hiking, and the like.

In order to maintain a satisfactory level of recreational opportunities in the future, Kodiak is likely to need to double the number or capacity of existing recreational facilities. Among the more important improvements likely to be demanded are about 10 to 12 hectares (25 to 30 acres) devoted to neighborhood parks and playlots, 4 or 5 basketball courts, perhaps another swimming pool, and a variety of lesser indoor and outdoor recreational facilities. Possibly, many of these new facilities can be developed in association with the school building program.

Local Government Finances. In fiscal year 1977, the City of Kodiak obtained most of its general fund revenues from local sources. Sales taxes (36 percnet), property taxes (16 percent) and a variety of service charges and miscellaneous other sources (26 percent) provided over three-fourths of the City's general fund income. Intergovernmental transfers, mainly federal and State revenue-sharing, accounted for the remaining 22 percent.

For the future, it is assumed, as explained in the Appendices, that the City's revenues will grow at the same rate as its population grows. By this standard, the City's 1978 general fund income of about $3,500,000 annually is forecast to c' imb to about $8,300,000 by 2000 (see Table 24) .

As for operating expenditures, for the base case, it is assumed that the City will continue to maintain about the same level of services at about the same level of per capita cost as it does at present (see Table 25). About two-thirds of the projected growth in the base case is allotted to the City of Kodiak, so the brunt of the fiscal impact of growth will land upon the City. However, this impact will be tempered by the fact that the Borough government administers and finances the local share of educational services as well as certain other areawide services (see Table 23). Also, certain utility services in Kodiak, such as power and telephone, are financed and supplied through independent public and private utilities.

At present, the City's general financial pos' tion in terms of its per capita debt, ratio of debt to valuation, property tax rates and other indexes of fiscal soundness is roughly equal or superior to the average of other Alaskan municipalities. However, if the City commits itself to major new public works projects to accommodate growth, pa~-titularly a costly water development project, then its added debt service demands may compe' the City to tap new revenue sources.

CAUSE/EFFECT OF IMPACTS

The base case forecast is for steady population growth in the Kodiak urban area at a rate of about 3 percent annually and a cumulative increase of almost 100 percent over the forecast period. The key economic activities in Kodiak's future will remain the fishing and seafood processing industries. Kodiak is well situated to expand into the bottomfishing industry as that new resource for Alaska's fishing fleet and processing industry begins to realize its potential. Also, the trend toward a more diversified year round fishery is expected to continue,

Due to the existing locational pattern of harbor and processing plant facilites, the City of Kodiak is forecast to strengthen its pre-eminent role as the center of the island's fishing industry. Thus, about two-thirds of the Kodiak area's population growth and most of the employment growth is expected to take place within the City.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

Overall, the Kodiak urban area is estimated to about double in population during the forecast period and, thus, about double in its general requirements for community infrastructure. According to the economic forecast, the growth trend will be steadily upward, without big population swings which would complicate community planning and development programs. On the other hand, there are a couple of elements in the community infrastructure which have historically been in short supply or may be costly to expand much beyond present capacities.

Despite recent residential construction activity, the Kodiak urban area continues to experience a general housing shortage. Housing accommodations are particularly short for seasonal and transient plant workers. This situation, unless alleviated may inhibit the projected expansion of the seafood processing industry and detract from Kodiak's economic base growth.

Also critically related to Kodiak's economic growth are the cost and reliability of two basic utilities - water and power supply. At times, industrial water use, mainly for seafood processing, accounts for up to 95 percent of the City of Kodiak's water consumption. As the City water supply is even now sometimes overtaxed at periods of peak plant operation, it is clear that a major water development project is a prerequisite for Kodiak to achieve its full economic potential as a base for seafood processing.

Electric power costs are high in Kodiak for industrial and residential consumers alike. Power requirements are forecast to nearly triple. If KEA is unable to develop a lower cost alternative to its existing diesel generated supply, then the price of power may prove to be another brake on Kodiak's economic growth potential.

Finally, the Kodiak area can expect to face a steady stream of the public works projects routinely required to service its growing urban residential area, such as the construction of new school facilities and the extension of water and sewer systems to escape the pollution potential of poor subsoils and drainage.

SUMMARY OF IMPACTS

In quantitative terms, the base case growth forecast projects that Kodiak's population will increase by more than 90 percent and its employment will grow by close to 80 percent between 1978 and the year 2000. The physical impact of this growth upon Kodiak's community infrastructure will clearly be substantial and will tend toward a more urban physical development pattern and lifestyle than is currently the case. The basic orientation of the town's economic base toward the fishing and fish processing industry is expected to persist. However, with the successful entry into large scale bottomfishing, the local fishing and fish processing industry should be characterized by high year-round levels of activity, essentially eliminating the seasonality normally associated with this industry.

Because the employment and population projections anticipate more rapid growth in the first half of the forecast period, the demand for additional housing, community facilities and utilities, plus attendant pressures on local financial resources, should be felt most strongly during the next ten years. Although the City of Kodiak's fiscal position is now stronger than that of most Alaska municipalities, if it commits itself to major new public works projects to accommodate growth, particularly a costly water development project, the added debt service demands could compel it to tap new revenue sources.

TABLE 15

FORECAST OF NET CHANGE IN HOUSING DEMAND
BASE CASE
KODIAK AREA
1978 - 2000

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	477	159	92	41	26
1979	335	112	65	29	18
1980	365	122		32	20
1981	555	185	1;;	48	30
1982	535	178	103	46	29
1983	559	186	107	49	30
1984	624	208	120	54	34
1985	546	182	105	48	29
1986	452	151	87	40	24
1987	389	130	75	34	21
1988	381	127	73	33	21
1989	228	76	44	20	12
1990	295	98	57	25	16
1991	379	126	73	33	20
1992	564	188	109	49	30
1993	415	138	80	36	22
1994	368	123	71	32	20
1995	362	121	70	32	19
1996	280	93	54	24	15
1997	290	97	56	25	16
1998	211	70	41	18	11
1999	392	131	76	34	21
2000	292	97	56	25	16
TOTALS	9,294	3,098	1,792	807	500

Source: Alaska Consultants, Inc.

TABLE 16

ESTIMATED DEMAND FOR RESIDENTIAL LAND
BASE CASE
KODIAK 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	227	32.7	12.7	45.4
Multifamily & Trailer	166	12.0	4.6	16.6
1981-85				
Single Family	542	78.0	30.4	108.4
Multifamily & Trailer	397	28.6	11.1	39.7
1986-90				
Single Family	336	48.4	18.8	67.2
Multifamily & Trailer	246	17.7	6.9	24.6
1991-95				
Single Family	403	58.0	22.6	80.6
Multifamily & Trailer	293	21.1	8.2	29.3
1996-2000				
Single Family	283	40.8	15.8	56.6
Multifamily & Trailer	205	14.8	5.7	20.5
TOTAL	3,098	352.1	136.8	488.9

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 17

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

Year	Domestic Capacity	'Industrial Capacity	Total Capacity
1978	663	11,337	12,000
979	697	11,921	12,618
980	733	12,546	13,279
981	789	13,505	14,294
982	844	14,443	15,287
983	901	15,422	16,323
984	965	16,506	17,471
985	1.019	17,444	18,463
986	1,064	18,215	.19,279
1987	1,105	18,903	20,008
1988	1,144	19,569	20,713
1989	1,167	19,965	21,132
1990	1,197	20,486	21,683
1991	1,235	21,133	22,368
1992	1,292	22,112	23,404
993	1,334	22,821	24,155
994	1,371	23,467	24,838
995	1,409	24,113	25,522
996	1,436	24,571	26,007
997	1,466	25,093	26,559
998	1,488	25,468	26,956
999	1 ,527	26,134	27,661
2000	1,558	26,655	28,213

a/ Multiply by 3.785 to obtain liters.

Source: Alaska Consultants, Inc.

TABLE 18

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
BASE CASE
CITY OF KODIAK
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	663	82.8
1979	697	87.1
1980	733	91.6
1981	789	98.7
1982	844	05.5
1983	901	12.7
1984	965	20.6
1985	1,019	27.4
1986	1,064	33.0
1987	1,105	138.1
1988	1,144	143.0
1989	1,167	145.9
1990	1,197	149.7
1991	J ,235	154.4
1992	1,292	161.5
1993	1,334	166.7
1994	1,371	171.5
1995	1,409	176.1
1996	1,436	179.5
1997	1,466	183.3
1998	1,488	186.1
1999	1,527	191.0
2000	1,558	194.7

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

Source: Alaska Consultants, Inc.

TABLE 19

ESTIMATED ELECTRIC POWER
CAPACITY REQUIREMENTS
BASE CASE
KODIAK AREA
1978 - 2000

Year	Estimated Capacity Requirements in kw s
1978	16,318
1979	17,498
1980	18,790
1981	20,622
1982	22,456
1983	24,409
1984	26,600
1985	28,631
1986	30,444
1987	32,117
1988	33,804
1989	34,488
1990	35,373
1991	36,510
1992	38,229
1993	39,447
1994	40,551
1995	41,637
1996	42,477
1997	43,347
1998	43,980
1999	45,156
2000	46,032

Source: Alaska Consultants, Inc.

TABLE 20

ESTIMATED DISPOSABLE SOLID WASTES
BASE CASE
KODIAK AREA
1978 - 2000

Year	Annual Tonnage a/	Annual Volume (cubic yards) b/
1978	8,990	54,500
1979	9,510	57,600
1980	10,070	61,000
1981	10,860	65,800
1982	11,660	70,700
1983	12,500	75,750
1984	13,450	81,500
1985	14,350	87,000
1986	15,010	91,000
1987	15,620	94,700
1988	16,220	98,300
1989	16,650	100,900
1990	17,180	104,100
1991	17,630	106,800
1992	18,310	111,000
1993	18,810	114,000
1994	19,250	116,700
1995	19,690	119,300
1996	20,020	121,300
1997	20,370	123,400
1998	20,620	125,000
1999	21,100	127,900
2000	21,450	130,000

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
BASE CASE
KODIAK AREA
1978 - 2000

Year	Total Number of Dwellings	Total Number of Telephones	Annual Increase
1978	2,173	2,716	--
1979	2,285	2,879	1 63
1980	2,407	3,057	241
1981	2,592	3,318	261
1982	2,770	3,573	255
1983	2,956	3,843	270
1984	3,164	4,145	302
1985	3,346	4,417	272
1986	3,497	4,651	234
1987	3,627	4>860	209
1988	3,754	5,068	208
1989	3,830	5,209	141
1990	3,928	5,381	172
1991	4,054	5,595	214
1992	4,242	5,896	301
1993	4,380	6,132	236
1994	4,503	6,304	172
1995	4,624	6,474	170
1996	4,717	6,604	130
1997	4,817	6,744	140
1998	4,884	6,838	94
1999	5,015	7,021	183
2000	5,112	7,157	136

Source: Alaska Consultants, Inc.

TABLE 22

SCHOOL ENROLLMENT FORECAST
BASE CASE
KODIAK AREA
1978 - 2000

Year	Grades			
	K - 6 Enrollment	7 - 8 Enrollment	9 - 12 Enrollment	Total Enrollment
1978	1,029	274	502	1,805
1979	1,067	285	520	1,872
1980	1,109	295	541	1,945
1981	1,172	312	572	2,056
1982	1,233	329	601	2,163
1983	1,297	346	632	2,275
1984	1,368	365	667	2,400
1985	1,430	381	698	2,509
1986	1,482	395	723	2,600
1987	1,526	407	744	2,677
1988	1,570	418	766	2,754
1989	1,595	426	778	2,799
1990	1,629	434	795	2,858
1991	1,672	446	816	2,934
1992	1,737	463	847	3,047
1993	1,784	476	870	3,130
1994	1,826	487	890	3,203
1995	1,867	498	911	3,276
1996	1,899	507	926	3,332
1997	1,932	515	943	3,390
1998	1,956	522	954	3,432
1999	2,001	533	976	3,510
2000	2,034	543	992	3,569

Source: Alaska Consultants, Inc.

TABLE 23

FORECAST OF KODIAK ISLAND BOROUGH SCHOOL DISTRICT REVENUES a_/
BASE CASE
KODIAK URBAN AREA
1978 - 2000
(in $1,000s)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	1,805	$ 395	$4,647	$ 56	$5,098
1979	1,872	410	4,820	58	5,288
1980	1,945	426	5,008	60	5,494
1981	2,056	450	5,294	64	5,808
1982	2,163	474	5,569	67	6,110
1983	2,275	498	5,857	70	6,425
1984	2,400	526	6,179	74	6,779
1985	2,509	550	6,450	78	7,088
1986	2,600	570	6,694	80	7,344
1987	2,677	586	6,892	83	7,561
1988	2,754	603	7,091	85	7,779
1989	2,799	613	7,207	87	7,907
1990	2,858	626	7,358	88	8,072
1991	2,934	643	7,554	91	8,288
1992	3,047	667	7,845	94	8,606
1993	3,130	686	8,059	97	8,842
1994	3,203	702	8,247	99	9,048
1995	3,276	718	8,435	101	9,254
1996	3,332	730	8,579	103	9,412
1997	3,390	743	8,728	105	9,577
1998	3,432	752	8,836	106	9,694
1999	3,510	769	9,037	109	9,915
2000	3,569	782	9,189	110	10,081

a/ The City of Kodiak does not raise any direct revenues for school purposes. The Kodiak Island Borough funds and operates a boroughwide school system. This table presents the Kodiak Urban area's projected pro rata share of revenues accruing to the Kodiak Island Borough for educational purposes. Expenditures are assumed to equal revenues.

Source: Alaska Consultants, Inc.

TABLE 24

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

Year	Property Taxes	Sal es Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 558	$1,263	$ 772	$ 940	.$3,533
1979	586	1,328	812	988	3,714
1980	617	1,399	855	1,041	3,912
1981	665	1,506	920	1,121	4,212
1982	711	1,610	984	1,198	4,503
1983	758	1,718	1,050	1,278	4,804
1984	812	1,839	1,123	1,368	5,142
1985	858	1,945	1,188	1,447	5,438
1986	897	2,032	1,242	1,512	5,683
1987	930	2,107	1,288	1,568	5,893
1988	963	2,181	1,333	1,623	6,100
1989	982	2,225	1,360	1,656	6,223
1990	1,007	2,283	1,394	1,698	6,382
1991	1,040	2,356	1,439	1,753	6,588
1992	1,089	2,467	1,507	1,835	6,898
1993	1,123	2,545	1,555	1,894	7,117
1994	1,155	2,616	1,598	1,947	7,316
1995	1,186	2,687	1,641	1,999	7,513
1996	1,210	2,741	1,674	2,039	7,664
1997	1,234	2,797	1,709	2,081	7,821
1998	1,252	2,838	1,734	2,111	7,935
1999	1,286	2,914	1,780	2,168	8,148
2000	1,311	2,970	1,815	2,210	8,306

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
BASE CASE
CITY OF KODIAK
1978 - 2000
(in $1,000s)

Year	General Fund Revenues			Operating Expenditures b/	Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total		
1978	$ 558	$2,975	$3,533	$3,251	$ 282
1979	586	3,128	3,714	3,418	296
1980	617	3,295	3,912	3,600	312
1981	665	3,547	4,212	3,876	336
1982	711	3,792	4,503	4,143	360
1983	758	4,046	4,804	4,421	383
1984	812	4,330	5,142	4,732	410
1985	858	4,580	5,438	5,004	434
1986	897	4,786	5,683	5,230	453
1987	930	4,963	5,893	5,423	470
1988	963	5,137	6,100	5,613	487
1989	982	5,241	6,223	5,726	497
1990	1,007	5,375	6,382	5,874	508
1991	1,040	5,548	6,588	6,062	526
1992	1,089	5,809	6,898	6,347	551
1993	1,123	5,994	7,117	6,550	567
1994	1,155	6,161	7,316	6,733	583
1995	1,186	6,327	7,513	6,914	599
1996	1,210	6,454	7,664	7,053	611
1997	1,234	6,587	7,821	7,198	623
1998	1,252	6,683	7,935	7,302	633
1999	1,286	6,862	8,148	7,498	650
2000	1,311	6,995	8,306	7,643	633

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

b/ The City of Kodiak does not make any direct expenditures for school support. The Kodiak Island Borough funds and operates a boroughwide school system.

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - 95 PERCENT SCENARIO

Introduction

The 95 percent and the other two OCS petroleum scenarios (or cases) which form the basis of the socioeconomic impact assessment for Seward and Kodiak in this study were selected by the U.S. Bureau of Land Management's Alaska OCS Office and developed by Dames and Moore from U.S. Geological Survey resource estimates. Although reasonably precise locations, quantities, methods of operation and time frames are necessary to the development of plausible scenarios, such 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 degree of precision. However, an indication is given of the type and scale of activities which could impact Western Gulf of Alaska communities and the extent to which individual communities would logically be impacted.

The 95 percent scenario assumes that the proposed Western Gulf of Alaska OCS Lease Sale #46 will take place as scheduled in December 1980. The assumed volume of oil and natural gas resources in the lease area is set at a level which has a 95 percent probability of occurrence.

According to this scenario, the exploration program begins the year after the lease sale, with three offshore drill rigs in operation. Exploration support is provided from Kodiak and Seward (see Table 26).

TABLE 26

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD AND KODIAK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA

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

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

During three years of exploration effort, a total of 17 exploration wells is drilled: 11 in the Middle Albatross Basin and 6 in the Tugidak Basin. Findings are discouraging. No commercial discoveries of oil or gas are made. The exploration program is concluded at the end of 1983 after which there is no futher OCS activity in the region as a consequence of this lease sale.

During the three years of active exploration, effects on the economy and populace of Kodiak and Seward are minimal, related to aviation support. based in Kodiak and marine service base support supplied from Seward. Offshore crews are employed on a rotation schedule which permits them to travel between work stations and permanent residences outside the Alaska coastal area, with only passing visits to Kodiak or Seward. Overall, the 95 percent scenario stimulates no new industrial or port development and imposes no lasting burden on the infrastructure of either coastal community. Following early shutdown of the exploration phase, community conditions revert to the patterns forecast under the base case.

Seward

COMMUNITY FORECASTS - 95 PERCENT SCENARIO

Significant Factors Affecting Growth

This scenario's growth impacts upon Seward are minor in scale and brief in duration (see Table 27 and Figure 4).

Seward is already assumed to be a major support center for the expanding operations in the Northern Gulf of Alaska. Its service base is the best located and readiest available to support exploration in the new lease area. The Western Gulf operations add an estimated maximum of 25 employees at the Seward service base for two years and another 13 indirect jobs to the area's economy (see Tables 29, 30 and 31). These new jobs support a temporary population increase of about 76 persons. By 1984, exploration activities in the Western Gulf are shut down with the related employees (and their dependents) either departing the locality or being absorbed by other areas of the economy. At most, OCS-related growth forecast to arise from the Western Gulf lease sale amounts to less than a 3 percent increment to Seward's total population.

Within the Seward sector, geophysical survey and offshore marine operations employ an estimated additional 93 workers in 1981 and 1982, but these are transient offsite workers who do not place any burdens upon Seward's infrastructure (see Table 28).

Overall, compared to growth accruing from general economic expansion and the economic effects of the Northern Gulf of Alaska lease sale, the Western Gulf of Alaska sale contributes only marginally to the demand for new public services and facilities, and then only for the period 1981-1983.

TABLE 27

FORECAST OF EMPLOYMENT AND POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA - SEWARD AREA

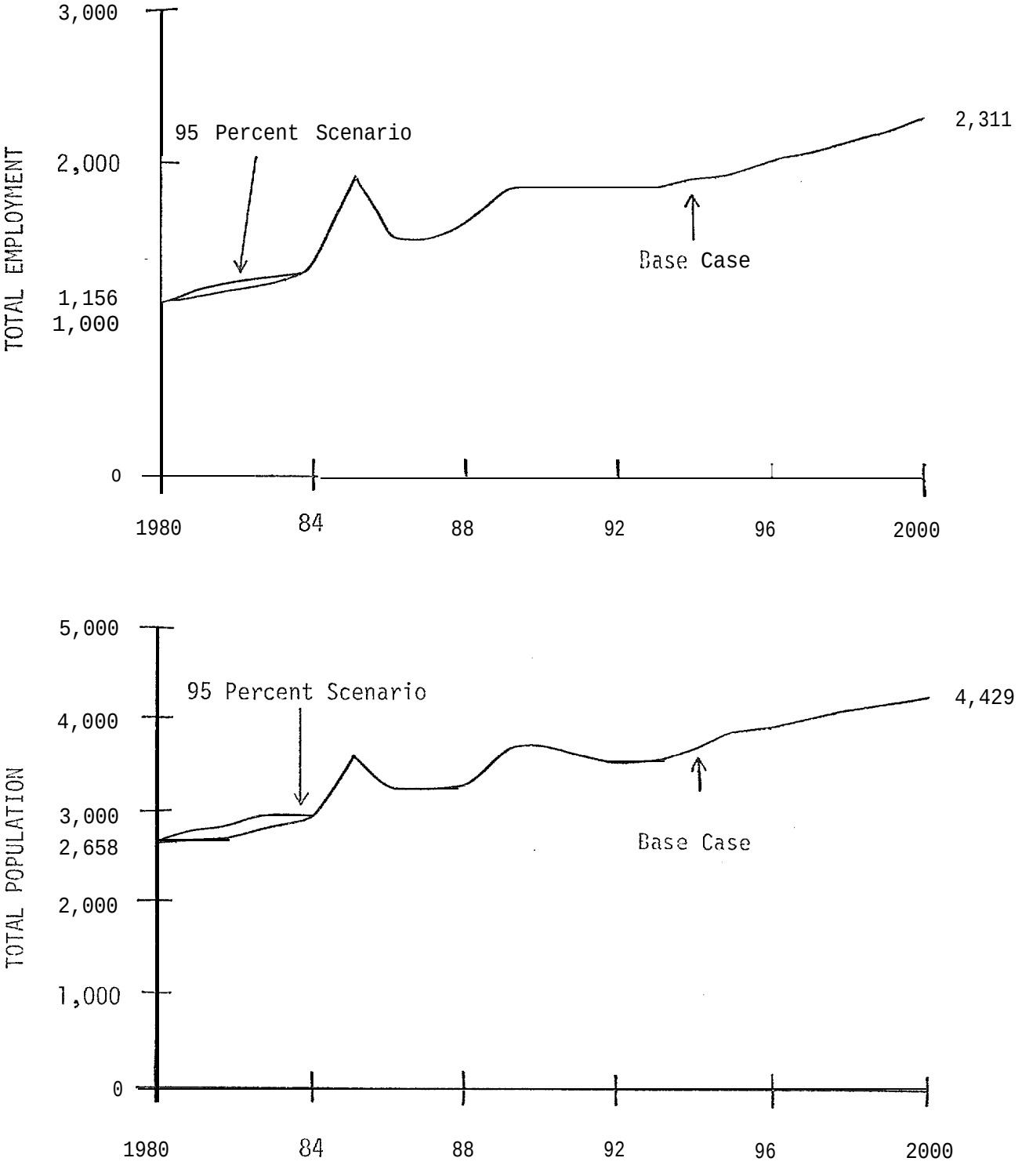
INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1986	1987	9[illegible]	1989	1990	1991	1992	994	1995	99[illegible]	1997	1998	1999
COMMODITY PRODUCING INDUSTRIES	257	258	279														
Agriculture, Forestry and Fisheries	(103)	(104	120														
Mining	(3)	(4	4														
Manufacturing	(121)	(100	125														
Contract Construction	(30)	(50	30														
DISTRIBUTIVE INDUSTRIES	548	559	563														
Transportation, Communications and Public Utilities	' 101)	107	(101)														
Trade	' 240)	242	(248)														
Finance, Insurance and Real Estate	, 23)	(24)	(24)														
Service	, 184)	(186)	(190)														
GOVERNMENT	417	425	432														
TOTAL EMPLOYMENT	1,222	1,242	,274														
TOTAL POPULATION - SEWARD AREA	2,796	2,840	2,872														
City of Seward	2,097	2,1[illegible]	2 ; 54														
Permanent Residents	(2,097)	(2,1[illegible]	(2,154														
Construction Camp Residents	-)	- '	- '														
Remaining Seward Area	699	710	7 8														

1984 - 2000 is same as Base Case

Source: Alaska Consultants, Inc.

FIGURE 4

Seward Area
Total Employment and Total Population
Base Case and 95 Percent Scenario
Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

TABLE 28

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN 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	15				78					93
1982	15				78					93
1983	6				26					32
1984										
1985										
1986										
1987										
1988										
1989										
990										
991										
992										
993										
994										
995										
996										
997										
1998										
1999										
2000										

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 29

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN 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								
1931	25											25
1982	25											25
1983	8											8
1984												
1985												
1986												
1987												
1988												
1989												
1930												
1991												
1992												
1993												
1994												
1995												
1996												
1397												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 30

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
EXPLORATION ONLY
MESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employment
	Offshore Resident	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981	0	25	25	0	13	13	38
1982	0	25	25	0	13	13	38
1983	0	8	8	0	4	4	12
1984							
1985							
1986							
987							
988							
989							
990							
991							
992							
993							
994							
1995							
1996							
1997							
1998							
1999							
2000							

Source: Alaska Consultants, Inc.

TABLE 31

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
EXPLORATION ONLY
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Population	Permanent Employment	Permanent Population	Total Population
1981	38		38	76	76
1982	38		38	76	76
1983	12		12	24	24
1984					
1985					
1986					
1987					
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					
2000					

Source: Alaska Consultants, Inc.

Kodiak

COMMUNITY FORECASTS - 95 PERCENT SCENARIO

Significant Factors Affecting Growth

Under the 95 percent or exploration only scenario, all marine support activities are initially based at Seward's existing service base facility in preference to investing in any new service base facilities elsewhere. As for air services, however, Kodiak is situated closer than Seward to the areas being explored offshore, a significant advantage for helicopter support activities. Consequently, all air support services involving helicopter transport of personnel and some lightweight cargo to the offshore exploratory rigs are assigned to Kodiak. Helicopter services account for up to 16 jobs and about 32 additional residents in the Kodiak area during exploration activities (see Tables 34, 35 and 36).

Up to about 168 workers are estimated to be employed on rigs in the Kodiak sector but these are transient workers maintaining permanent residences outside the lease sale region (see Table 33).

At most, OCS-related growth adds only a fraction of a percent to Kodiak's employment and population, and that only for a couple of years (see Table 32). Demand for public services and housing is not significantly affected. After 1984, upon termination of the exploration effort, the lease sale has no further impacts upon Kodiak.

TABLE 32

FORECAST OF EMPLOYMENT AND POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

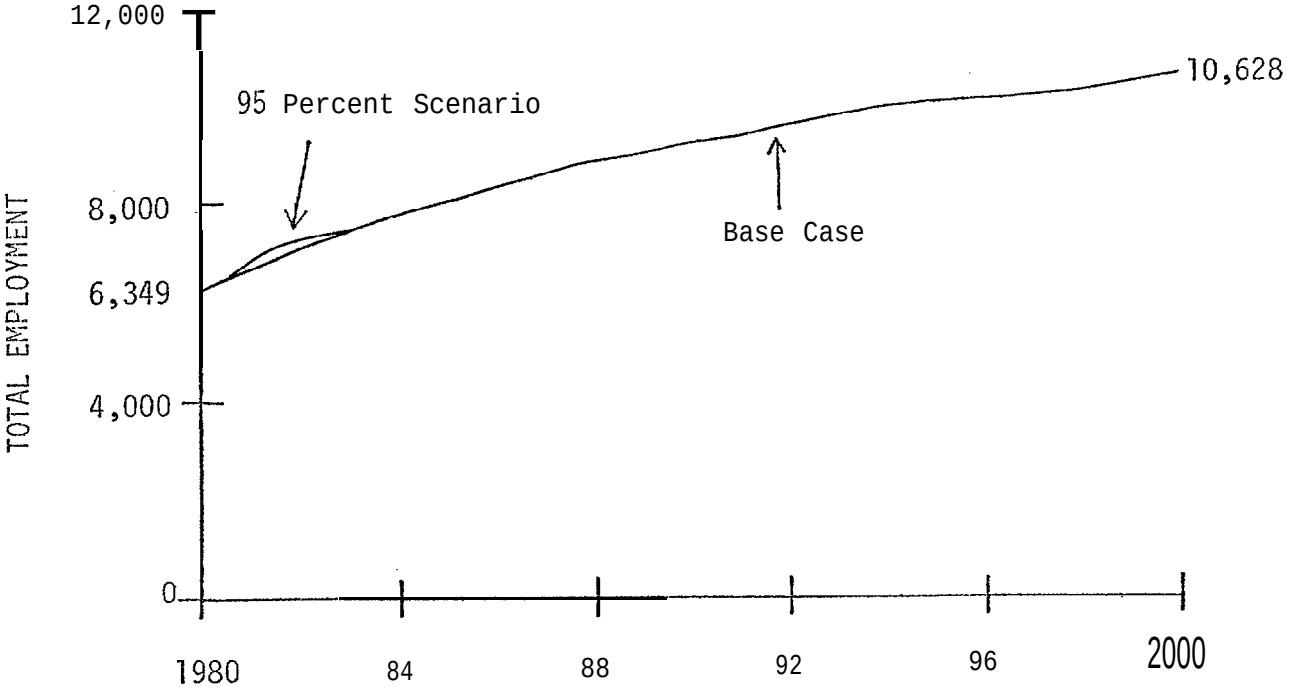
INDUSTRY CLASSIFICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMODITY PRODUCING INDUSTRIES	2.919	3,088	3.252																	
Agriculture, Forestry and Fisheries	(978)	(1,027)	(1 ,079)																	
Mining	(2)	(4)	(5)																	
Manufacturing	(1,666)	(1,749)	(1 ,837)																	
Contract Construction	273)	(308)	(331)																	
DISTRIBUTIVE INDUSTRIES	1,692	1,836	I ,990																	
Transportation, Communications and Public Utilities	(275)	(295)	(317)																	
Trade	(734)	(806)	(883)																	
Finance, Insurance and Real Estate	(133)	(140)	(147)																	
Service	(550)	(595)	(643)																	
GOVERNMENT	2,099	2,120	2,141																	
TOTAL EMPLOYMENT	6,710	7,044	7,383																	
TOTAL POPULATION - KODIAK ROAD-CONNECTED AREA	10,314	10,849	11,388																	
Coast Guard Base	2,500	2,500	2,500																	
Non-Military	7,814	8,349	8,838																	
City of Kodiak	5,204	5,561	5,923																	
Remaining Road-Connected Area	2,610	2,788	2,965																	
Permanent Residents	(2,610)	(2,788)	(?,788)																	
Construction Camp Residents	(--)	(--)	(--)																	

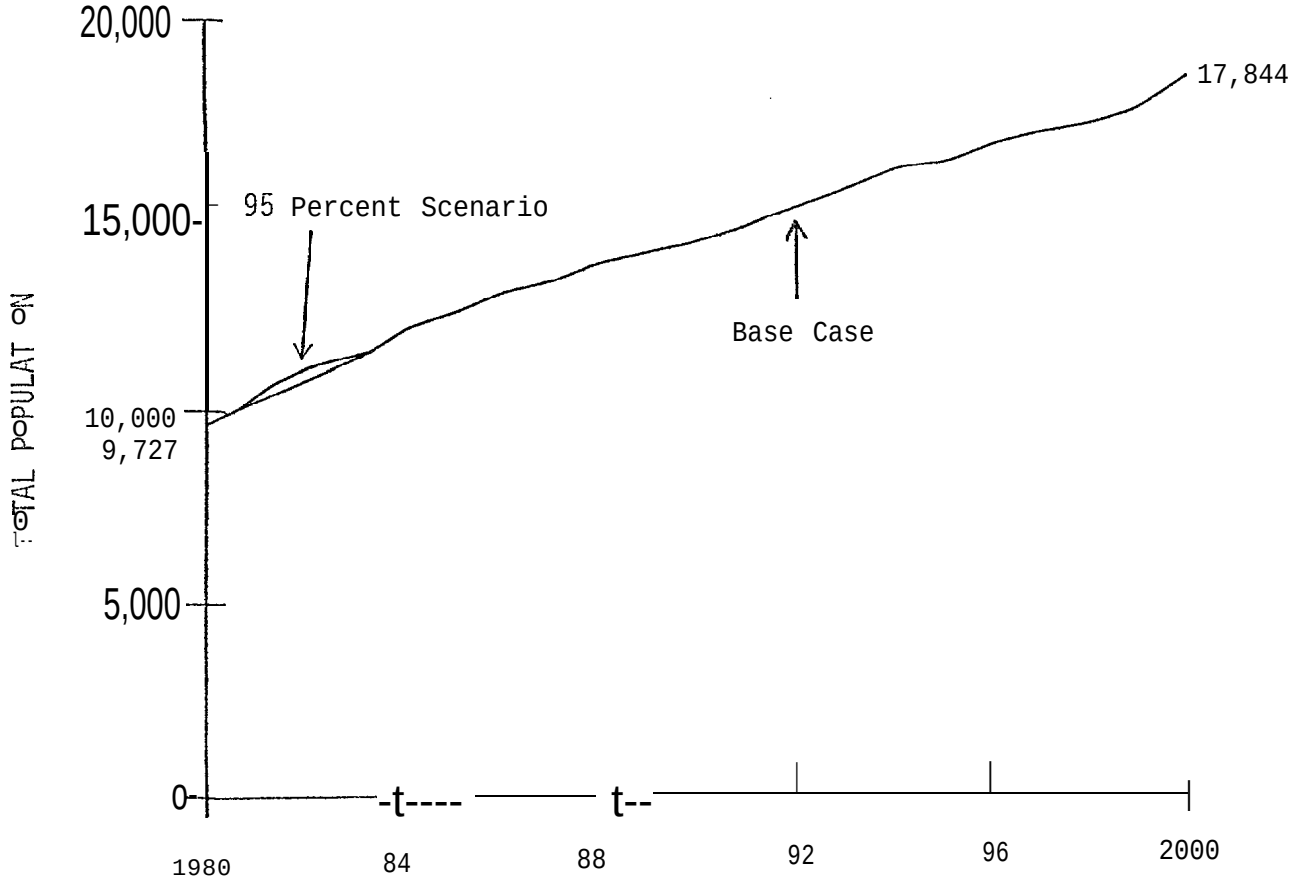
1984 - 2000 is same as Base Case

Source: Alaska Consultants, Inc.

FIGURE 5

Kodiak Area
Total Employment and Total Population
Base Case. and 95 Percent Scenario
Western Gulf of Alaska
1980 - 2000





Source: Alaska Consultants, Inc.

TABLE 33

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA - KODIAK
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								168
1982		168								168
1983		56								56
1984										
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 34

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA - KODIAK 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		15										15
1982		15										15
1983		5										5
1984												
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 35

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
EXPLORATION ONLY
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employment
	Offshore Resident in	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981	0	15	15	0	1	1	16
1982	0	15	15	0	1	1	16
1983	0	5	5	0	1	1	6
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							

Source: Alaska Consultants, Inc.

TABLE 36

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO
EXPLORATION ONLY
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Population	Permanent Employment	Permanent Population	Total Population
1981	16		16	32	32
1982	16		16	32	32
1983	6		6	12	12
1984					
1985					
1986					
1987					
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					
2000					

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - MEAN SCENARIO

Introduction

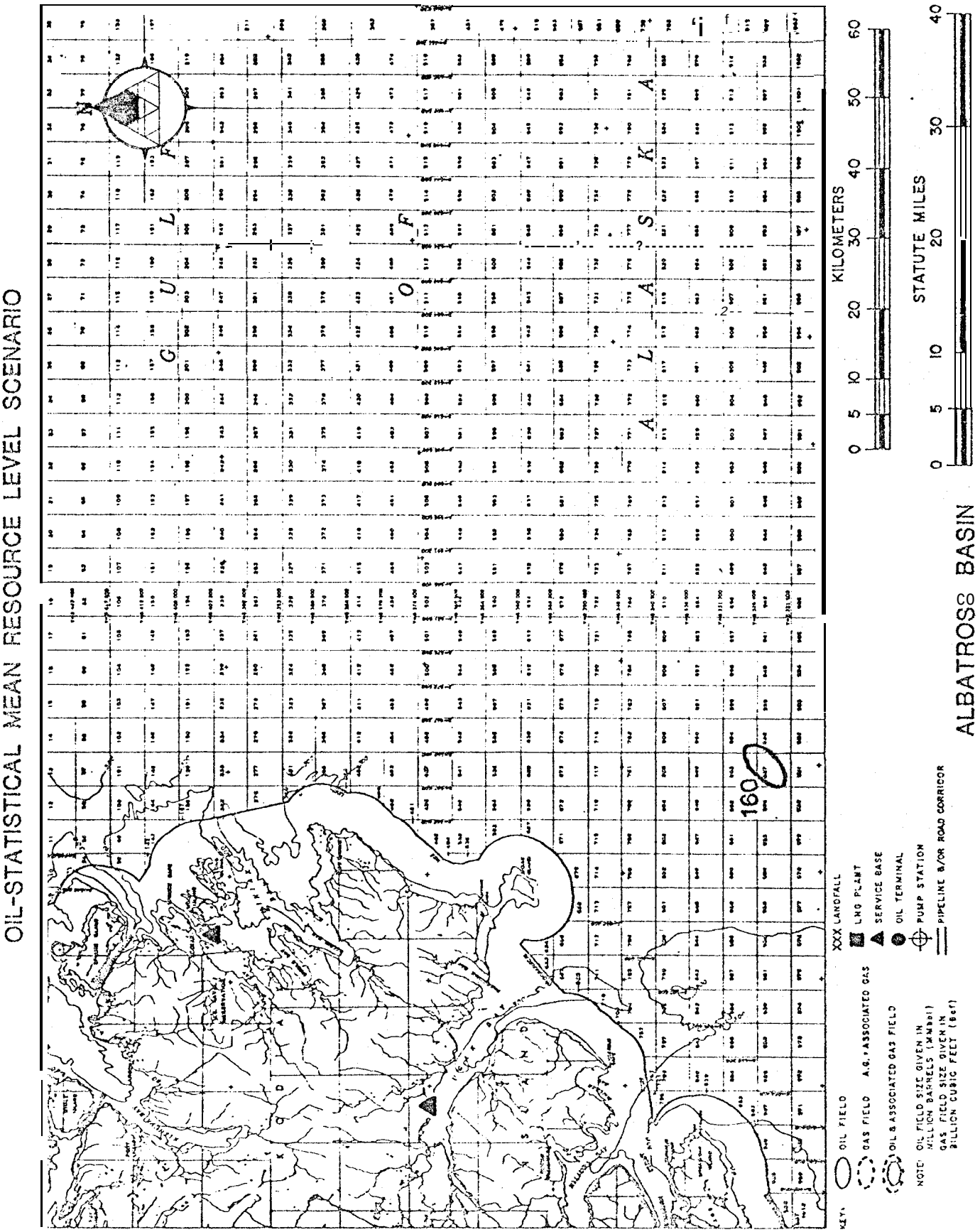
The mean and the other two OCS petroleum sceanrios (or cases) which form the basis of the socioeconomic impact assessment for Seward and Kodiak in this study were selected by the U.S. Bureau of Land Management's Alaska OCS Office and developed by Dames and Moore from U.S. Geological Survey resource estimates. Although reasonably precise locations, quantities, methods of operation and time frames are necessary to the development of plausible scenarios, such 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 degree of precision. However, an indication is given of the type and scale of activities which could impact Western Gulf of Alaska communities and the extent to which individual communities would logically be impacted.

Following the December 1980 lease sale, exploration begins in 1981 with two drill rigs on site. Kodiak and Seward are the temporary support bases for the exploration phase. Over a three year exploration period, 14 wells are drilled: 12 exploratory wells and 2 delineation wells after discovery of a commercially promising oil field in the first drilling season. Ultimately, a single commercial oil field of 160,000,000 barrels is found in the Middle Albatross Basin. No natural gas discoveries of commercial value are made (see Figure 6 and Table 37).

Development commences with the installation of a steel production platform in 1985. It is assumed that the platform is fabricated at a West Coast port and barged to the installation site. For economic reasons, an offshore loading system using a single point mooring (SPM) system and floating tanker storage is chosen in preference to a submarine pipeline/ onshore storage and trans-shipment terminal system. Support for platform installation and field development is based primarily at Kodiak.

Oil production begins in 1987 but does not reach peak capacity of 65,000 barrels per day until after the full complement of 40 production wells is completed in 1989. The productive life of the oil field is relatively brief. By 1999, the commercial reserves are exhausted and production is shut down. At the close of the forecast period in 2000, there is no direct OCS employment remaining in the region.

FIGURE 6



Source: Dames and Moore.

TABLE 37

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD AND KODIAK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Kodiak
EXPLORATION		
Survey		
Offshore Geophysical and Geological Surveying [area of operation]	Not Applicable	Survey vessels conducting geophysical and geological surveys on Albatross Basin outside the Kodiak coastal area.
Onshore Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross Basin.	Not Applicable
Rigs		
Offshore Exploration Well Drilling [area of operation]	Not Applicable	Rigs drilling exploration wells on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.

Onshore Service Base	Shore base supplying rigs and boats on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	Not Applicable
Air Transportation	Not Applicable	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross Basin.
Construction	Not Applicable	Constructing a permanent service base.
DEVELOPMENT		
Platform Installation		
Offshore Platform Installation [area of operation]	Not Applicable	Locating, installing and commissioning platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Seward.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Kodiak.
Onshore Service Base	Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Seward.	Shore base supply boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Kodiak.

Air Transportation	Not Applicable	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Albatross Basin.
Platforms		
Offshore		
Development Drilling [area of operation]	Not Applicable	Development drilling on platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross Basin.	Supply boats transporting materials to platforms on the Albatross Basin.
Onshore		
Service Base	Shore base supplying boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	Not Applicable	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms on Albatross Basin.
PRODUCTION		
Platforms		
Offshore		
Platform Operations [area of operation]	Not Applicable	Operating platforms with workovers and well stimulation on Albatross Basin.
Marine Transportation [port area]	Not Applicable	Supply boats transporting materials to platforms on the Albatross Basin.

Onshore Service Base	Not Applicable	Shore base supplying boats and platforms on the Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.

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

Seward

COMMUNITY FORECASTS - MEAN SCENARIO

Significant Factors_ Affecting Growth

Under this scenario for the Western Gulf of Alaska lease sale, Seward's existing marine service base provides all needed marine support through the exploration phase. Then, most marine service support shifts to a new service base constructed at Womens Bay on Kodiak Island (south of the City of Kodiak but connected to it by road) specifically to support field development and production of the commercial oil field discovered in Middle Albatross Basin. Some minor marine support continues to be provided out of Seward during the busiest period of field development.

In summary terms, this scenario sees some slight employment and resident expansion at Seward between 1981 and 1988, peaking at about 29 jobs and 58 residents in 1986 (see Tables 38 to 42 and Figure 7). The Western Gulf of Alaska lease sale never accounts for as much as 2 percent of Seward's total workforce.

The incremental impact upon city growth and infrastructure attributable to the Western Gulf of Alaska lease sale is not expected to be noticeable, especially in" comparison to the growth stimulus of the concurrent Northern Gulf of Alaska sale and general expansion of Seward's economy.

TABLE 38

FORECAST OF EMPLOYMENT AND POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENAR10
WESTERN GULF OF ALASKA - SEWARD AREA
19LH - 2000

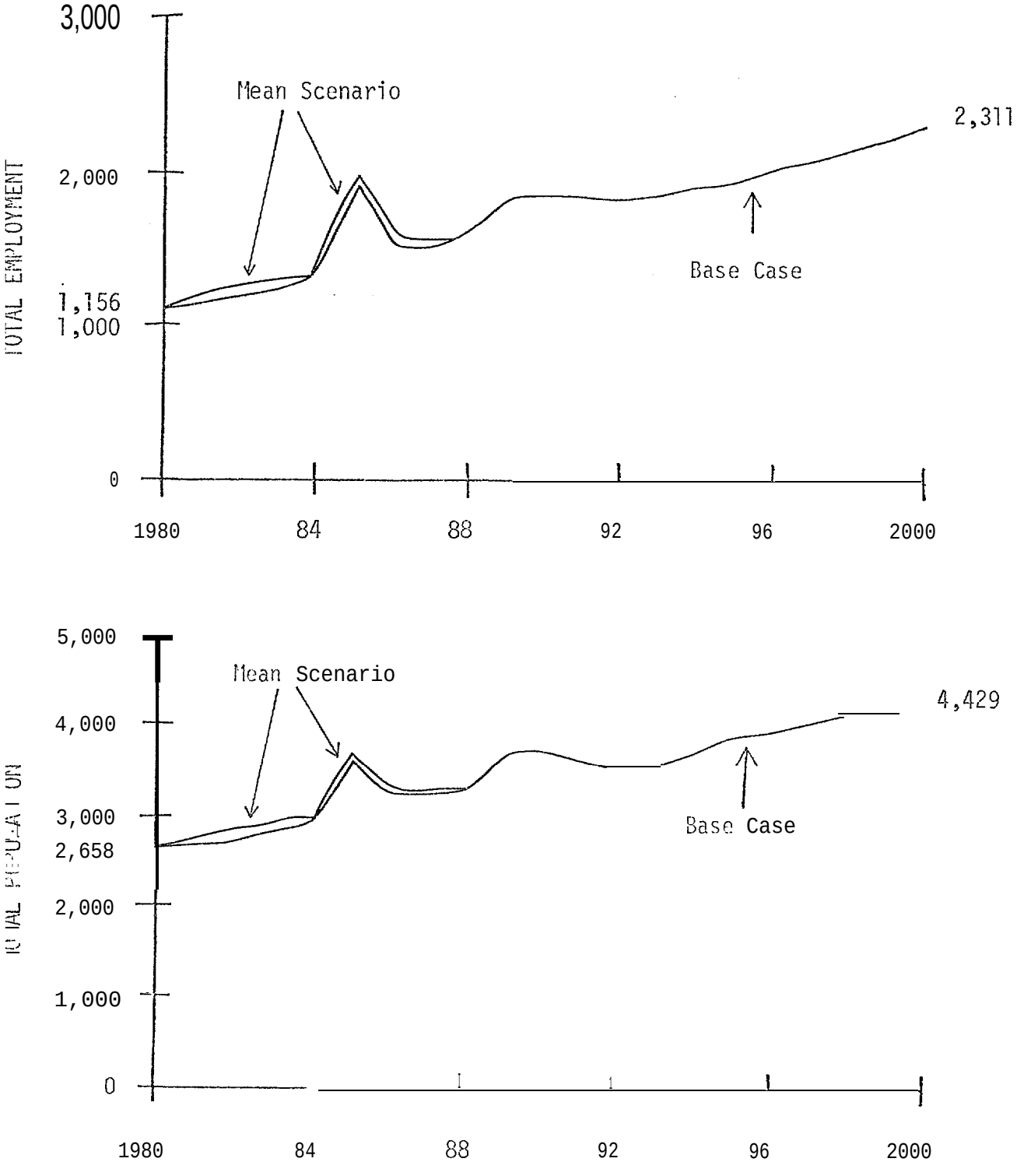
INDUSTRY CLASS IF ICATION/YEAR	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
COMMOD I TY PRODUC ING INDUSTRIES	257	258	279	362	831	445	401	441												
Agriculture, Forestry and Fisheries	(103)	(104)	(120)	(140)	(152)	(156)	(160)	(168)												
Mining	(3)	(4)	(4)	(4)	(4)	(4)	(5)	(5)												
Manufacturing	(121)	(100)	(125)	(151)	(202)	(201)	(201)	(201)												
Contract Construction	(30)	(50)	(30)	(31)	(473)	(84)	(35)	(67)												
DISTRIBUTIVE INDUSTRIES	537	548	563	571	642	656	659	705												
Transportation, Communications and Public Utilities	(93)	(99)	(101)	(97)	(127)	(142)	(133)	(158)												
Trade	(239)	(241)	(248)	(254)	(275)	(276)	(282)	(297)												
Finance, Insurance and Real Estate	(22)	(23)	(24)	(25)	(28)	(26)	(27)	(29)												
Service	(183)	(185)	(190)	(195)	(212)	(212)	(217)	(226)												
GOVERNMENT	416	424	432	440	466	466	472	483												
TOTAL EMPLOYMENT	1,210	1,230	1,274	1,337	1,939	1,567	1,532	1,629												
TOTAL POPULATION - SEWARD AREA	2,772	2,816	2,872	2,964	3,699	3,293	3,220	3,332												
City of Seward	2,079	2,112	2,154	2,223	2,883	2,482	2,415	2,506												
Permanent Residents	(2,079)	(2,112)	(2,154)	(2,223)	(2,447)	(2.433)	(2,415)	(2,477)												
Construction Camp Residents	(--)	(--)	(--)	(--)	(436)	(49)	(--)	(29)												
Remaining Seward Area	693	704	718	741	816	811	805	826												

1989 - 2000 is same as Base Case

Source: Alaska Consultants, Inc.

FIGURE 7

Seward Area
Total Employ ment and Total Population
Base Case and Mean Scenario
Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

TABLE 39

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN 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	10				52					62
1982	12				52					64
1983	6				26					32
1984										0
1985						11				11
1986						10				10
1987						0				0
1988						1				1
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 40

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN 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	17											17
1982	17											17
1983	8											8
1984	0											0
1985	17											17
1986	19											19
1987	6											6
1988	4											4
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 41

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employmen
	Offshore Resident in	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981		17	17		9	9	26
1982		17	17		9	9	2 6
1983		8	8		4	4	12
1984		0	0		0	0	0
1985	1	17	18	0	9	9	27
1986	1	19	20	0	9	9	29
1987		6	6		3	3	9
1988		4	4		2	2	6
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							

Source: Alaska Consultants, Inc.

TABLE 42

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Population	Permanent Employment	Permanent Population	Total Population
1981	26		26	52	52
1982	26		26	52	52
1983	12		12	24	24
1984	0		0	0	0
1985	27		27	54	54
1986	29		29	58	58
1987	9		9	18	18
1988	6		6	12	12
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					
2000					

Source: Alaska Consultants, Inc.

COMMUNITY FORECASTS - MEAN SCENARIO

Significant Factors Affecting Growth

This scenario presumes discovery and development of a very large oil field in the Middle Albatross Basin offshore Kodiak Island. Nevertheless, certain assumptions about the characteristics of the field and the economically optimal production system for its exploitation cooperate to moderate socioeconomic impacts upon Kodiak. By conventional oil industry standards, a single oil field with recoverable reserves of 160,000,000 barrels of oil would be classified as a giant field. In the economic context of frontier offshore development under difficult environmental conditions, however, the Middle Albatross Basin field is commercially viable only under the most favorable economic assumptions.

The pertinent scenario assumptions which tend to limit the generation of onshore impacts at Kodiak are:

- There are no commercial natural gas finds.
- A single production platform suffices for field development.
- An offshore transfer system for all oil production is technically feasible and economically preferred.
- Thus, there is no onshore oil terminal and no submarine oil pipeline to Kodiak.

- Camp accommodation< are provided for the project workforce for the marine service base constructed at Womens Bay which is located south of the City of Kodiak but within the Kodiak road-connected area.

The estimated employment and population impacts on the Kodiak area throughout this scenario are minor with the exception of the single year when the new marine service base is constructed to service the offshore field development program (see Tables 43 to 47 and Figure 8).

During exploration, Kodiak provides only helicopter support services, accounting for fewer than a dozen jobs and two dozen residents.

Upon the decision to develop, a large scale marine support base is constructed at Womens Bay to service field development. This project is labor intensive, employing an estimated 469 workers. This is to be a one-shot, one-year project and it is assumed that the construction workforce will be sheltered in an onsite work camp housing rather than relying for accommodations upon the Kodiak area which has experienced a long-term housing shortage. This means of sheltering the construction workforce limits but does not eliminate secondary mpacts upon Kodiak's economy and community facilities.

From the beginning of field development in 1985 through shutdown of production in 1999, Kodiak maintains a steady but limited employment stake in offshore operations, ranging from 35 to 55 jobs and 70 to 110

residents. These jobs stem from service base and air support functions and include some offshore platform workers who choose to settle at Kodiak. Overall, OCS development accounts for less than one percent of the area's economic base.

TABLE 43

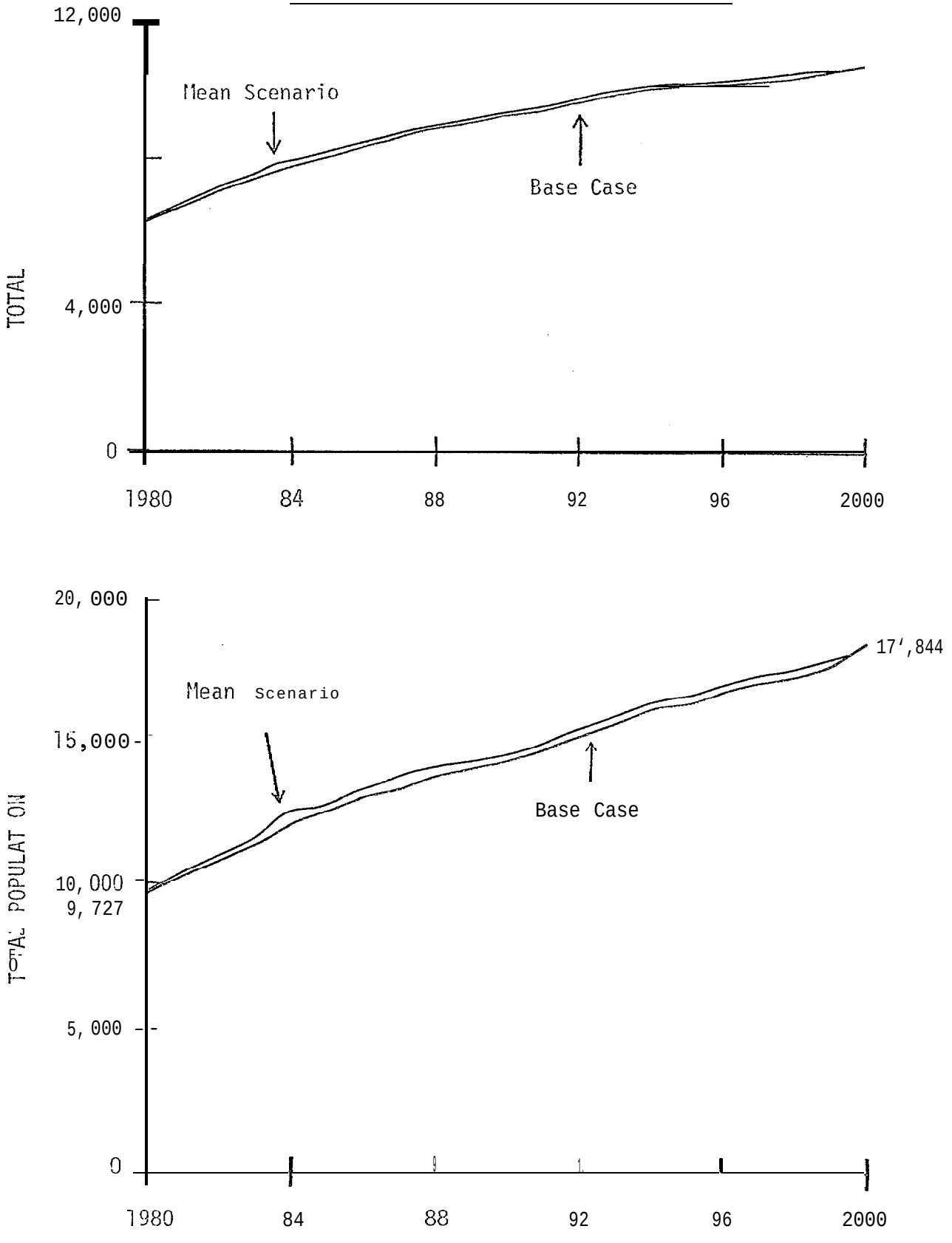
FORECAST OF EMPLOYMENT AND POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2003

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	2,919	3,088	3,252	3,929	3,628	3,742	3,844	3,947	3,995	4,074	4,134	4,189	4,253	4,311	4,375	4,417	4,466	4,507	4,548	4,587
Agriculture, Forestry and Fisheries	(978)	(1,027)	(1,079)	(1,133)	(1,189)	(1,237)	(1,274)	(1,312)	(1,338	(1,365)	(1,385)	(1,400)	(1,421)	(1,442)	(1,464)	(1,476)	(1,499	(1,509	(1,523	(1,536
Mining	(2)	(4)	(5)	(6)	(8)	(18)	(21)	(19)	(12	(12)	(12)	(17)	(17)	(17)	(17)	(17	(17	(17	(15)	(9
Manufacturing	(1,666)	(1,749)	(1,837)	(1,930)	(2,025)	(2,106)	(2,169)	(2,234)	(2,279	(2,324)	(2,359)	(2,384)	(2,420)	(2,456)	(2.493)	(2,517)	(2,543)	(2,569	(2,594	(2,620)
Contract Construction	(273)	(308)	(331)	(860)	(406)	(381)	(380)	(382)	(366	(373)	(378)	(388)	(395)	(396)	(401)	(405)	(410)	(412	(416)	(419)
DISTRIBUTIVE INDUSTRIES	1,687	1,831	1,990	2,175	2,318	2,469	2,873	2,692	2,743	2,821	2,912	3,124	3,227	3,213	3,387	3,435	3,484	3,488	3,600	3,627
Transportation, Communications and Public Utilities	270)	(290)	(317)	(352)	(395)	(420)	(431)	(465)	(474)	(509)	(518)	(533)	(560)	(585)	(577)	583)	(603)	(604)	620)	629)
Trade	734)	(806)	(883)	(964)	(1,029)	(1,098)	(1,140)	(1,183)	(1,188)	(1,200)	(1,229)	(1,401)	(1,442)	(1,450)	(1,494)	1,525)	(1,543)	(1,544)	1,578)	,589)
Finance, Insurance and Real Estate	133)	(140)	(147)	(156)	(163)	(169)	(175)	(180)	(183)	(187)	(190)	(192)	(197)	(197)	(201)	203)	(206)	(207)	209)	210)
Service	550)	(595)	(643)	(703)	(731)	(782)	(827)	(864)	(898)	(925)	(975)	(998)	(1,022)	(1,001)	(1,115)	1,124)	(1,132)	(1,133)	1,193)	,199)
GOVERNMENT	2,099	2,120	2,141	2,177	2,187	2,211	2,232	2,256	2,275	2,299	2,316	2,335	2,347	2,358	2,440	2,382	2,393	2,406	2,411	2,414
TOTAL EMPLOYMENT	6,705	7,039	7,383	8,281	8,133	8,422	8,649	8,895	9,013	9,194	9,362	9,648	9,827	9,982	10,132	10,234	10,340	10,401	10,559	10,628
TOTAL POPULATION - KODIAK ROAD-CONNECTED AREA	10,304	10,839	11,388	12,563	12,612	13,096	13,467	13,878	14,058	14,353	14,732	15,310	15,725	16,093	16,455	16,735	17,025	17,236	17,622	17,844
Coast Guard Base	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Non-Military	7,804	8,339	8,888	10,063	10,112	10,596	10,967	11,378	11,558	11,853	12,232	12,810	13,225	13,593	13,955	14,235	14,525	14,736	15,122	15,344
City of Kodiak	5,199	5,556	5,923	6,380	6,730	7,048	7,298	7,567	7,695	7,892	8,144	8,533	8,804	9,049	9,291	9,477	9,671	9,811	10,070	10,229
Remaining Road-Connected Area	2,605	2,783	2,965	3,683	3,382	3,548	3,669	3,811	3,863	3,961	4,088	4,286	4,421	4,544	4,664	4,758	4,854	4,925	5,052	5,115
Permanent Residents	(2,605)	(2,783)	(2,965)	(3,214)	(3,382)	(3,548)	(3,669)	(3,811)	(3,863)	(3,961)	(4,088)	(4,286)	(4,421)	(4,544)	(4,664)	(4,758)	(4,854)	(4,925)	(5,052)	5,115)
Construction Camp Residents	(--)	(--)	(--)	(469)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	--)

Source: Alaska Consultants, Inc.

FIGURE 8

Kodiak Area
Total Employment and Total Population
Base Case and Mean Scenario
Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

TABLE 44

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - KODIAK
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		112								112
1982		112								112
1983		56								56
1984										0
1985			9			12		233		254
1986			112			11		150		273
1987			112	8			6			126
1988			75	16			13			104
1989				16			13			29
1990				16			13			29
1991				16			13			29
1992				41			13			54
1993				41			13			54
1994				41			13			54
1995				41			13			54
1996				41			13			54
1997				41			13			54
1998				41			13			54
1999				28			13			41
2000				0			0			0

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 45

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - KODIAK 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		10										10
1983		5										5
1984					469							469
1985	17		3									20
1986	20		1									21
1987	11			2								13
1988	18			5								23
1989	10			5								15
1990	10			5								15
1991	10			5								15
1992	10			5								15
1993	10			5								15
1994	10			5								15
1995	10			5								15
1996	10			5								15
1997	10			5								15
1998	10			5								15
1999	10			5								15
2000	0			0								0

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 46

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
MESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employment
	Offshore Resident	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981		10	10		1	1	11
1982		10	10		1	1	11
1983		5	5		1	1	6
1984		469	469		47	47	516
1985	2	20	22	1	10	11	33
1986	12	21	33	6	10	16	49
1987	14	13	27	7	6	13	40
1988	13	23	36	7	12	19	55
1989	5	15	20	3	8	11	31
1990	5	15	20	3	8	11	31
1991	5	15	20	3	8	11	31
1992	10	15	25	5	8	13	38
1993	10	15	25	5	8	13	38
1994	10	15	25	5	8	13	38
1995	0	15	25	5	8	13	38
1996	0	15	25	5	8	13	38
1997	0	15	25	5	8	13	38
1998	0	15	25	5	8	13	38
1999	8	15	23	4	8	12	35
2000	0	0	0	0	0	0	0

Source: Alaska Consultants, Inc.

TABLE 47

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Population	Permanent Employment	Permanent Population	Total Population
1981	11		11	22	22
1982	11		11	22	22
1983	6		6	12	12
1984	516	469	47	94	563
1985	33		33	66	66
1986	49		49	98	98
1987	40		40	80	80
1988	55		55	110	110
1989	31		31	62	62
1990	31		31	62	62
1991	31		31	62	62
1992	38		38	76	76
1993	38		38	76	76
1994	38		38	76	76
1995	38		38	76	76
1996	38		38	76	76
1997	38		38	76	76
1998	38		38	76	76
1999	35		35	70	70
2000	0		0	0	0

Source: Alaska Consultants, Inc.

PROJECTIONS OF GROWTH - 5 PERCENT SCENARIO

Introduction

The 5 percent and the other two OCS petroleum scenarios (or cases) which form the basis of the socioeconomic impact assessment for Seward and Kodiak in this study were selected by the U.S. Bureau of Land Management's Alaska OCS Office and developed by Dames and Moore from U.S. Geological Survey resource estimates. Although reasonably precise locations, quantities, methods of operation and time frames are necessary to the development of plausible scenarios, such 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 degree of precision. However, an indication is given of the type and scale of activities which could impact Western Gulf of Alaska communities and the extent to which individual communities would logically be impacted.

This particular scenario corresponds with an exceptions" ly successful outcome in the search for oil and gas in the Western Gu f of Alaska lease area. Commercial reserves of 1.2 billion barrels of oil and 2.8 trillion cubic feet of natural gas are discovered and brought into production. Exploration, development and production of the oil and gas reserves is a major undertaking stretching over decades, involving a great commitment of capital, labor and material resources, with noteworthy onshore economic, social and environmental impacts, particularly upon Kodiak Island (see Figures 9 to 12 and Table 48).

Under the 5 percent scenario, exploration begins in 1981, concentrating on the Middle Albatross Basin and, later, on the Tugidak Basin south of Sitkinak and Tugidak Islands. Quickened by positive first results, exploration accelerates in the following years, peaking in 1984 when 8 offshore rigs are onsite and drill a total of 21 exploration and delineation wells. Initial exploration efforts are temporarily based in facilities at Kodiak and Seward. Later, a large permanent service base is installed at Kodiak, supplemented by existing base facilities at Seward.

Due to the extensive distribution of oil and gas deposits, the exploration phase continues over a seven year period. Altogether, 78 exploration and delineation wells are drilled, 40 on potential oil deposits and 38 on potential gas fields. Three oil and three gas finds of commercial value are discovered in the Middle Albatross Basin and one commercial oil field and a non-commercial gas field are discovered in Tugidak Basin.

By 1982, the first commercial oil and gas finds are made, but the decision to develop is deferred until 1984 by which time further discoveries confirm the commercial worth of the province. Oil and non-associated gas are assumed to occur in separate reservoirs and require separate production facilities.

Gas field development commences in 1984. Three production platforms are installed on Middle Albatross Basin, one each in 1984, 1985 and 1986.

An LNG plant is constructed on Kodiak Island at Ugak Bay (located south of the City of Kodiak but within the general Kodiak road-connected area) during 1984-1986. About 71 miles of submarine gas gathering and trunk pipelines are installed in 1985 and 1986.

Oil field development starts in 1985. The first platform is installed in 1986, two more in 1987 and a fourth in 1988, all on the cluster of three oil fields in the Albatross Basin. Steel platforms fabricated on the West Coast and barged to site are chosen over other platform designs. A variety of factors -- distance to shore, production volumes, field grouping, environmental constraints -- favor product gathering and transport by pipeline to an onshore terminal for trans-shipment rather than an offshore storage and transfer system. Construction of an onshore terminal, sited at Ugak Bay on Kodiak Island, is begun in 1986 and concluded by 1988. Submarine pipeline laying is undertaken over the 1987-1988 seasons; 119 kilometers (74 miles) of subsea pipeline is installed including a 76 kilometer (47 mile) long 71 to 76 centimeter (28 to 30 inch) trunk line to Ugak Bay. Meanwhile development drilling activities continue on the four Albatross Basin oi" platforms with 160 production wells completed between 1987 and 1992.

Due to its lesser potential, the Tugidak Basin area does not attract exploration until 1984. Discovery of a single commercial oil field of 250 million recoverable barrels results in installation of a steel production platform by 1989, to be fitted out with 40 production wells over the next couple of years. Economic unfeasibility precludes the

option of a pipeline/shore terminal product transport system. Instead, a SPM system with direct loading to stand-by oil tankers is selected for product storage and transfer.

During oil and gas field development, support services are provided from the large permanent onshore service base constructed at Kodiak in 1984, with major expansion in 1986. Seward also is engaged to deliver material and some support services for field development, most particularly during subsea pipelaying, for which operation all pipe is routed through the pipe coating yard at Seward.

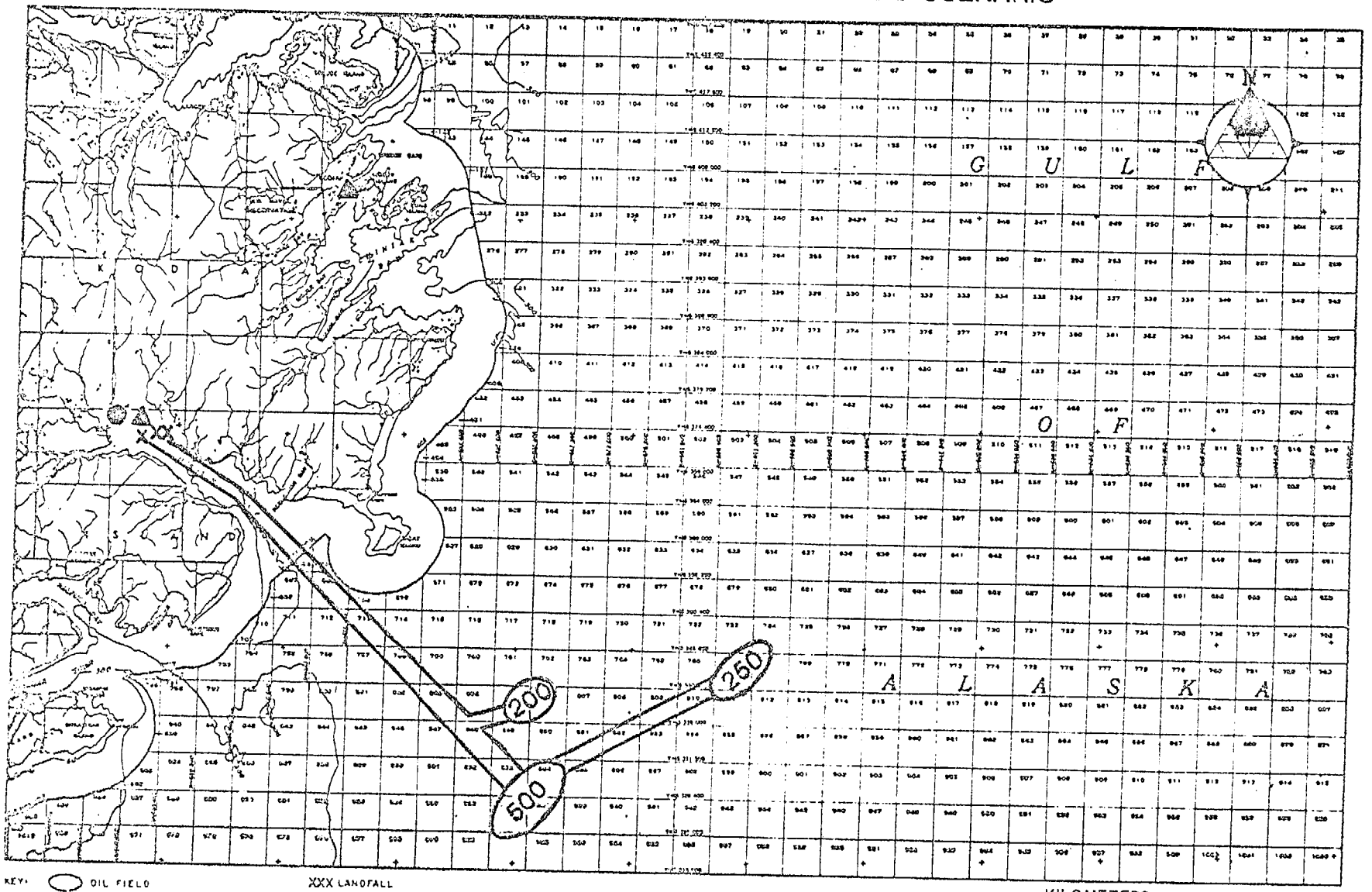
Gas production starts up in 1986, with all gas delivered by pipeline to the LNG plant for liquefaction and transfer to LNG tankers for transport to West Coast ports. Highest gas production is attained between 1986 and 1992, peaking at 576 million cubic feet per day. Thereafter, gas yields decline steadily through and beyond the forecast period. Cumulative gas production over the life of the gas fields is 2.8 trillion cubic feet.

Production start-up for the Albatross Basin oil fields occur in 1988, reaches peak flows of 384,000 barrels per day a few year later, then gradually tapers off. Production shut down takes place some years after the end of the forecast period. The Tugidak Basin platform starts producing in 1991, peaks at a rate of 65,000 barrels per day, and stays in production throughout the forecast period.

During the production phase, about two-thirds of support activities for field maintenance, workovers, etc., is based on Kodiak, with Seward providing the remaining support.

Through the production phase, the most significant OCS-related activity in terms of long-range growth impacts is the operation of the oil terminal and LNG plant at Ugak Bay on Kodiak Island.

OIL - 5% PROBABILITY RESOURCE LEVEL SCENARIO



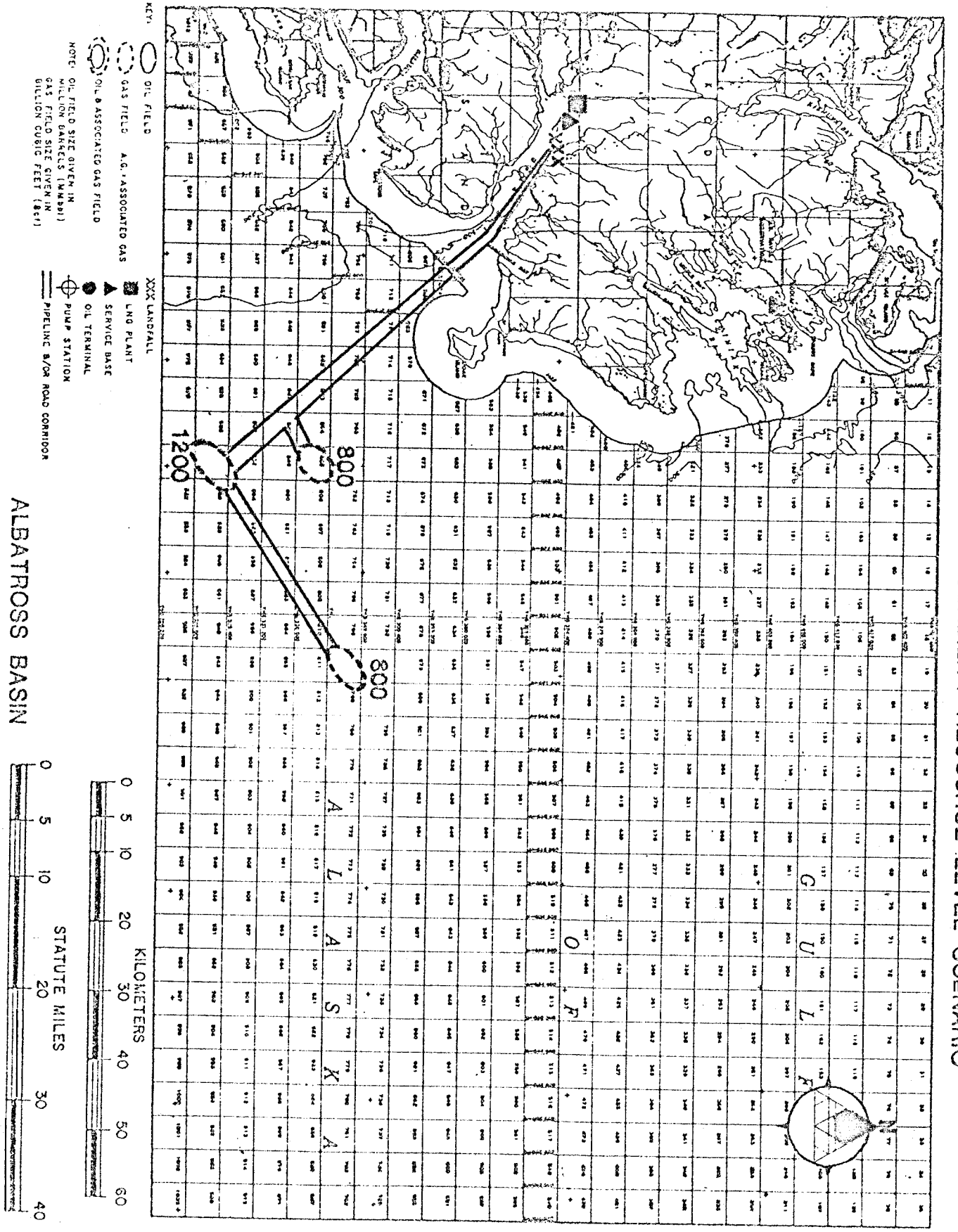
ALBATROSS BASIN

FIELD AND ONSHORE SITE LOCATIONS

Source: Dames and Moore.

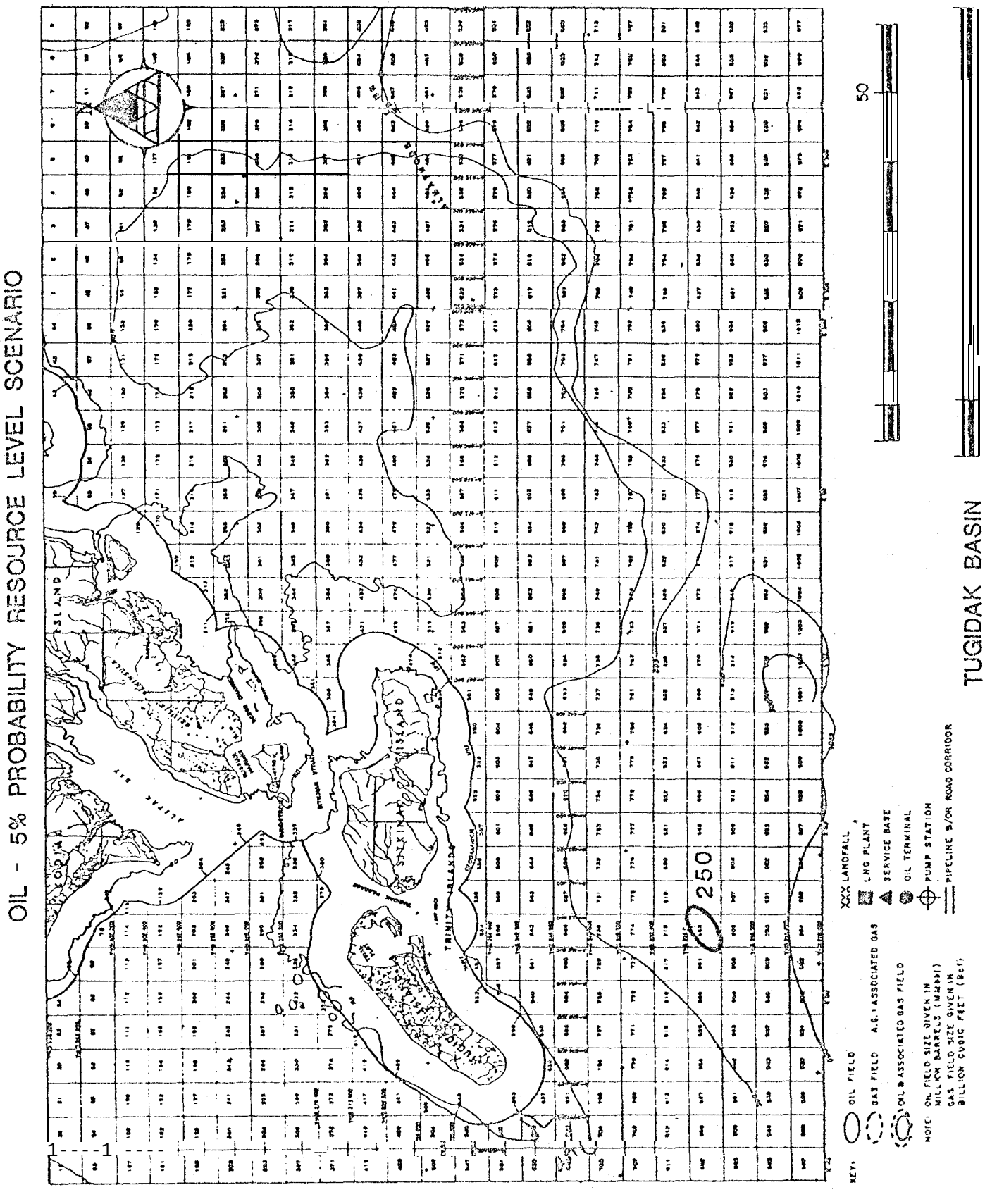
FIGURE 9

FIGURE 10



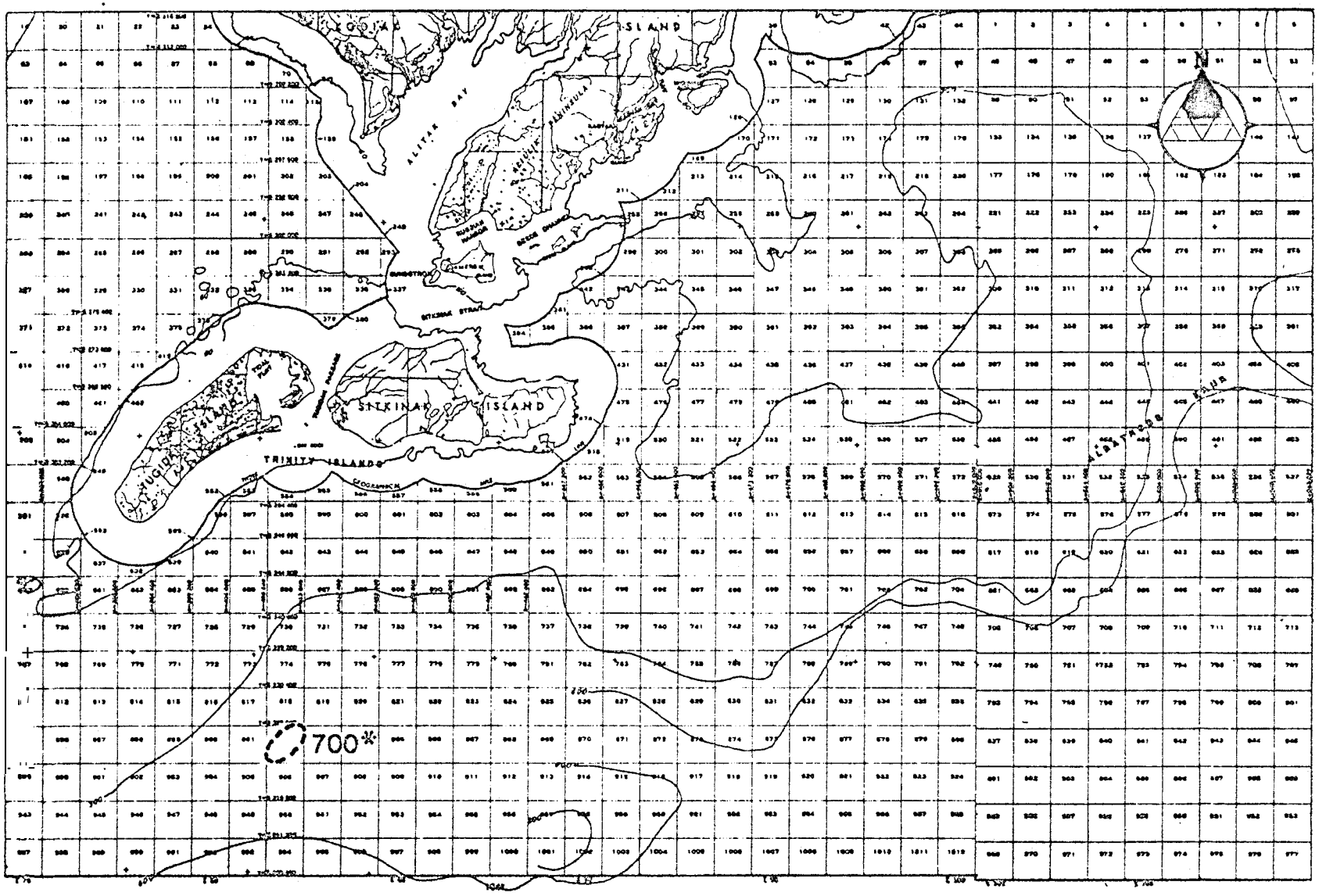
Source: Dames and Moore.

FIGURE 11



Source: Dames and Moore.

NON-ASSOCIATED GAS - 5% PROBABILITY RESOURCE LEVEL SCENAR IO



KEY:
- OIL FIELD
- GAS FIELD A.G. = ASSOCIATED GAS
- OIL & ASSOCIATED GAS FIELD

NOTE: OIL FIELD SIZE GIVEN IN MILLION BARRELS (MMbbl)
GAS FIELD SIZE GIVEN IN BILLION CUBIC FEET (Bcf)

- XXX LANDFALL
- LNG PLANT
- SERVICE BASE
- OIL TERMINAL
- PUMP STATION
- PIPELINE &/OR ROAD CORRIDOR

* NON-COMMERCIAL

KILOMETERS
0 5 10 20 30 40 50 60

STATUTE MILES
0 5 10 20 30 40

TUGIDAK BASIN

FIELD AND ONSHORE SITE LOCATIONS

FIGURE 12

Source: Dames and Moore.

TABLE 48

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD AND KODIAK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Kodiak
EXPLORATION		
Survey		
Offshore Geophysical and Geological Surveying [area of operation]	Not Applicable	Survey vessels conducting geophysical and geological surveys on Albatross and Tugidak Basins outside the Kodiak coastal area.
Onshore Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross and Tugidak Basins.	Not Applicable
Rigs		
Offshore Exploration Well Drilling [area of operation]	Not Applicable	Rigs drilling exploration wells on the Albatross and Tugidak Basins outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross and Tugidak Basins.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross and Tugidak Basins.

Onshore			
Service Base	Shore base supplying rigs and boats on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.		Shore base supplying rigs and boats on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation		Not Applicable	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross and Tugidak Basins.
Construction		Not Applicable	Constructing a permanent service base.
DEVELOPMENT			
Platform Installation			
Offshore			
Platform Installation [area of operation]		Not Applicable	Locating, installing and commissioning platforms on the Albatross and Tugidak Basins outside the Kodiak coastal area.
Pipeline Construction		Not Applicable	Laying and burying subsea gathering lines and a trunk line from Albatross Basin to the north shore of Ugak Bay.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Seward.		Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Kodiak.
Onshore			
Service Base	Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Seward.		Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Kodiak.

Air Transportation	Not Applicable	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Albatross Basin.
Construction	Coating of all pipe used in subsea gathering and trunk pipelines at Sews rd.	Constructing onshore pipeline, oil terminal and LNG plant on the north shore of Ugak Bay.
Platforms		
Offshore		
Development Drilling [area of operation]	Not Applicable	Development drilling on platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins.	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins.
Onshore		
Service Base	Shore base supplying boats and platforms on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying boats and platforms on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	Not Applicable	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms on Albatross and Tugidak Basins.
PRODUCTION		
Platforms		
Offshore		
Platform Operations [area of operation]	Not Applicable	Operating platforms with workovers and well stimulation on Albatross and Tugidak Basins.

Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins. One third of the Albatross and and Tugidak Basins effort will be provided from Seward.	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins. Two thirds of the effort on the Albatross and Tugidak Basins will be provided from Kodiak.
Onshore Service Base	Shore base providing one third the effort in supplying boats and platforms on the Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base providing two thirds the effort in supplying boats and platforms on the Albatross and Tugidak Basins 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 on the north side of Ugak Bay processing oil and gas from Albatross Basin.

Source: Alaska Consultants, Inc.

Seward

COMMUNITY FORECASTS - 5 PERCENT SCENARIO

Significant Factors Affecting Growth

Under the base case assumptions, two important functions in support of Northern Gulf of Alaska OCS developments are located at Seward: a large comprehensive marine service base and a pipe coating yard for preparation of submarine pipe for offshore installation. For the 5 percent scenario in the Western Gulf of Alaska lease sale, Seward again attracts these two functions. On the basis of its existing support capabilities, Seward is chosen to provide all marine support during the first couple of years of exploration. It continues to be an important secondary support center even after Kodiak itself emerges as the primary forward support base for offshore activities in the Western Gulf. The Seward pipe coating yard also is used to coat all submarine pipe installed to convey oil and natural gas production to the oil and gas handling facilities located on Kodiak Island.

At Seward, activity levels related to the Western Gulf of Alaska peak in the 1985 to 1988 period when the simultaneous activities of exploration, platform installation, development drilling, pipe coating and submarine pipelaying account for between 8 to 10 percent of total employment and 7 to 8 percent of the resident population in the Seward area.

Subsequently, Seward's employment in Western Gulf of Alaska support functions declines to an estimated maintenance level of about 48 jobs and 98 residents.

Overall, in contrast to the 95 percent and mean scenarios, the 5 percent scenario's impacts upon Seward would be of sufficient scale and duration to warrant the more detailed impact analysis which follows below.

The impact analysis focuses on the incremental impact of the Western Gulf of Alaska OCS lease sale upon Seward during the period when Seward is already assumed to be experiencing significant growth from OCS-related offshore activities in the Northern Gulf of Alaska lease sale area.

Recall that the base case adopted for the Western Gulf of Alaska sale impact analysis is the mean petroleum development scenario defined for the Northern Gulf of Alaska lease sale.

By the assumptions specified for the Western Gulf of Alaska 5 percent petroleum development scenario, that scenario's effect upon Seward resembles closely the effect of the Northern Gulf of Alaska mean scenario upon Seward's non-OCS base case. The impact of the Northern Gulf of Alaska mean scenario was to stimulate a wave of growth, followed first by a slack period and then a recovery to steady growth in the traditional economy. The Western Gulf of Alaska 5 percent scenario promotes a cycle of OCS-related growth which is similar in scale and timing to the impact

of the Northern Gulf of Alaska mean scenario so that the impacts upon Seward of the two successive lease sales are stacked rather than serial. Thus, the Western Gulf of Alaska 5 percent scenario is essentially an exaggerated version of the base case growth profile.

Future Employment

The onset of exploration in the Western Gulf of Alaska sale area brings an estimated 52 new jobs to Seward by 1982 (see Tables 49 to 53 and Figure 13). The first commercial oil and gas discoveries are made by 1982 in the Middle Albatross Basin near Kodiak Island and at. that time the geographic center of support operations for the Western Gulf of Alaska province shifts from Seward to the Kodiak area. Still, during the 1984 to 1989 period of most intensive exploration and field development activity, Seward's support operations are expanded. Between 1984 and 1989, total Western Gulf of Alaska OCS-related employment ranges from 110 to a high of 172 jobs or about 9 percent of all employment at Seward. About two-thirds of these jobs are connected with the various offshore support services and logistic functions operated out of the marine service base. The other jobs arise as indirect employment primarily in the trade and service sectors. After the peak, employment tapers off and levels off at about 48 tota"l jobs or less than 3 percent of the Seward area's employment base.

Again, it should be noted that these OCS-related jobs are in addition to the OCS-related jobs stemming from the Northern Gulf of Alaska mean

scenario which is here incorporated in the base case used for comparative analysis of the Western Gulf of Alaska scenarios. In rough terms, the Western Gulf of Alaska 5 percent scenario adds about as many jobs to Seward's employment base as does the Northern Gulf of Alaska mean scenario. Thus, while the incremental additions to the Seward economy attributable to the second OCS sale are of a certain magnitude, the cumulative OCS-related sector assumes a more imposing role in Seward's economy.

It should also be noted that this scenario is assumed not to require construction of any additional shore-based facilities at Seward beyond those assumed built to service the Northern Gulf of Alaska sale area.

Future Population

The population impact is largely concentrated in the five-year span 1984 to 1988 during which the added Western Gulf of Alaska OCS-related population varies from 220 to 315 residents (see Table 54). This amounts to 7 to 8 percent of Seward's population base. After 1990, the OCS-related population slackens and levels off at about 100 residents once oil and gas production is fully underway.

To a degree, then, this scenario accentuates the underlying boom/letdown/recovery pattern of population growth inherited from the Northern Gulf of Alaska mean scenario.

TABLE 49

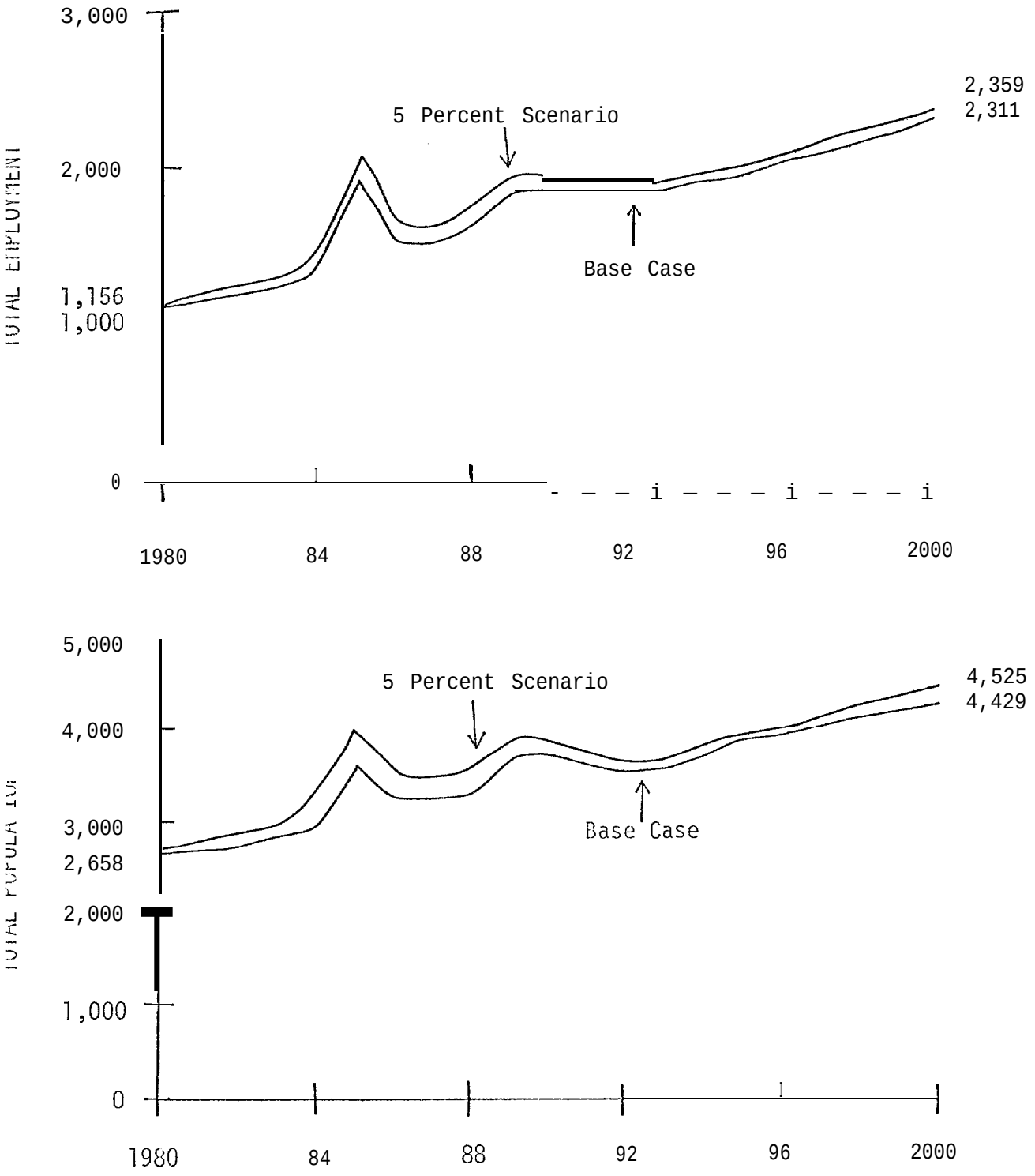
FORECAST OF EMPLOYMENT AND POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

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	259	281	330	865	463	436	462	558	572	574	576	581	588	594	600	607	613	619	626
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)	(203)	(202)	(202)	(202)	(255)	(307)	(308)	(310)	(313)	(316)	(319)	(322)	(325)	(328)	(331)	(334)
Contract Construction	(29)	(51)	(32)	(35)	(506)	(101)	(69)	(87)	(114)	(56)	(44)	(42)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)
DISTRIBUTIVE INDUSTRIES	535	570	596	666	741	726	764	803	890	884	828	805	819	849	890	933	978	1,025	1,074	1,126
Transportation, Communications and Public Utilities	(91)	(117)	(128)	(175)	(206)	(197)	(218)	(239)	(296)	(280)	(209)	(164)	(148)	(144)	(147)	(150)	(153)	(156)	(159)	(162)
Trade	(239)	(243)	(251)	(262)	(284)	(283)	(291)	(300)	(316)	(322)	(330)	(340)	(355)	(372)	(390)	(409)	(429)	(450)	(472)	(495)
Finance, Insurance and Real Estate	(22)	(23)	(24)	(27)	(31)	(28)	(30)	(31)	(33)	(33)	(33)	(34)	(35)	(36)	(38)	(40)	(42)	(44)	(46)	(48)
Service	(183)	(187)	(193)	(202)	(220)	(218)	(225)	(233)	(245)	(249)	(2561	(267)	(281)	(2S'7)	(315)	(334)	(354)	(375)	(397)	(421)
GOVERNMENT	415	427	437	451	478	474	485	495	514	520	519	5i?2	530	539	550	561	572	583	595	607
TOTAL EMPLOYMENT	1,206	1,256	1,314	1,447	2,084	1,663	1,685	1,760	1,962	1,976	1,921	1,903	1,930	1,976	2,034	2,094	2,157	2,221	2,288	2,359
TOTAL POPULATION - SEWARD AREA	2,764	2,868	2,950	3,184	3,960	3,470	3,497	3,579	3,916	3,940	3,762	3,655	3,705	3,792	4,003	4,019	4,140	4,262	4,390	4,525
City of Seward	2,079	2,157	2,219	2,395	3,086	2,618	2,630	2.695	2,957	2,964	2,830	2,749	2,787	2,853	3,011	3,023	3,114	3,?06	3,302	3,404
Permanent Residents	(2,079)	(?,157)	(2,719)	(2,395)	(2,6?1)	(2,554)	(2,601)	(2,651)	(2,894)	(2,964)	(?,830)	(2,749)	(2,787)	(2,853)	(3,011)	(3,023)	(3,1111)	(3,206)	(3,30?)	(3,404)
Construction Camp Residents	(- -)	(- -)	(- -)	(- -)	(465)	(64)	(29)	(44)	(58)	(--)	(--)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)	(- -)
Remaining Seward Area	685	711	731	789	874	852	867	884	964	976	932.	906	918	939	992	996	I ,026	1,056	1,088	1,121

Source: Alaska Consultants, Inc.

FIGURE 13

Seward Area
Total Employment and Total Population
Base Case and 5 Percent Scenario
Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

TABLE 50

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN 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	8				48					56
1982	24				104					128
1983	24				104					128
1984	44				156	12				212
1985	36				130	34				200
1986	22				52	31	6			111
1987	4				14	46	11			75
1988						38	15			53
1989						24	22			46
1990						12	28			40
1991							33			33
1992							35			35
1993							35			35
1994							35			35
1995							35			35
1996							35			35
1997							35			35
1998							35			35
1999							35			35
2000							35			35

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 51

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN 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	15											15
1982	34											34
1983	34											34
1984	73											73
1985	90								29			119
1986	69								15			84
1987	82								29			111
1988	76								15			91
1989	72											72
1990	61											61
1991	41											41
1992	34											34
1993	28											28
1994	27											27
1995	27											27
1996	27											27
1997	27											27
1998	27											27
1999	27											27
2000	27											27

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 52

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employment
	Offshore Resident in	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981		15	15		7	7	22
1982		34	34		18	18	52
1983		34	34		18	18	52
1984	1	73	74		36	36	110
1985	3	119	122	1	49	50	172
1986	4		88	2	35	37	125
1987	5	1;?	116	2	44	46	162
1988	5	91	96	2	39	41	137
1989	5	72	77	2	36	38	115
1990	5	61	66	2	30	32	98
1991	5	41	46	2	20	22	68
1992	5	34	39	2	17	19	58
1993	5	28	33	2	14	16	49
1994	5	27	32	2	14	16	48
1995	5	27	32	2	14	16	48
1996	5	27	32	2	14	16	48
1997	5	27	32	2	14	16	48
1998	5	27	32	2	14	16	48
1999	5	27	32	2	14	16	48
2000	5	27	32	2	14	16	48

Source: Alaska Consultants, Inc.

TABLE 53

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - SEWARD AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Popu?ation	Permanent Employment	Permanent Population	Total Population
1981	22		'22	44	44
1382	52		52	104	104
1983	52		52	104	104
1984	110		1 10	220	220
1985	172	29	143	286	315
1986	125	15	110	220	235
1987	162	29	133	266	295
1988	137	15	122	244	259
1989	115		115	230	230
1990	98		98	196	196
1991	68		68	136	136
1992	58		58	116	116
1993	49		49	98	98
1994	48		48	96	96
1995	48		48	96	96
1996	48		48	96	96
1997	48		48	96	96
1998	48		48	96	96
1999	48		48	96	96
2000	48		48	96	96

Source: Alaska Consultants, Inc.

TABLE 54

ESTIMATED POPULATION
NON-OCS BASE CASE, NGA MEAN SCENARIO, WGA 5 PERCENT SCENARIO
SEWARD AREA
1978 - 2000

Year	Non-OCS Base Case	NGA Mean Scenario	WGA 5 Percent. Scenario	Total Population
1978	2,600			2,600
1979	2,612			2,612
1980	2,658			2,658
1981	2,695	24	44	2,764
1982	2,732	32	104	2,868
1983	2,786	60	104	2,950
1984	2,896	68	220	3,184
1985	3,041	604	315	3,960
1986	3,052	183	235	3,470
1987	3,064	138	295	3,497
1988	3,077	243	259	3,579
1989	3,242	444	230	3,916
1990	3,384	360	196	3,940
1991	3,416	210	136	3,762
1992	3,446	90	116	3,655
1993	3,553	54	98	3,705
1994	3,660	36	96	3,792
1995	3,771	36	96	4,003
1996	3,887	36	96	4,019
1997	4,008	36	96	4,140
1998	4,130	36	96	4,262
1999	4,258	36	96	4,390
2000	4,393	36	96	4,525

Source: Alaska Consultants, Inc.

In the overall picture of the two lease sales taken together, the estimated population impact upon Seward never exceeds 919 persons or 30 percent of Seward's non-OCS base population. A sizable part of this peak population is composed of temporary construction workers assumed to live in camp housing. Of course, should circumstances alter the presumed timing of the development scenarios, then the cumulative impacts of the pair of lease sales might shape up very differently.

IMPACT ASSESSMENT

Social Impacts

In comparison to the other growth factors at play in the base case, including the mean scenario of the Northern Gulf of Alaska sale, the absolute and relative impact of the 5 percent scenario upon Seward is by no means the dominant event in the community's future. In general, those aspects of OCS development expected to impinge upon Seward appear compatible with the town's economic and social character.

While the population added by the 5 percent scenario does lift the total OCS-related share to a substantial level for a few years, many of the new OCS jobs arising at the service base do not require highly specialized skills and can potentially be filled locally or within the labor market region. This fact would tend to moderate the change in population composition which would ordinarily be expected to accompany a large influx of new jobs and new workers. As long as Seward's economy grows

to take up quickly the slack created by the eventual let down in OCS employment, the 5 percent scenario should not have any markedly adverse social impacts.

The 5 percent scenario will advance by a few years the timing of population growth and the related demand for new community facilities, but will have negligible incremental impact on the overall long-term demand for public facilities and services.

Impacts on Community Infrastructure

Housing and Residential Land. Compared to the base case, the 5 percent scenario accelerates slightly the estimated rate of growth in housing demand during the early years of the forecast period. After the bulk of added OCS employment phases out, the overall level of new housing demand returns to about the level which would have prevailed without the Western Gulf of Alaska lease sale, The incremental effect above the base case upon demand levels at the close of the forecast period is about 40 additional dwellings and about three more hectares (7 acres) of land newly converted to residential use (see Tables 55 and 56). This is only about 6 percent of the total increase in housing and residential land estimated to be needed under the base case.

Inasmuch as Seward has limited tracts available and suitable for residential development and a relatively aged housing stock, the 5 percent scenario might acid momentum to a trend toward higher residential densities and some redevelopment in older sections of town.

Utilities. While some basic utility improvements are already scheduled and others will be needed to maintain adequate utility service levels for the base case, the 5 percent scenario, considered separately, does not significantly add to the burdens placed upon the utility systems by Seward's growth.

- Water. Even with the additional industrial water consumption associated with the service base supplying offshore activities, the water demand estimated for the 5 percent scenario can be supplied for many years within the basic capacity of the public works projects the City is now completing. Possibly toward the end of the forecast, the City may have to consider increasing its water supply capacity (see Table 57).

- Sewer. Completion of the proposed sanitary waste treatment plant will equip Seward with adequate capacity for its foreseeable needs, including any requirements which the 5 percent scenario may add (see Table 58}.

- Electric Power. Maintaining an adequate power supply will probably require steps to increase available capacity earlier than would otherwise be necessary. hue to the demands of OCS industrial consumption, it is estimated that an additional 3,000 to 4,000 kw beyond improvements now programmed will be demanded by about 985 (see Table 59).

- Solid Waste Disposal. The 5 percent scenario is not significantly different from the base case (see Table 60).

- Communications. The 5 percent scenario is not significantly different from the base case (see Table 61).

Public Safety

- Police. The estimated need for police officers and jail facilities under the 5 percent scenario does not materially differ from the base case.

- Fire Protection. There is no change over the base case forecast in the need for fire protection facilities.

Health and Social Services. The impact of the 5 percent scenario is essentially similar to the base case.

Education. The minor enrollment increases estimated for the 5 percent scenario appear to be within the capacity of the existing educational facilities at Seward (see Table 62).

Recreation. The long run recreational demands of Seward are not significantly increased compared to the base case, although those demands will become felt somewhat sooner since the pace of growth is advanced by a few years under the 5 percent scenario.

Local Government Finances. The net effect of the 5 percent scenario on the balance of Seward's revenues and expenditures is trivial (see Tables 63, 64 and 65). Estimated expenditures and revenues are each projected to rise, but in about the same proportion, so that they offset each other. However, since the City's ability to finance capital improvements is constrained by relatively high property tax and indebtedness rates, OCS growth which causes the City to accelerate its capital improvements program may place the City in an unfavorable fiscal position.

CAUSE/EFFECT OF IMPACTS

The port of Seward's previously established role as a support center for offshore exploration in the two prior Northern Gulf of Alaska lease sale make it the most economic option to supply initial exploration efforts in the Western Gulf of Alaska. Even after discovery of major oil and gas fields near Kodiak Island justifies the transfer of many support activities to new support facilities built on Kodiak Island, Seward retains a limited support role in Western Gulf of Alaska operations throughout the forecast.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

The added OCS-related growth forecast for Seward under the 5 percent scenario will tend to place more pressure on certain elements of the town's infrastructure which will, even in the base case. be in need of

expansion or upgrading. In particular, Seward will have to take timely steps to insure that its reserve power capacity is expanded to meet the added residential and industrial load. Also, maintaining decent housing conditions may prove more difficult in view of the age of Seward's housing stock, low vacancy rates and the public investment costs of new residential land development.

SUMMARY OF IMPACTS

For a period of about five years in the late 1980's, the 5 percent scenario is estimated to stimulate the economic and population growth of Seward to a level about 8 percent above the base case (the base case being the mean petroleum development scenario developed for the Northern Gulf of Alaska OCS lease sale). Subsequently, the local impact diminishes to about '2 percent at which point the incremental impacts of this scenario on employment and population at Seward are relatively minor.

As there is little permanent impact on workforce or population levels, there is little impact on community infrastructure beyond the probable need to accelerate installation of certain improvements such as additional power capacity, housing and residential utilities. However, since the City of Seward's ability to finance capital improvements is already limited by relatively high property tax and indebtedness rates, any OCS growth which necessitates the additional assumption of long term debt could place the City in an unfavorable fiscal position.

TABLE 55

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	4	1	0
980	46	17	11	5	1
981	105	42	28	12	2
982	105	42	28	12	2
983	82	31	21	9	1
984	234	93	62	27	4
985	311	123	82	35	6
986	- 91	- 38	- 25	- 11	- 2
1987	58	24	16	7	1
1988	61	24	16	7	1
1989	317	124	83	35	6
1990	84	30	20	9	1
1991	-172	- 71	- 48	- 20	- 3
1992	-103	- 41	- 27	- 12	- 2
1993	50	18	12	5	1
1994	87	33	22	9	2
1995	111	42	28	12	2
1996	116	44	29	13	2
1997	121	46	31	13	2
1998	122	4 6	31	13	2
1999	128	49	33	14	2
2000	135	51	34	15	2
TOTALS	1,919	734	491	210	33

Source: Alaska Consultants, Inc.

TABLE 56

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	15	2.2	0.8	3.0
Multifamily & Trailer	7	0.5	0.2	0.7
1981-85				
Single Family	221	31.8	12.4	44.2
Multifamily & Trailer	110	7.9	3.1	11.0
1986-90				
Single Family	110	15.8	6.2	22.0
Multifamily & Trailer	54	3.9	1.5	5.4
1991-95				
Single Family	- 13	(-1.9)	(-0.7)	(-2.6)
Multifamily & Trailer	- 6	(-0.4)	(-0.2)	(-0.6)
1996-2000				
Single Family	158	22.8	8.8	31.6
Multifamily & Trailer	78	5.6	2.2	7.8
TOTAL	734	88.2	34.3	122.5

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 57

PROJECTED CAPACITY REQUIREMENTS
MATER SUPPLY SYSTEM
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000
(1 ,000 gal 1 ons per day) a/

Year	Domestic Capacity	Industrial Capacity	Ocs Industrial Capacity	Total Capacity
1978	245	1,369		1,614
1979	246	1,375		1,621
1980	250	1,400		1,650
1981	260	1,456	73	1,789
1982	270	1,512	159	1,941
1983	278	1,557	159	1,994
1984	300	1,680	246	2,226
1985	328	1,837	47	2,412
1986	320	1,792	34	2,246
1987	325	1,820	14	2,259
1988	332	1,859	36	2,327
1989	362	2,027	66	2,555
1990	370	2,072	67	2,609
1991	354	1,982	00	2>436
1992	344	1,926	57	2,327
1993	348	1,949	29	2,326
1994	357	1,999	25	2,381
1995	376	2,106	26	2,508
1996	378	2,117	27	2,522
1997	389	2,178	27	2,594
1998	401	2,246	27	2,674
1999	413	2,313	27	2,753
2000	425	2,380	27	2,832

a/ Multiply by 3.785 to obtain liters.

Source: Alaska Consultants, Inc.

TABLE 58

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	31.2
1981	260	32.5
1982	270	33.8
1983	278	34.8
1984	300	37.5
1985	328	41.0
1986	320	40.0
1987	325	40.6
1988	332	41.5
1989	362	45.2
1990	370	46.2
1991	354	44.2
1992	344	43.0
1993	348	43.5
1994	357	44.6
1995	376	47.0
1996	378	47.2
1997	389	48.6
1998	401	50.1
1999	413	51.6
2000	425	53.1

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

Source: Alaska Consultants, Inc.

TABLE 59

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

Year	Community Requirements in kws	OCS Industrial Requirements		Total
		Marine Service Base	Construction Camp & Sites	
978	6,500			6,500
979	6,661			6,661
980	6,911			6,911
981	7,325	650		7,975
982	7,744	1,300		9,044
983	8,118	1,300		9,418
984	8,915	1,300		10,215
985	9,961	1,300	1,833	13,094
986	9,877	2,600	627	13,104
987	10,231	1,950	525	12,706
988	10,605	1,950	525	13,080
989	11,574	2,600	525	14,699
990	11,820	1,300		13,120
991	11,286	650		11,936
1992	10,965	650		11,615
1993	11,115	650		11,765
1994	11,376	650		12,026
1995	12,009	650		12,659
1996	12,057	650		12,707
1997	12,420	650		13,070
1998	12,786	650		13,436
1999	13,170	650		13,820
2000	13,575	650		14,225

Source: Alaska Consultants, Inc.

TABLE 60

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

Year	Community Solid Wastes (annual tonnage) a/	Marine Service Base (annual tonnage) a/	Construction Camp & Site (annual tonnage) a/	Total (annual tonnage) a/	Total (cubic yards) b/
1978	2,590			2,590	15,700
1979	2,650			2,650	16,100
1980	2,750			2,750	16,700
1981	2,920	175		3,095	17,900
1982	3,090	313		3,403	19,200
1983	3,240	375		3,615	20,200
1984	3,570	543		4,113	22,500
1985	4,000	600	544	5,144	28,600
1986	3,930	405	75	4,410	25,200
1987	4,050	344	34	4,428	25,700
1988	4,160	411	52	4,623	26,600
1989	4,590	595	68	5,253	29,800
1990	4,740	619		5,359	30,200
1991	4,520	532		5,052	28,400
1992	4,390	356		4,746	26,600
1993	4,450	207		4,657	27,400
1994	4,560	120		4,680	27,700
1995	4,810	120		4,930	29,500
1996	4,830	120		4,950	29,600
1997	4,980	120		5,100	30,500
1998	5,120	120		5,240	31,300
1999	5,280	120		5,400	32,300
2000	5,440	120		5,560	33,300

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

Source: Alaska Consultants, Inc.

TABLE 61

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

Year	Total Number of Dwellings	Total Number of Telephones	Annual Change
1978	990	1,238	--
1979	995	1,254	16
1980	1,012	1,285	31
1981	1,054	1,349	64
1982	1,096	1,414	65
1983	1,127	1,465	51
1984	1,220	1,598	133
1985	1,343	1,773	175
1986	1,305	1,736	- 37
1987	1,329	1,781	45
1988	1,353	1,827	46
1989	1,477	2,009	182
1990	1,507	2,065	56
1991	1,436	1,982	- 83
1992	1,395	1,939	- 43
1993	1,413	1,978	39
1994	1,446	2,024	46
1995	1,488	2,083	59
1996	1,532	2,144	61
1997	1,578	2,209	65
1998	1,624	2,274	65
1999	1,673	2,342	68
2000	1,724	2,414	72

Source: Alaska Consultants, Inc.

TABLE 62

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

Year	Elementary Enrollment	Secondary Enrollment	Total Enrollment
1978	313	168	481
1979	314	169	483
1980	320	172	492
1981	332	179	511
1982	344	186	530
1983	355	191	546
1984	383	206	589
1985	421	226	647
1986	410	220	630
1987	417	224	641
1988	425	229	654
1989	464	250	714
1990	474	255	729
1991	452	244	696
1992	439	237	676
1993	445	240	685
1994	456	246	702
1995	482	259	741
1996	484	260	744
1997	498	268	766
1998	513	276	789
1999	528	284	812
2000	544	293	837

Source: Alaska Consultants, Inc.

TABLE 63

FORECAST OF KENAI PENINSULA BOROUGH SCHOOL DISTRICT REVENUES a/
5 PERCENT PROBABILITY SCENARIO
SEWARD AREA
1978 - 2000
(in $1,000s)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	480	$ 515	$1,157	$ 28	$1,700
1979	482	517	,161	28	1,706
1980	491	527	,183	28	1,738
1981	511	548	,231	30	1,809
1982	530	568	,277	31	1,876
1983	546	586	,315	32	1,933
1984	589	632	,419	34	2,085
1985	647	694	,558	37	2,289
1986	630	676	1,517	36	2,229
1987	641	688	1,544	37	2,269
1988	654	701	1,575	38	2,314
1989	714	766	1,720	41	2,527
1990	729	782	1,756	42	2,580
1991	696	746	1,676	40	2,462
1992	676	725	1,628	39	2,392
1993	685	735	1,650	40	2,425
1994	702	753	1,691	41	2,485
1995	741	795	1,785	43	2,625
1996	744	798	1,792	43	2,633
1997	766	822	1,845	44	2,711
1998	789	846	1,900	46	2,792
1999	812	871	1,956	47	2,874
2000	837	898	2,016	48	2,962

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 the Seward area's projected pro rata share of revenues accruing to the Kenai Peninsula Borough for educational purposes. Expenditures are assumed to equal revenues.

Source: Alaska Consultants, Inc.

TABLE 64

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

Year	Property Taxes	Sal es Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 507	N/A	$ 333	$ 612	$1,452
1979	509	N/A	334	615	1,458
1980	518	N/A	340	626	1,484
1981	647	N/A	354	650	1,651
1982	666	N/A	366	675	1,707
1983	683	N/A	377	694	1,754
1984	729	N/A	407	750	1,886
1985	787	N/A	445	821	2,053
1986	878	N/A	434	799	2,111
1987	890	N/A	443	814	2,147
1988	902	N/A	451	830	2,183
1989	966	N/A	492	906	2,364
1990	984	N/A	504	928	2,416
1991	949	N/A	481	886	2,316
1992	820	N/A	468	860	2,?48
1993	830	N/A	473	872	2,175
1994	847	N/A	485	893	2,225
1995	888	N/A	512	943	2,343
1996	891	N/A	514	947	2,352
1997	915	N/A	529	975	2,419
1998	939	N/A	545	1,004	2,488
1999	964	N/A	561	1,034	2,559
2000	990	N/A	578	1,066	2,634

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

Source: Alaska Consultants, Inc.

TABLE 65

FORECAST OF REVENUES AND OPERATING EXPENDITURES
5 PERCENT PROBABILITY SCENARIO
CITY OF SEWARD
1978 - 2000

(in .$1,000s)

Year	General Fund Revenues			Operating Expenditures b/	Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total		
1978	$ 506	$ 946	$1,452	$1,351	$ 101
1979	508	950	1,458	1,357	101
1980	517	967	1,484	1,382	102
1981	628	1,005	1,633	1,436	197
1982	648	1,043	1,691	1,490	201
1983	664	1,073	1,737	1,533	204
1984	710	1,158	1,868	1,654	214
1985	768	1,267	2,035	1,874	161
1986	841	1,235	2,076	1,773	303
1987	853	1,257	2,110	1,803	307
1988	866	1,282	2,148	1,837	311
1989	929	1,399	2,328	2,007	321
1990	947	1,433	2,380	2,047	333
1991	912	1,368	2,280	1,955	325
1992	801	1,329	2,130	1,899	231
1993	811	1,347	2,158	1,925	233
1994	828	1,379	2,207	1,971	236
1995	869	1,456	2,325	2,080	245
1996	872	1,461	2,333	2,088	245
1997	896	1,505	2,401	2,151	250
1998	920	1,550	2,470	2,215	255
1999	944	1,596	2,540	2,281	259
2000	971	1,646	2,617	2,351	266

a/ Includes sales taxes, 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.

Source: Alaska Consultants, Inc.

COMMUNITY FORECASTS - 5 PERCENT SCENARIO

Significant Factors Affecting Growth

The 5 percent scenario incorporates the highest estimates of recoverable oil (1.2 billion barrels) and natural gas (2.8 trillion cubic feet) from fields offshore from Kodiak Island in the Western Gulf of Alaska. Similarly, this scenario yields the highest forecast of community impacts upon the Kodiak area.

The features of this OCS scenario which stimulate growth at Kodiak include a wide range of OCS activities and facilities. As with the mean scenario, initial impacts relate to helicopter services in support of offshore exploration otherwise supported from Seward. However, once oil and gas are discovered near Kodiak, the pace and variety of OCS-related activities accelerates. A large service base built at Womens Bay provides the main support for continuing exploration, development and production maintenance for the Middle Albatross and Tugidak Basins. There are four major OCS industrial construction projects scheduled at Kodiak: initial construction and later expansion of the marine service base; an LNG plant; and an oil storage and transfer terminal. The construction of each of these facilities employs a large workforce. The LNG and oil terminals are also major employers during the production phase. Additionally, once production begins, a portion of the offshore production

platform workforce elects to live in Kodiak, further adding to the area's economy and population. All this OCS-related direct employment stimulates significant indirect employment in the Kodiak area.

The bulk of the long-term OCS-related employment is located outside the Kodiak City limits at Womens Bay and the Ugak Bay oil and gas facilities. However, the scenario assumes that all direct employment will be in the road-connected area in and around the City of Kodiak and that the associated population growth will be evenly divided between the City of Kodiak and the remainder of the road-connected area.

The Kodiak area already has a much larger economic and population base than any of the other coastal communities affected by OCS development in the Gulf of Alaska. Still, the scale of OCS impacts is substantial enough to merit detailed analysis.

Future Employment

As Seward is assumed to be the chief support center for the opening phase of Western Gulf of Alaska oil and gas exploration, Kodiak is minimally affected during the first few post-sale years. Kodiak's initial role is limited to provision of aviation services in which function up to 20 persons are employed.

However, once oil and gas finds of commercial value are confirmed off Kodiak Island, private corporate decisions quickly follow to invest

in a variety of major OCS industrial facilities in the Kodiak area. These decisions are seen to trigger two distinct phases of employment impact at Kodiak, involving different sectors of the labor force and different consequences for long-term community development (see Tables 66 to 69 and Figure 14).

The industrial construction projects, which include the marine service base and the oil and LNG terminals, are essentially short-term labor-intensive undertakings. These projects will far exceed the capacity of Kodiak's existing construction industry and workforce, especially at a time when the demand for new construction is estimated to be strong, even apart from OCS activities. Therefore, it is assumed that the job opportunities created by these large projects will be matched by a counterpart increase in the non-resident temporary construction workforce at Kodiak.

The OCS projects overlap a 5-year construction boom, during which the OCS construction employment varies between 325 and 973 jobs. That these temporary construction projects account for better than 40 percent of total direct OCS employment for this scenario's 20 year forecast period is a measure of their labor intensity.

The scenario assumes that these projects will be located at sites some distance by road from the City of Kodiak. Consequently, it is assumed that the construction workforce will be housed on site in the type of camp facilities usually provided for large remote projects of this sort.

Reinforcing this assumption is the circumstance that the Kodiak area does not have the spare housing to shelter this workforce. As a result of their isolation, the construction projects themselves are not calculated to have as strong an economic impact on Kodiak or to place a heavy burden on Kodiak's infrastructure as might otherwise be expected.

As the OCS facilities are completed and put into operation, the temporary construction jobs give way to the permanent operational jobs. It is anticipated that this operational phase will attract a relatively stable workforce with low turnover, which would effectively be added to the resident employment base of the Kodiak area.

After all OCS facilities are on line by about 1990, direct OCS employment is estimated to stabilize at about 420 new basic jobs affiliated with the service base (55 jobs), helicopter services 40), oil terminal operation (200), LNG plant operation (50) and an estimated 75 offshore platform workers who are assumed to take up residence in the Kodiak area in preference to maintaining residence elsewhere. These basic OCS jobs are estimated to generate about 210 more indirect jobs in the Kodiak area economy.

Thus, the 5 percent scenario creates a total of about 630 steady jobs for the second decade of the forecast period, accounting for about 6 percent of all Kodiak area employment. To place this added employment in the perspective of Kodiak's overall growth forecast, these 630 jobs amount to less than 15 percent of the total additional employment in all

economic sectors forecast for Kodiak by 2000. By far, growth in the fishing and seafood processing industries and trade and services still makes up the greatest share of total employment growth in the 5 percent scenario.

Future Population

For purposes of determining OCS impacts upon community infrastructure at Kodiak, permanent population growth is a more relevant measuring stick than total population growth which includes a large component of transient construction workers. Permanent OCS related population growth is expected to occur at Kodiak in two stages.

First, the exploration and offshore field development phases are estimated to stimulate an influx of nearly 600 new residents to the Kodiak area (see Table 70). These residents will be supported by basic employment in the air and water transportation industries or in secondary economic activities near the City of Kodiak. Most of the basic jobs will persist through the active life of the offshore fields and are thus likely to attract a relatively stable workforce. Furthermore, since the air and port facilities at which this basic employment is centered are easily accessible to the City of Kodiak, it is assumed that most of the new residents arriving at this stage will tend to settle in the City.

The second pulse of permanent growth will coincide with the start-up of the LNG and oil terminals at Ugak Bay toward the end of the decade. In

contrast to the settlement pattern of the first growth phase, it is expected that most of these 250 plant workers with their families will tend to live in the vicinity of Ugak Bay, rather than commute 45 miles to the City of Kodiak area. This will promote the emergence of a new satellite settlement of a few hundred people near, but safely distant from the oil and LNG plant facilities.

Around the time oil and gas production begins, it is also assumed that a portion of the workforce engaged in continuing production platform operation will elect to settle permanently in the Kodiak area. These residents, and other new residents supported in OCS-related secondary economic activities, are assumed to dwell in or near the City of Kodiak.

In all, the 5 percent scenario is forecast to bring about 1,260 new residents to the Kodiak area before the end of the 1'380's. About half of these residents are allocated to the City of Kodiak and half to the rest of the road-connected area, primarily the Ugak Bay vicinity. This distribution will tend to blunt the growth impacts upon the existing settled areas of Kodiak.

To put OCS growth impacts in the context of the Kodiak area projections, about 2 percent of the estimated population growth from the 1978 baseline through 1990 stems from OCS developments. By 1990, about 8 percent of the Kod ak urban area's population depends directly or indirectly on ocs activit es for its livelihood. 'Thereafter, the number of OCS-related jobs and residential levels off, although Kodiak's economy and population

TABLE 66

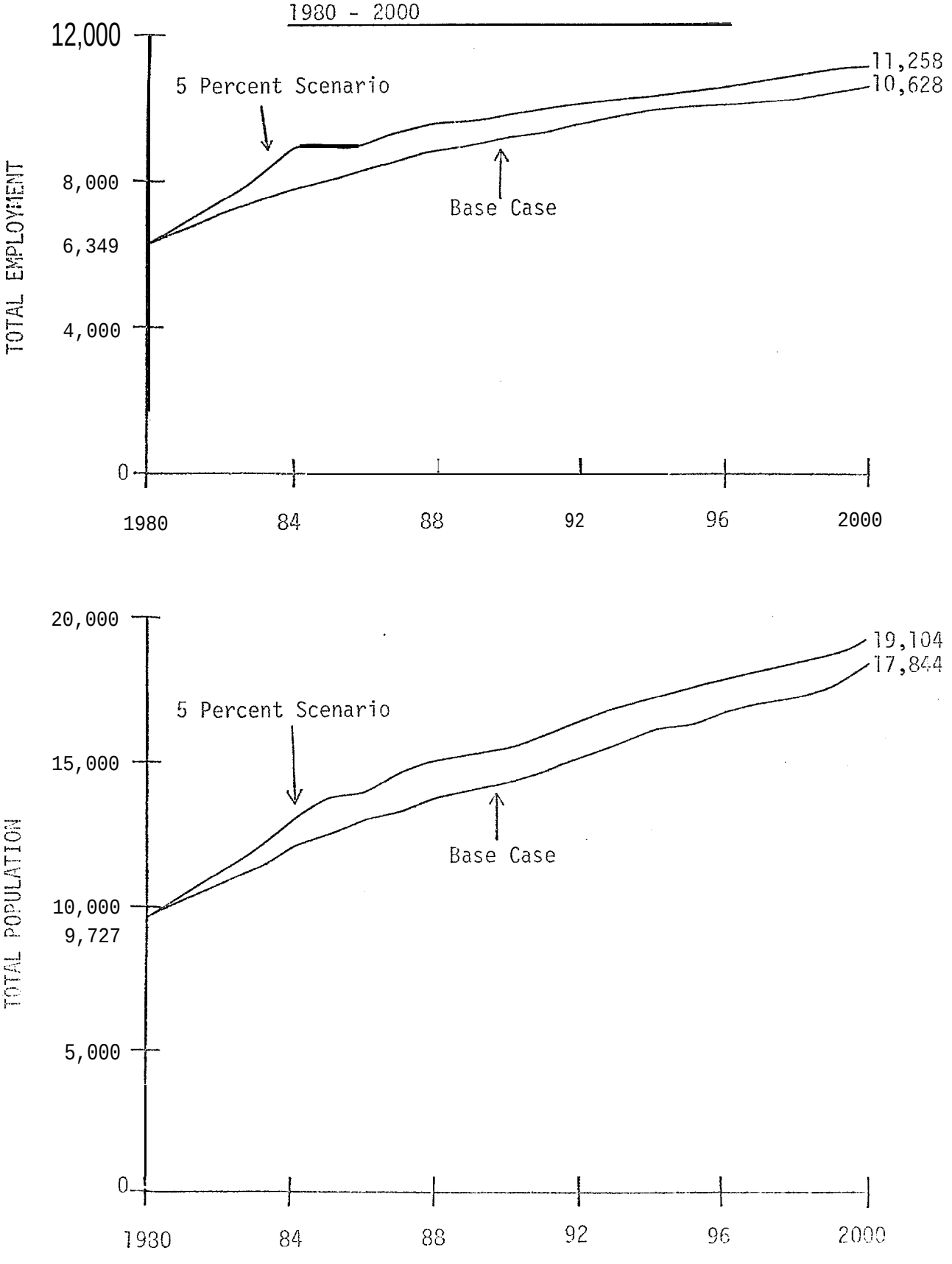
FORECAST OF EMPLOYMENT AND POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

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	2,919	3,088	3,916	4,436	4,551	4,122	4,496	4,131	4,124	4,205	4,270	4,312	4,368	4,434	4,504	4,551	4,597	4,641	4,684	4,730
Agriculture, Forestry and Fisheries	(978)	(1,027)	(1,079)	(1,133	(1,189)	(1,237)	(1,274)	(1,312)	[1,338)	(1,365)	(1,385)	(1,400)	(1,421)	(1,442)	(1,464)	(1,478)	(1,493)	(1,509)	(1,523)	(1,539)
Mining	(2)	(4)	(5)	(6)	(10)	(13)	(23)	(42)	65	(66)	(71)	(64)	(58)	(65)	(70)	(75)	(75)	(75)	(75)	(75)
Manufacturing	(1,666)	(1,749)	(1,839)	(1,931)	(2,028)	(2,159)	(2,222)	(2,290)	(2,335	(2,380)	(2,416)	(2,441	(2,476)	(2,512)	2,560)	(2,574)	(7,600)	(2,626)	(2,651)	(2,677)
Contract Construction	(273)	(308)	(993)	(1,366)	(1.324)	(713)	(977)	(487)	(386)	(394)	(398)	(407)	(413)	(415)	(420)	(424)	(492)	(431)	(435)	(439)
DISTRIBUTIVE INDUSTRIES	1,686	1,842	2,037	2,259	2,449	2,587	2,735	3,094	3,169	3,248	3,320	3,529	3,623	3,709	3,784	3,834	3,883	3,'387	3,999	4,051
Transportation, Cuml-mun ications and Public Utilities	(269)	(300)	(338)	(4?6)	(483)	(506)	(546)	(700)	(806)	(841)	(833)	(847)	(867)	(871)	(883)	(889)	(909)	(910)	[926)	(953)
Trade	(734)	(807)	(895)	(968)	(1.049)	(1,113)	(1,163)	(1,224)	(1,232)	(1,245)	(1.772)	(1,444)	(1,4[5)	(1,493)	(1,537)	(1,569)	(1,587)	(1,588)	(1,677)	(1.6'16)
Finance, Insurance and Real [stale	(133)	(140)	(150)	(157)	(167)	(172)	(179)	(189)	(192)	(196)	(200)	(202)	(206)	(206)	(211)	(213)	(?16)	(217)	(719)	(221)
Service	(550)	(595)	(654)	(708)	(750)	(796)	(847)	(901)	(939)	(966)	(1.015)	(1,036)	(1,065)	(1,139)	(1,153)	(1,163)	(1,171)	(1,17?)	(1,23?)	(1,241)
GOVERNMENT	2,099	2,120	2,158	2,183	2,214	2,232	2,263	2,311	2,337	2,361	2,376	2,394	2,404	2,415	2,428	2,441	2,452	2,465	2,471	?,477
TOTAL EMPLOYMENT	6,704	7,050	8,111	8,878	9,214	8,941	9,494	9,536	9,630	9,814	9,966	10,235	10,395	10,558	10,716	10,U26	10,932	10,993	11,154	11,258
TOTAL POPULATION - KODIAK ROAD-CONNECTED AR[A	10,302	10,861	12,188	13,253	13,865	13,809	14,570	15,073	15.292	15.593	15.940	16.493	16.1361	17.245	17.623	17.919	18,209	18,420	18, 812	19, 104
Coast Guard Base	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2 ,500	2,500	2 ,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Non-Mi l i tary	7,802	8,361	9,688	10,753	11,365	11,309	12,070	12,573	12,792	13,093	13,440	13,993	14,361	14,745	15,123	15,419	15,709	15,920	16,312	16,604
City of Kodiak	5,198	5,567	5,996	6,473	6,902	7,242	7,556	8,121	8,312	0,512	8,748	9,120	9,372	9,625	9,875	10,069	10,263	10,403	10,665	10.859
Remain i,no Road-Connected Area	2.604	2,794	3,693	4,280	4,463	4,067	4,514	4,452	4,480	4 ,5S1	Q, 692	4,873	4,989	5,120	5,248	5,450	5,446	5,517	5,647	5,745
Permanent Residents	(2,604)	(2,794)	(3,037)	(3,307)	(3,554)	(3,742)	(3,927)	(4,365)	(4,480)	(4,581)	(4,692)	(4,873)	(4,989)	(5,120)	(5,248)	(5,450)	(5,406)	(5,517)	(5,647)	(5,745)
Construct ion Camp Residents	(--)	(--)	(656)	(973)	(909)	(325)	(587)	(87)	(--)	(--)	)	(-)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)

Source: Alaska Consultants. Inc.

FIGURE 14

Kodiak Area
Total Employment and Total Population
Base Case and 5 Percent Scenario
Western Gulf of Alaska
1980 - 2000



Source: Alaska Consultants, Inc.

TABLE 67

ESTIMATED OFFSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - KODIAK
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		103								
1982		224								
1983		224								
1984		448								
1985		392	28		52	11		233		
1986		224	10		52	33		467	62	
1987		47	66	24	56	29	13	566	17	
1988			225	40	12	46	21	800	62	
1989			395	56		39	30	700	17	
1990			421	80		24	43	467		
1991			281	104		12	56	467		
1992			140	170			66			
1993			28	203			69			
1994				228			69			
1995				278			69			
1996				303			69			
1997				328			69			
1998				328			69			
1999				328			69			
2000				328			69			

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 68

ESTIMATED DIRECT ONSHORE ONSITE EMPLOYMENT BY TASK
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - KODIAK 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		9										9
1982		20										20
1983		20			469			187				676
1984	28	40	3					973				1,044
1985	55	35	7		469			440				1,006
1986	64	20	6	8			325				50	473
1987	86	4	11	12			587				50	750
1988	88		10	17			87			200	50	452
1989	88		7	25						200	50	370
1990	83		3	33						200	50	369
1991	65			38						200	50	353
1992	61			40						200	50	351
1993	55			40						200	50	345
1994	53			40						200	50	343
1995	53			40						200	50	343
1996	53			40						200	50	343
1997	53			40						200	50	343
1998	53			40						200	50	343
1999	53			40						200	50	343
2000	53			40						200	50	343

Source: Dames and Moore/Alaska Consultants, Inc.

TABLE 69

ESTIMATED ADDITIONAL DIRECT, INDIRECT AND TOTAL EMPLOYMENT
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Direct Employment			Indirect Employment			Total Employment
	Offshore Resident in	Onshore-Onsite in Area	Total	Derived from Direct Offshore	Derived from Direct Onshore	Total	
1981		9	-9		1	1	10
1982		20	20		2	2	22
1983		676	676		58	58	734
1984	1	1,044	1,045			68	1,113
1985	5	1,006	1,011	3	1:;	103	1,114
1986	9	473	482	5	81	86	568
1987	20	750	770	10	105	115	885
1988	41	452	493	20	183	203	696
1989	64	370	434	32	182	214	648
1990	66	369	435	33	183	216	651
1991	71	353	424	35	176	211	635
1992	65	351	416	33	176	209	625
1993	59	345	404	30	172	202	606
1994	66	343	409	33	172	205	614
1995	71	343	414	36	172	208	622
1996	76	343	419	39	172	211	630
1997	76	343	419	39	172	211	630
1998	76	343	419	39	172	211	630
1999	76	343	419	39	172	211	630
2000	76	343	419	39	172	211	630

Source: Alaska Consultants, Inc.

TABLE 70

ESTIMATED ADDITIONAL CONSTRUCTION, PERMANENT AND TOTAL POPULATION
5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS
WESTERN GULF OF ALASKA - KODIAK AREA
1981 - 2000

Year	Total Employment	Onshore-Onsite Construction Employment/Population	Permanent Employment	Permanent Population	Total Population
1981	10		10	20	20
1982	22		22	44	44
1983	734	656	78	156	812
1984	1,113	973	140	280	1,253
1985	1,114	909	205	410	1,319
1986	568	325	243	486	811
1987	885	587	298	596	1,183
1988	696	87	609	1,218	1,305
1989	648		648	1,296	1,296
1990	651		651	1,302	1,302
1991	635		635	1,270	1,270
1992	625		625	1,250	1,250
1993	606		606	1,212	1,212
1994	614		614	1,228	1,228"
1995	622		622	1,244	1,244
1996	630		630	1,260	1,260
1997	630		630	1,260	1,260
1998	630		630	1,260	1,260
1999	630		630	1,260	1,260
2000	630		630	1,260	1,260

Source: Alaska Consultants, Inc.

continue to grow. Since, the OCS sector does not much change after 1990, it becomes a steadily dwindling share of Kodiak's growing population.

It should be noted that the scope and scale of growth impacts upon Kodiak is directly tied to certain assumptions made under the 5 percent petroleum development scenario. For example, if the location or production characteristics of the offshore oil and gas fields were to make it infeasible to pipe production to shore near Kodiak (or at all, as is the case with the Tugidak Basin oil field) then the impacts of OCS development upon Kodiak Island could take a very different pattern.

IMPACT ASSESSMENT

Social Impacts

Even under the base case, a substantial population increase is forecast for the Kodiak area. Thus, during the decade in which OCS growth impacts will be felt, OCS development, still only accounts for about one-fifth of projected new residents. The Kodiak area will experience growing pains as it expands to accommodate this growth, and the OCS increment will add its share to the demand for new housing and public facilities and services. Similarly, it will lend added impetus to the trend toward urbanization of the Kodiak area.

However, the main social impacts are likely to be qualitative rather than quantitative in nature. It is clear from many public meetings and

discussions that the prospective advent of OCS development at Kodiak is a controversial topic. A significant part of the existing fishing community perceives oil development as a threat to the environmental and economic well-being of the town's primary source of livelihood. Thus, the potential seems high for institutional conflict at the outset of any OCS exploration between Kodiak residents and the governmental and industry groups sponsoring oil and gas development.

Certain features about the physical arrangement of OCS-related development under the 5 percent scenario may tend to mitigate the practical aspects of potential conflicts between the fishing industry and the offshore oil and gas industries. The siting of the onshore OCS industrial facilities at Womens Bay and Ugak Bay will help minimize interference with fishing fleet operations and customary use of harbor facilities. Likewise, the assumption that many oil and gas terminal workers will choose to settle in the Ugak Bay vicinity will steer part of the growth impact away from Kodiak proper.

The addition of a billion dollars in industrial properties to the Borough government's property tax rolls may have consequences for the division of fiscal and governmental responsibilities between the City of Kodiak and the Kodiak Island Borough. Presumably, the strengthened financial position of the Borough under this scenario would support the assumption of additional powers by the Borough and, perhaps, some transfer of powers from the City to the Borough level.

Impacts on Community Infrastructure

Housing and Residential Land. Under the 5 percent scenario, the Kodiak area may need about 530 additional dwellings, or about one-sixth more than estimated to be needed to satisfy base case demand (see Table 71). All of the demand to house OCS-related growth is expected to be felt before 1990. Consistent with the settlement pattern projected for the oil terminal and LNG plant workers, the City of Kodiak is expected to absorb about half of this added housing demand, with the Ugak Bay area absorbing most of the rest. An estimated additional 23 hectares (58 acres) will be demanded for residential development under the 5 percent scenario, some of it away from the immediate Kodiak area (see Table 72). According to a recent land inventory study, the supply of land at Kodiak is adequate for this level of development.

Utilities

- Mater. It is anticipated that major improvements in the City's water supply system will be called for, primarily to meet the requirements of the seafood processing industry which, at times, consumes up to 95 percent of the City's water supply. The 5 percent scenario adds very little, less than 2 percent, to water supply capacity (see Table 73). Much of the residential settlement and industrial development associated with the 5 percent scenario takes place outside the area which can feasibly be served by the City water system. Consequently,

the 5 percent scenario is expected to add very little, less than 2 percent to the water systems's capacity requirement.

- Sewer. The City of Kodiak's secondary sewage treatment plant was designed with adequate capacity for this scenario although some additions to the sewage collection system may be necessary (see Table 74).

It is assumed that isolated industrial facilities and residential concentrations outside the City will rely upon individual treatment plants, as needed to maintain environments? standards.

- Electric Power. To estimate future electric power requirements under this scenario, it was assumed that new residential consumers and the heavy power demands for construction and operation of the marine service base would be supplied by the existing power utility, Kodiak Electric Association. However, it was assumed that the LNG plant and oil terminal would supply their own power requirements.

Under the base case forecast, repeated additions to KEA's generating capacity are anticipated to keep pace with power demand. At different stages, the 5 percent scenario adds between 8 to 20 percent or up to 6,000 kw to power demand above the base case (see Table 75). Thus, as a result of OCS development, KEA is likely to face substantial expansion in

generating capacity. For the short run, installation of more diesel units appears the most feasible but most costly means of supply. If the proposed Terror Lake hydropower project is eventually completed, that project could provide ample power to the Kodiak area for the forecast period. Another possible alternative to diesel units might be the use of part of the natural gas brought ashore at Ugak Bay for power generation. Part of Anchorage's electric needs are met by gas-fired turbine generators fueled with Cook Inlet gas. Depending on transmission and generating costs, natural gas might be economically superior to diesel or hydropower generation.

- Solid Waste Disposal. Kodiak has a severe problem with its existing solid waste disposal site. Selection and development of a new site is urgently needed and presumably will be accomplished within the next couple of years. If so, there should be no difficulty in disposing of the volume of solid waste, including the substantial industrial waste material, attributable to OCS development (see Table 76).

- Communications. The 5 percent scenario forecast is not significantly different from the base case forecast (see Table 77).

Public Safety

- Police. It is estimated that the City of Kodiak may need one additional police officer and jail cell beyond what is called for in the base case to maintain the standard level of police services. Similarly, some expansion in staffing of the Alaska State Troopers would be in order, since that agency provides police protection services outside the City of Kodiak.

- Fire Protection. The improvements in firefighting facilities and services needed to serve base case growth should be adequate to cover the added fire protection requirements of the 5 percent scenario in the vicinity of the City of Kodiak. However, residential growth in the Ugak Bay area may require establishment of a new service area for fire protection. The major industrial facilities are assumed to maintain their own firefighting capability.

Health and Social Services. The health and social services facilities tp be provided to accommodate the base case forecast should be adequate in capacity to serve the additional residents of the 5 percent scenario.

Education. Under the base case forecast, the Kodiak Island Borough was seen to undertake a major school construction program, including 3 new elementary schools and 2 new junior high schools. This program Would replace some obsolete facilities serving the central area and also

station schools in newly developing residential neighborhoods not currently served by their own local schools.

To this building program, the 5 percent scenario's enrollment growth adds a demand for about 6 elementary and 6 secondary classrooms (see Table 78). In line with the settlement pattern assumed for the 5 percent scenario, about half of the new education facility needs should arise in neighborhoods where the need for new school facilities has otherwise been identified and can be met merely by incorporating extra classrooms into the facility programs. However, if significant settlement occurs toward Ugak Bay beyond the service area of the expanded school system required for the base case, then it might be necessary to construct an additional elementary school and, possibly, a secondary school for schoolchildren in the Ugak Bay area.

Recreation. The scale of growth stemming from the 5 percent scenario would add only slightly to the demand for recreational facilities which would arise under the base case and is not likely to present a significant developmental problem.

Local Government Finances. According to the methods used to forecast future local government revenues and expenditures, the growth in revenues and expenditures are expected to offset each other except where the fiscal balance is skewed by the addition of high-value OCS industrial properties to the tax rolls or by extraordinary expenditure obligations to meet the public service demands of growth (see Tables 79 to 81).

In the case of the City of Kodiak under the 5 percent scenario, general fund revenues and operating expenditures are estimated to increase, holding at a level about 6 to 8 percent higher than the base case. As long as the City is not called upon to make disproportionately high capital investments in public works, its financial standing is not expected to be adversely affected by OCS developments.

The most significant fiscal feature to local governments of the 5 percent scenario is the creation of a huge OCS industrial tax base exclusively in the Borough's taxing jurisdiction and outside the City of Kodiak. Specifically, the 5 percent scenario assumes that the following OCS facilities totalling $1.1 billion in estimated assessed valuation, will be added to the Borough's taxable property base before the end of the decade: service base (S20 million); LNG terminal ($824 million); oil terminal ($250 million) oil and gas pipelines ($17 million). For comparison, in 1977, the total assessed valuation in the Borough was $175 million. At the Borough's 1978 property tax rate of 7 mills, the hypothesized OCS industrial properties would yield about $7.8 million in revenues, compared to about S1.3 million in actual Borough property tax revenues in 1977. In effect, the 5 percent scenario would add to the Borough government's expenditures in the Kodiak area roughly in proportion to a population increase of perhaps 7 percents over the base forecast, but would magnify the property tax base a couple of times over. On the other hand, the City would receive about half of the OCS-related growth impact and most of the base case growth impact., but would receive no share of the OCS industrial property tax revenues, since the highly assessed OCS facilities would be situated outside the City boundaries.

This relative enhancement of the revenue base of the Borough government could have important consequences for local government organization to provide public services at Kodiak. Addition of a billion dollar OCS industrial tax base to the Borough's tax jurisdiction could motivate a restructuring of the governmental and fiscal roles of the Kodiak Island Borough, the City of Kodiak and other Kodiak Island towns. Specifically, this increase in the Borough's OCS industrial property tax base would enable it to assume and exercise additional borough-wide functions at little cost or reduced cost to other property taxpayers. Such a step could relieve the City of Kodiak and other areas of the Borough of some of their property tax burden and at the same time allow for improved local public services.

CAUSE/EFFECT OF IMPACTS

The discovery of commercial oil and gas fields off Kodiak Island adds to the Kodiak area's growth over the base case forecast. Overall, the growth impacts upon Kodiak are mild, considering that the oil and gas fields to be developed are in the "giant" class. Kodiak simply does not have the diversified industrial, technical or managerial base to provide locally most of the goods and services required for offshore operations. Under the 5 percent petroleum development scenario, this limits Kodiak's role to essential logistic and product transport functions for which there are no feasible alternative locations.

Onshore impacts at Kodiak are shaped by the location of the offshore fields in relation to the sites on Kodiak Island best suited to host support facilities. Particularly important is the assumption that the OCS industrial facilities built for this scenario (the service base and, more importantly, the LNG plant and oil terminal) will be accessible by road to the City of Kodiak, its labor force and the Kodiak airport, but at a sufficient distance to avoid direct physical impacts on the existing settled areas and upon harbor operations. The remote location of the LNG and oil terminals also appears likely to deflect a major share of growth impact from the City of Kodiak to a new satellite community in the Ugak Bay vicinity. On the other hand, the skill requirements of the service base and the marine operations based at Womens Bay are fairly compatible with employment skills and experience of the workforce of the nearby Kodiak urban area.

The offshore platform work-Force is assumed to work on a rotation basis, for the most part traveling hi-weekly from offshore work stations through Kodiak airport to home destinations outside the region.

PROBLEMS/ISSUES AFFECTING THE COMMUNITY INFRASTRUCTURE

The 5 percent scenario overlays an added increment of population growth, about 1,260 persons, upon a base forecast which is expected to add an estimated 8,817 residents to the Kodiak urban area 'by 2000. The OCS-related expansion takes place in the first decade of the forecast, reaching the level at which it stabilizes by 1990.

Thus, the effect of the OCS scenario is to accelerate Kodiak's already noteworthy base case growth rate and to accentuate such general development problems as are likely to occur in the base case. In particular, additional demand for housing, water and power supply and residential land improvement will be felt in and around the City of Kodiak. Furthermore, the concentration of employment at Ugak Bay under the 5 percent scenario is expected to attract population growth and raise developmental questions concerning that previously unsettled area of the Borough.

The premises of' the 5 percent scenario cause a differential fiscal impact upon the Kodiak Island Borough and the City of Kodiak. Nearly all of the OCS property tax base is assigned exclusively to the Borough, but much of the tax burden of growth impacts spills over upon the City of Kodiak. This imbalance may prompt consideration of some changes in the distribution of governing functions now divided between the City and Borough governments.

SUMMARY OF IMPACTS

The petroleum development assumptions for this scenario imply that there will be growth impacts upon Kodiak, but that their scope will be kept in check by the limitations of Kodiak's economic structure vis-a-vis the specialized requirements of the offshore oil industry.

OCS development introduces 'some intensive industrial facilities at isolated sites in the Kodiak urban area, along with some settlement in the orbit of the shore-based oil and gas trans-shipment terminals. The construction of capital-intensive OCS industrial facilities also confers opportunity for substantial net fiscal benefits upon the local governments in the impact area, although there are statutory obstacles to the equitable distribution of new revenues.

Finally, there is potential for conflict over OCS leasing and development decisions between Kodiak's established fishing community and the public and private sponsors of offshore oil and gas development in the Western Gulf o-F Alaska. This potential for conflicts is, of course, equal ly present at the outset of all scenarios, since it is based in the local anticipation that OCS activities may have adverse operation' and environmental impacts upon the local fishing industry. As it happens, the specific facility assumptions adopted for the 5 percent scenario are consistent with a development pattern of minimal intrusion upon the fishing industry. That is to say, this scenario steers the LNG plant and the oil terminal to Ugak Bay and the marine service base to Womens Bay, which serves to isolate OCS operations from established fishing fleet and seafood processing activities, though some habitat damage and pre-emption would still occur. Mere the scenario's facilities to be sited elsewhere, then the occasions for conflicts could be magnified.

Kodiak community and road-connected area infrastructure requirements likely to be most impacted by this scenario include housing, electric

power and education facilities. The establishment of a new industrial area and satellite residential area at Ugak Bay will lessen the extent of impact on the City of Kodiak. However, since the OCS industrial facilities will be physically located outside Kodiak's corporate limits, the City will experience impacts without also receiving potential tax revenue benefits of major increases in assessed property valuation. Such a situation could have consequences for the division of fiscal and governmental responsibilities between the City and the Borough, such as the assumption of additional powers by the Borough and possibly some transfer of powers from the City to the Borough level.

TABLE 71

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

Year	Net Population Increase	Net Change Demand for Housing Units	Single Family	Multi-Family	Trailer
1978	477	159	92	41	26
1979	335	112	65	29	18
1980	365	122	70	32	20
1981	575	193	112	50	30
1982	559	188	109	49	30
1983	671	233	135	61	37
1984	748	260	150	68	42
1985	676	236	136	62	38
1986	528	183	106	48	29
1987	499	176	102	46	28
1988	1,003	386	223	102	62
1989	306	108	63	28	17
1990	301	100	58	26	16
1991	347	113	65	30	18
1992	544	180	104	47	29
1993	377	122	70	32	20
1994	384	130	75	34	21
1995	378	128	74	33	21
1996	296	100	58	26	16
1997	290	97	56	25	16
1998	211	70	41	18	11
1999	392	131	76	34	21
2000	292	97	56	25	16
TOTALS	10,554	3,624	2,096	946	582

Source: Alaska Consultants, Inc.

TABLE 72

ESTIMATED DEMAND FOR RESIDENTIAL LAND
5 PERCENT PROBABILITY SCENARIO
KODIAK 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	135	19.4	7.6	27.0
Multifamily & Trailer	99	7.1	2.8	9.9
1981-85				
Single Family	642	92.4	36.0	128.4
Multifamily & Trailer	467	33.6	13.1	46.7
1986-90				
Single Family	552	79.5	30.9	110.4
Multifamily & Trailer	402	28.9	11.3	40.2
1991-95				
Single Family	388	55.9	21.7	77.6
Multifamily & Trailer	285	20.5	8.0	28.5
1996-2000				
Single Family	287	41.3	16.1	57.4
Multifamily & Trailer	208	15.0	5	20.8
TOTAL	3,465	393.6	153.3	546.9

a/ Multiply by .40469 to obtain hectares.

Source: Alaska Consultants, Inc.

TABLE 73

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

Year	Domestic Capacity	Industrial Capacity	Ocs Industrial Capacity	Total Capacity
1978	663	11,337		12,000
1979	697	11,921		12,618
1980	733	12,546		13,279
1981	790	13,505	1	14,296
1982	848	14,443	2	15,293
1983	913	15,422	84	16,419
1984	987	16,506	233	17,726
1985	1,051	17,444	258	18,753
1986	1,101	18,215	177	19,493
1987	1,150	18,903	196	20,249
1988	1,236	19,559	124	20,929
1989	1,265	19,965	209	21,439
1990	1,296	20,486	214	21,996
1991	1,331	21,133	151	22,615
1992	1,387	22,112	113	23,612
1993	1,426	22,821	86	24,333
1994	1,465	23,467	84	25,016
1995	1,504	24,113	89	25,706
1996	1,532	24,571	89	26,192
1997	1,563	25,092	89	26,744
1998	1,584	25,468	89	27,141
1999	1,623	26,134	89	27,846
2000	1,654	26,655	89	28,398

a/ Multiply by 3.785 to obtain liters.

Source: Alaska Consultants, Inc.

TABLE 74

ESTIMATED CAPACITY REQUIREMENTS
DOMESTIC SEWAGE TREATMENT
5 PERCENT PROBABILITY SCENAR1O
CITY OF KODIAK
1978 - 2000

Year	Daily Treatment Capacity (1,000 gallons) a/	Peak Hourly Capacity (1,000's gallons per hour) b/
1978	663	82.8
1979	697	87.1
1980	733	91.6
1981	790	98.8
1982	848	106.0
1983	913	114.1
1984	987	123.4
1985	1,051	131.4
1986	1,101	137.6
1987	1,150	143.8
1988	1,236	154.5
1989	1,265	158.1
1990	1,296	162.0
1991	1,331	166.4
1992	1,387	173.4
1993	1,426	178.2
1994	1,465	183.1
1995	1,504	188.0
1996	1,532	191.5
1997	1,563	195.4
1998	1,584	198.0
1999	1,623	202.9
2000	1,654	206.8

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

Source: Alaska Consultants, Inc.

TABLE 75

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

Year	Community Requirements in kws	OCS Industrial Requirements		Total
		Marine Service Base	Construction Camp & Sites	
1978	16,318			16,318
1979	17,498			17,498
1980	18,790			18,790
1981	20,675			20,675
1982	22,575			22,575
1983	26,642		1,407	28,049
1984	30,108	650		30,758
1985	32,390	650	1,407	34,447
1986	32,796	650		33,446
1987	35,606	1,300		35,906
1988	37,719	1,300		39,019
1989	38,376	1,300		39,676
1990	39,279	1,300		40,579
1991	40,320	650		40,970
1992	41,979	650		42,629
1993	43,083	650		43,733
1994	44,235	650		44,885
1995	45,369	650		46,019
1996	46,257	650		46,907
1997	47,127	650		47,777
1998	47,760	650		48,410
1999	48,936	650		49,586
2000	49,812	0		49,812

Source: Alaska Consultants, Inc.

TABLE 76

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

Year	Community Solid Wastes (annual tonnage) a/	Marine Service Base (annual tonnage) a/	Construction Camp & Site (annual tonnage) a/	Oil Terminal (annual tonnage) a/	LNG Plant (annual tonnage) a/	Total (annual tonnage) a/	Total (cubic yards) b/
1978	8,990					8,990	54,500
1979	9,510					9,510	57,600
1980	10,070					10,070	61,000
1981	10,880					10,880	65,900
1982	11,700					11,700	70,900
1983	12,680		768			13,448	81,500
1984	13,770	152	1,138			15,060	90,600
1985	14,820	216	1,064			16,100	96,700
1986	15,570	233	380		58	16,241	97,500
1987	16,310	216	453		58	17,037	102,600"
1988	17,660	250	102	234	58	18,304	110,100
1989	18,200	326		234	58	18,818	112,800
1990	18,740	318		234	58	19,350	116,000
1991	19,160	249		234	58	19.701	118.400
1992	19,810	214		2311	58	20,316	122,320
1993	20,260	172		234	58	20,724	125,000
1994	20,730	175		234	58	21,197	127,800
1995	21,180	175		234	58	21,647	130,600
1996	21,540	175		234	58	22,007	132,700
1997	21,880	175		234	58	22,347	134,800
1998	22,140	175		234	58	22,607	136,400
1999	22,610	175		234	58	*23,077*	139,200
2000	22,960	175		234	58	*23,427*	*141,300*

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

Source: Alaska Consultants, Inc.

TABLE 77

ESTIMATED CAPACITY REQUIREMENTS
TELEPHONE SYSTEM
5 PERCENT PROBABILITY SCENARIO
KODIAK AREA
1978 - 2000

Year	Total Number of Dwellings	Total Number of Telephones	Annual Change
1978	2,173	2,716	--
1979	2,285	2,879	163
1980	2,407	3,057	241
1981	2,600	3,328	271
1982	2,788	3,597	269
1983	3,021	3,927	330
1984	3,281	4,298	371
1985	3,517	4,642	344
1986	3,700	4,921	279
1987	3,876	5,194	273
1988	4,262	5,754	560
1989	4,370	5,943	189
1990	4,470	6,124	181
1991	4,583	6,325	201
1992	4,763	6,621	296
1993	4,885	6,839	218
1994	5,015	7,021	182
1595	5,143	7,200	179
1996	5,243	7,340	140
1997	5,340	7,476	136
1998	5,410	7,574	
1999	5,541	7,757	1::
2000	5,638	7,893	136

Source: Alaska Consultants, Inc.

TABLE 78

SCHOOL ENROLLMENT FORECAST
5 PERCENT PROBABILITY SCENARIO
KODIAK AREA
1978 - 2000'

Year	Grades			Total Enrollment
	K - 6 Enrollment	7 - 8 Enrollment	9 - 12 Enrollment	
1978	1,029	274	502	1,805
1979	1,067	285	520	1,872
1980	1,109	295	541	1,945
1981	1,174	313	573	2,060
1982	1,238	330	604	2,172
1983	1,314	351	641	2,306
1984	1,400	373	683	2,456
1985	1,477	394	720	2,591
1986	1,537	410	750	2,697
1987	1,594	425	777	2,796
1988	1,709	456	833	2,998
1989	1,743	465	850	3,058
1990	1,777	474	867	3,118
1991	1,817	485	886	3,188
1992	1,879	501	917	3,297
1993	1,922	513	937	3,372
1994	1,966	524	959	3,449
1995	2,009	536	980	3,525
1996	2,043	545	996	3,584
1997	2,076	554	1,012	3,642
1998	2,100	560	1,024	3,684
1999	2,144	572	1,046	3,762
2000	2,178	581	1,062	3,821

Source: Alaska Consultants, Inc.

TABLE 79

FORECAST OF KODIAK ISLAND BOROUGH SCHOOL DISTRICT REVENUES a/
5 PERCENT PROBABILITY SCENARIO
KODIAK URBAN AREA
1978 - 2000
(in $1,000s)

Year	Student Enrollment	Estimated Revenues by Source			
		Local	State	Federal	Total
1978	1,805	$ 395	$4,647	$ 56	$5,098
1979	1,872	410	4,820	58	5,288
1980	1,945	426	5,008	60	5,494
1981	2,060	451	5,304	64	5,819
1982	2,172	476	5,592	67	6,135
1983	2,306	505	5,937	71	6,513
1984	2,456	538	6,323	76	6,937
1985	2,591	568	6,671	80	7,319
1986	2,697	591	6,944	83	7,618
1987	2,796	612	7,199	87	7,898
1988	2,998	657	7,719	93	8,469
1989	3,058	670	7,873	95	8,638
1990	3,118	683	8,028	96	8,807
1991	3,188	698	8,208	99	9,005
1992	3,297	722	8,489	102	9,313
1993	3,372	739	8,682	104	9,525
1994	3,449	756	8,880	107	9,743
1995	3,525	772	9,076	109	9,957
1996	3,584	785	9,228	111	10,124
1997	3,642	798	9,377	113	10,288
1998	3,684	807	9,485	114	10,406
1999	3,762	824	9,686	116	10,626
2000	3,821	837	9,838	118	10,793

a/ The City of Kodiak does not raise any direct revenues for school purposes. The Kodiak Island Borough funds and operates a boroughwide school system. This table presents the Kodiak Urban area's projected pro rata share o-f revenues accruing to the Kodiak Island Borough for educational purposes. Expenditures are assumed to equal revenues.

Source: Alaska Consultants, Inc.

TABLE 80 .

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

Year	Property Taxes	Sales Taxes	Intergovernmental Revenues	Other a/	Total
1978	$ 558	$1,263	$ .772	$ 940	$3,533
1979	586	1,328	812	988	3,714
1980	617	1,399	855	1,041	3,912
1981	666	1,509	922	1,123	4,220
1982	713	1,616	988	1,203	4,520
1983	768	1,7"14	1,064	1,295	4,868
1984	830	1,880	1,148	1,399	5,257
1985	885	2,004	1,224	1,491	5 , 6 0 4
1986	928	2,103	1,285	1,565	5,881
1987	968	2,194	1,340	1,632	6,134
1988	1,041	2,358	1,441	1,755	6,595
1989	1,065	2,414	1,474	1,796	6,749
1990	1,091	2,472	1,510	1,839	6,912
1991	1,121	2,540	1,552	1,890	7,103
1992	1,169	2,648	1,618	1,970	7,405
1993	1,201	2,721	1,663	2,025	7,610
1994	1,233	2,795	1,707	2,080	7,815
1995	1,266	2,867	1,752	2,134	8,019
1996	1,290	2,924	1,786	2,?75	8,175
1997	1,315	2,980	1,821	2,217	8,333
1998	1,333	3,021	1,845	2,248	8,447
1999	1,367	3,097	1,892	2,304	8,660
2000	1,392	3,153	1,926	2,346	8,817

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

Source: Alaska Consultants, Inc.

TABLE 81

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

Year	General Fund Revenues			Operating Expenditures b/	Available for Capital Improvements b/
	Property Tax	Other Revenues a/	Total		
1978	$ 558	$2,975	$3,533	$3,251	$ 282
1979	586	3,128	3,714	3,418	296
1980	617	3,295	3,912	3,600	312
1981	666	3,554	4,220	3,884	336
1982	713	3,807	4,520	4,160	360
1983	768	4,100	4,868	4,480	388
1 984	830	4,427	.5,257	4,837	420
1985	885	4,719	5,604	5,157	447
1986	928	4,953	5,881	5,411	470
1987	968	5,166	6,134	5,646	488
1988	1,041	5,554	6,595	6,068	527
1989	1,065	5,684	6,749	6,211	538
1990	1 ,09?	5,821	6,912	6,360	552
1991	1,121	5,982	7,103	6,536	567
1992	1,169	6,239	7,405	6,814	591
1993	1,201	6,409	7,610	7,003	607
1994	1,233	6,582	7,815	7,192	623
1995	1,266	6,753	8,019	7,379	640
1996	1,290	6,885	8>175	7,524	651
1997	1,315	7,018	8,333	7,668	665
1998	1,333	7,114	8,447	7,773	674
1999	1,367	7,293	8,660	7,969	691
2000	1,392	7,425	8,817	8,114	703

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

b/ The City of Kodiak does not make any direct expenditures for school support. The Kodiak Island Borough funds and operates a boroughwide school system.

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 Western Gulf of Alaska communities of Kodiak 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 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: Yt = total community or regional employment

Ys = 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, Communication 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.: $'I'S = kYt$

so that: $Yt = \left(\frac{1}{1 - k}\right)E = mE$

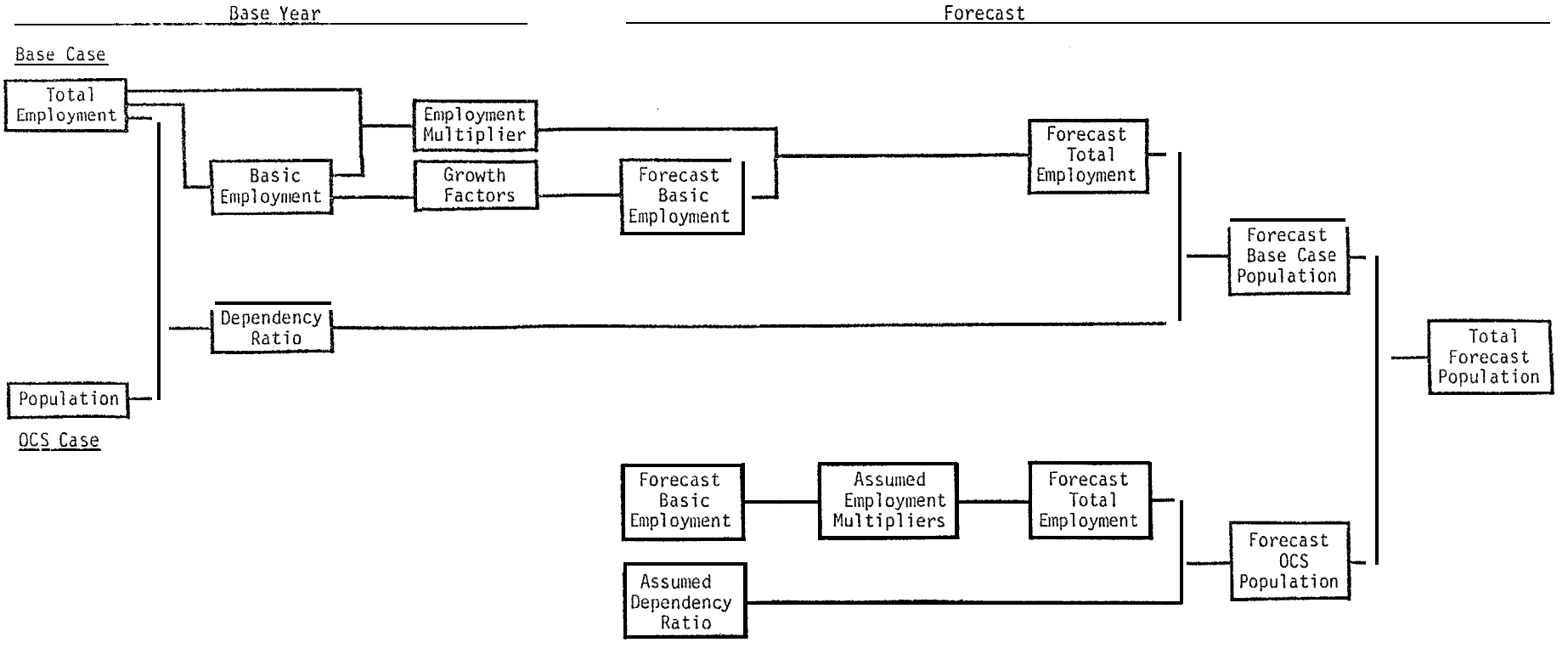
and so that m, the multiplier, $\frac{1}{1 - k} = \frac{1}{1 - \frac{Ys}{(Yt)}} = \frac{Yt}{E} = \frac{Ys + E}{E} = 1 + \frac{Ys}{E}$ "

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 dependency ratio gained by observing the historic relationship of total employment to total population produces a forecast of total population (see Figure A-l).

The base case for the Seward area is assumed to be the statistical mean resource level scenario developed for the Northern Gulf of Alaska OCS Lease Sale No. 55. This base case is the product of a non-OCS

FIGURE A-1

SIMPLIFIED DIAGRAM OF EMPLOYMENT/POPULATION FORECASTING METHODOLOGY



Source: Alaska Consultants, Inc.

forecast and the forecast of the OCS statistical mean resource level scenario. However, the economic base methodology employed to produce forecasts of employment and population for the OCS scenarios in this appendix are applicable to the Seward base case. The methodology differs only in the estimating of base year employment or present employment estimates.

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 Kodiak Census Division and the Seward Census Division. These Census Divisions conform by definition to the statistical areas utilized by the Alaska Department of Labor.

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 Kodiak and Seward areas are assessed. The process of investigation is carried out for each sector of these local economies.

Since the Seward area of study was not populous, informal interviews of all employers were conducted during the development of Seward's base case. As previously mentioned, the base case for the Seward area is the

Northern Gulf of Alaska OCS Lease Sale No. 55 statistical mean resource level scenario. Among the information obtained was 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.

In the more populous Kodiak area, only selected informal interviews are conducted. This sample interviewing together with published and unpublished employment data provided by the Employment Security Division of the Alaska Department of Labor are re" ied upon to convey information similar to that obtained by interviewing the universe in the Seward area.

The information collected for these areas coupled with published and unpublished employment data provided by the Employment Security Division of the Alaska Department o-F Labor provide the basis for current employment estimates.

The employment in each of these geographic areas is then arrayed by major industrial division 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 average 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 model, 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.

Forecast of Non-OCS Employment

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 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 Kodiak and Seward was estimated for the base year as well as the areas outside. In Kodiak and Seward, the population outside the town includes everyone living within the Kodiak and 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.

Forecast of Non-OCS Population

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:

Total Non-OCS Employment Forecast	×	Dependency Ratio	=	578	x	2.2	=	1,272	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 ocations, 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 o-f activities which could impact Western Gulf of Alaska communities and the extent to which the individual communities of Kodiak and Seward 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 Western Gulf of Alaska coastal area and the communities of Kodiak 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 Western 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 Western 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, development 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.

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, construct on employment of the magnitude associated with

TABLE A-1

AGGREGATION OF ONSHORE AND OFFSHORE EMPLOYMENT BY TASK
WESTERN 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

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 Men 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.

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 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.

TABLE A-2

EMPLOYMENT ASSUMPTIONS REFLECTED IN MULTIPLIER VALUES
MESTERN 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 Western Gulf of Alaska (WGA) 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 WGA coastal area. Essentially the entire helicopter work force will be rotated between the WGA coastal area and their permanent residences outside. In the development phase with long term employment in the WGA 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 workforce is seen as being essentially permanent employees and residents of the WGA 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 WGA 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 onshore pipelines which terminate at the oil terminal or LNG plants are about and are accessible from construction camps located at the oil terminal or LNG plant construction sites, pipeline construction employees will be considered with oil terminal or LNG plant construction workforces and will reside in those 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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 WGA 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.

TABLE A-3

EMPLOYMENT MULTIPLIER VALUES FOR THE COASTAL AREAS a/
OF SEWARD AND KODIAK

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	(10%)	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 Seward and Kodiak. These areas do not include the Western 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.

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.

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.

TABLE A-4

CLASSIFICATION OF ONSHORE AND OFFSHORE EMPLOYMENT
WESTERN GULF OF ALASKA

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.

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.

Since the Western 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 Kodiak 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 Seward area for example, approximately 75 percent is allocated to the City of Seward, and 25 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 the Western Gulf of Alaska OCS activity during the exploration only scenario, statistical mean resource level scenario and 95 percent probability resource level scenario.

The extent of the impact upon the communities of Kodiak and Seward is then elicited by comparing the base case forecasts of population with

the population forecasts which include the Western Gulf of Alaska 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 Kodiak and Seward or within the metropolitan areas of these communities.

- The types of housing desired by the new population will approximate current usage of 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, increased 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 employed in forecasting 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 Kodiak and Seward for areas within their corporate limits.
- Law enforcement in the road-connected areas outside these communities 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 the communities under study and special situations in the communities were noted.

Nationwide, the desired ratio of law enforcement officers to population is one for every 500 people. 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.

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 Kodiak and Seward have more police officers than would ordinarily be considered necessary. Additional officers are needed to provide police protection services to these communities' large transient populations composed in large part of summer tourists and transient fishing boat crews. Nevertheless, despite the larger than normal complement of police personnel in these communities, 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:

- The existing relationships between population and the number of police officers in the cities of Kodiak and Seward is assumed as the base from which forecasts are made with an additional officer to be required for each successive growth of 500 population.
- One jail cell for every 500 people.

In the various OCS cases, offshore personnel are assumed not to have a 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 persons.

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 cities of Kodiak and Seward both have their own fire protection capabilities. The Bear Creek area outside Seward has fire protection services provided by the Kenai Peninsula Borough on a service area basis. Outside the City of Kodiak, the Coast Guard base provides its own service and Monashka Bay, Mill Bay, Spruce Cape and the Island Lake road-connected areas are served by City equipment and personnel under a service area agreement with the Kodiak Island Borough.

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 the cities of Kodiak and Seward, to 9 for most of the road-connected areas such as Mill Bay.

According to the Insurance Services Office, the minimum criteria for a 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.

Kodiak and Seward generally meet the standards set out above except that the Kodiak road-connected area (outside Kodiak's corporate limits) requires a separate fire station. The need is locally recognized and a new facility is currently in the planning stages.

In both the non-OCS and OCS cases, 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 risks, such as service bases, would depend on municipal fire protection services.

Heal th

The communities under study (Kodiak and Seward) currently have operating hospitals. 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 on the following two pages indicate that Kodiak and Seward are at "Level Three" (see Tables A-6 and A-7).

The most critical element involved in health care is the presence of a physician. On average, it is assumed that one physician requires a 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 people. 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 both Kodiak and Seward, 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.

TABLE A-6

INDICATORS OF AVAILABILITY"

Level One	Level Two	Level Three	Level Four
1 itinerant public health 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 special- '. ists) people
1 health aide and alternate b/	1 public health nurse	3 acute care beds per 1,000 people	3 acute inpatient beds per 1,000 people
clinic space	1 EMT II c/	community mental health center and psychologist	paramedics and advanced life support c/ d/
EMT trained person	1 dentist extender	1 dentist per 4,000 people	inpatient psychiatric beds
annual itinerant dental visits	diagnostic X-ray capability	X-ray technician	long term alchol- ism treatment beds c/
monthly itinerant behavioral health worker visits	1 behavioral health counselor or social worker	detox capability/	neonatal beds/ live births d_/
communications system	medical laboratory capability (micro- scope and refrigerator)	Class 4 emergency room (AMA) c/	therapeutic radiation capability cl/
annual itinerant eye care	home health aide or long term care alternative	mobile e.m.s. . capacity with EMT trained attendants	surgical capacity d/
representative health decision-making group		medical technologist	1 CAT Scanner per 250,000 residents d/
		1 optometrist	pathology and autopsy capability
		short term shelter care	blood bank
		itinerant M.D. special- ist visits	specialists/popula- tion

a/ Definition to include audiologic testing, immunization.

b/ Range of services provided by health aide as described in guidelines for Primary Health Care

c/ 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).

d/ Federal guidelines have been issued related to these areas of medical care services but the Board of Directors has not made specifi c. recommendations regarding them.

Source: South Central Health Planning and Development, Inc.

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	2,500 - 200,000	200,000 - 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.

It is assumed that each addition of an increment of 1,500 people above a population of 3,000 would require another physician in 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 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 Kodiak Island Borough (Kodiak) 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 Kodiak 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.

In the various OCS cases, assuming that most offshore population plus construction camp personnel 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.

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.

For the various OCS cases, if offshore population plus construction camp personnel are discounted, no significant changes in the assumptions made for the non-OCS case are anticipated in forecasting future school requirements.

Recreation

Recreation is a power which has been retained by the cities of Kodiak and Seward (i.e. not transferred to the Kodiak Island or Kenai Peninsula Boroughs). However, as elsewhere in Alaska, much of the recreation function in these communities is associated with the schools. Thus, recreation facilities and services in Kodiak and Seward are also provided by the Kodiak Island and Kenai Peninsula Boroughs.

The following standards suggested by the National Recreation and Park Association are basic standards which are slightly modified to apply to the communities of Kodiak 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 2,000 people now has a swimming pool as well as most major high schools in the urban areas of the State. Perhaps a more extreme deviation from 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:

- Indoor Basketball Courts: One for every 2,000 people.
- Swimming Pools: 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 form of 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, as was the case with the Alyeska pipeline project camps.

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 gallons) per person per clay. This higher figure is believed to be warranted as the communities under study receive significant numbers of visitors for purposes of recreation, fishing and other activities. 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 clay 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 derived from the estimates provided by the Alaska State Department of Community and Regional Affairs based upon exploration drilling during Lease Sale No. 39 in the Northern Gulf of Alaska.

Approximately 151 kiloliters (40,000 gallons) per day per offshore rig operation including supply boats was estimated by ARCO to be the offshore consumption. Of this amount 114 kiloliters (30,000 gallons) is estimated to be drill water. 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.

The supply of water to offshore activities and to onshore service bases and pipe coating plants during construction and operations is assumed to be provided by the City of Seward. However, since the Kodiak service base, will probably be located at Womens Bay rather than within the City of Kodiak, the supply of water would probably have to be purchased from the Coast Guard. Also, given the remote location of the onshore oil terminal and LNG plant, the extension of existing systems appears not to be economically feasible. For this reason, water requirements for the oil terminal and LNG construction camps and sites are not included in the water demands for the community system in Kodiak.

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 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 any given hour.

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 location of the oil terminal and LNG plant, 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 Kodiak 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 unit 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 which is similar to the present industrial distribution.

In the OCS cases, 3 kw per person of installed capacity are 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. Service bases are assumed to have demand for electric power exceeding the overall 3.0 kw per person standard. Approximately 650 KW is required to drive the pumps for loading water, fuel, and powdered mud and cement onboard the supply vessels. This block of power is sufficient to accommodate two berths. Additional increments of two berths will require 650 kw to power like equipment. The LNG plant and oil terminal construction sites and camps are remote from the community of Kodiak 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 consideration of a combined generating facility is included.

Communications. Telephone service in the communities under study is currently provided by private companies. 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. Inthe 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 with the exception of the helicopter operations will generate 2.9 kilograms (6.5 pounds) per day per employee of additional 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 semi-submersible rig, platform rig or barge operation including any refuse from supporting boats during the exploration and development phases. 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. Upon completion of the development phase, one-fourth the amount generated by maximum platform activity is assumed to return from the platforms during the production phase.

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.
- 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 limitations 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.

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.

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. It is recognized that improvements in a given year will not appear as increases in assessed value until the tax rolls are compiled the following year. Thus, there is a lag in the receipt of revenue.

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 rom oil and gas development on the Outer Continental Shelf will remain in effect throughout the planning period.

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 total sales tax receipts in the base year divided by the total population.

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.

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 fee, 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.

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 two governmental divisions will continue throughout the planning period.

Expenditures

Operating Expenditures. In the non-OCS case, the operating budget is forecast on a per capita basis.

In the non-OCS cases, the operating budget is also forecast on a per capita basis. However, where major construction activities take place onshore, it is assumed that construction workers in camps will 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.

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.

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. 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.

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