

KODIAK

OUTER CONT.

SHELF IMPACT

STUDY

vol. 1

## **VOLUME ONE**

- LEVEL OF OIL ACTIVITY
- POLICY ALTERNATIVES
- SUMMARY OF IMPACT

prepared by

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**JUNE 1977**

The preparation of this report was financed in part by funds from the Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U. S. Department of Commerce, administered by the Division of Community Planning, Alaska Department of Community and Regional Affairs

**KODIAK ISLAND BOROUGH OUTER  
CONTINENTAL SHELF IMPACT STUDY**

## P R E F A C E

During the last five years the United States has engaged in an intensive search for new oil and natural gas sources. Spurred by the Arab oil embargo and the resultant national shortage of oil, the United States heightened its efforts to reduce dependence on foreign oil through exploration and development of resources within this country. Inevitably the quest for new oil sources led to Alaska.

Oil exploration and development are not new to Alaska, however. Over the past twenty years the oil industry has explored much of Alaska in a search for new deposits. The first Alaskan deposits of developable oil were found in the Cook Inlet Basin. Offshore platforms were located in Cook Inlet in the early 1960's. At the same time, rigs were drilling in the nearby Swanson River drainage. Refining operations were set up near Kenai to process some of the Cook Inlet oil and are still producing petroleum products.

While the Cook Inlet fields were being developed, the oil industry turned its exploration attention to other parts of Alaska. In the late 1960's large quantities of oil were discovered on the North Slope. The crude oil found there was low grade and heavily laden with sulfur, but quantities were so great that extraordinary methods were sought to bring the oil to market. The Trans-Alaska Pipeline resulted.

Now that the development stage of oil production is underway on the North Slope, the oil industry has directed its exploratory energies toward what it considers the next area of great potential for oil production - the Alaskan Outer Continental Shelf (OCS). Government and industry experts have estimated that one-fifth of the nation's undiscovered recoverable oil may lie under Alaska's OCS.

Preparation for Gulf of Alaska oil development has not happened overnight. The possibilities of oil deposits in the Gulf of Alaska have been studied by private industry and the state and federal governments for over a decade. Until recently, however, there has been little effort to develop oil production in this area due to adverse cost and technical considerations.

The present need for national oil sources coupled with recent technological advances in the field of offshore production have prompted the federal government and the oil industry to agree that oil production in this area is now feasible. Firm evidence that development of the oil resources in the Gulf of Alaska will occur was evidenced by a major oil lease sale held April 13, 1976, in which 409,057 acres in the Northern Gulf of Alaska were leased to the oil industry. Offshore exploratory drilling of this land is expected to begin in the summer of 1977.

A new lease sale of up to 3.2 million acres of land located on the Kodiak Shelf, east of Kodiak Island, has been tentatively scheduled for November, 1977. The oil industry originally nominated 12.8 million acres in this area as having strong potential for developable oil deposits, and it is expected that initial exploration for oil will begin shortly following the lease sale. See Map 2 on page 33.

Offshore oil development on the Kodiak Shelf will generate substantial onshore development. During the initial exploration stage the onshore facilities will be relatively minor since the oil companies will avoid substantial capital expenditures until the existence of economically viable oil deposits is verified. However, once oil is found development of the oil fields will occur. Consequently, the onshore facilities will swell in size and their activities will intensify to the point that their presence will severely impact the surrounding area and communities. The impacts will involve both air and marine transportation activity; population increases; demands on housing, community facilities and infrastructural services as well as economic impacts and changes in the basic life style of the surrounding residents. Because of Kodiak Island's proximity to this area, it is inevitable that the Kodiak area will thus be affected.

The purpose of this study is to help determine what impact oil exploration will have on Kodiak and to provide recommendations designed to help plan for and mitigate adverse conditions that such impact might create.

For years Kodiak has been a relatively self-sufficient community. As the largest city on the island it has functioned as a regional economic and cultural center as well as a base for the fishing industry. Both the City and Island of Kodiak have experienced a steady trend of growth and anticipate a continuation of growth in the foreseeable future. Now, with the advent of oil exploration and possible production, the Kodiak area is faced with the possibility of major changes. The importance of planning for these changes is emphasized by the following quote from the Draft EIS for the OCS Lease Sale in the northern Gulf of Alaska.

"As the development of offshore oil and gas proceeds from the initial exploratory phase through drilling, production, and transport, substantial onshore activity will be generated, from which both positive and negative impacts can be expected.

"The degree to which on balance these effects are positive is related to the ability of public officials to plan for and direct the onshore development that is integral to OCS development and to

plan for the growth that onshore facilities generate throughout the region. OCS operations will result in massive development in areas where there is little or no experience in land use planning or regulatory activities. Unless this capability is quickly developed in such areas, the result could be permanent degradation of the environment and unnecessary disruption of traditional values and life styles for those living there now." (CEQ 1974)

The process of preparing the study was divided into four Phases. Phase one of the study process was a compilation of base line data assessing the current level of community services, utilities, facilities and housing. The end result is a summary profile of the community and a generalized projection of the growth trends that have been established and that could be expected to continue regardless of OCS development.

Phase two involved review and projections of expected oil industry activity in the Kodiak area. Many external factors will affect the level of this activity: the amount of recoverable oil discovered, the degree of oil industry reliance upon Kodiak as a transportation and staging area for OCS development, and Kodiak's capability to provide services and facilities necessary for oil development.

The first of these factors is a large unknown greatly affecting employment, land needs, transportation and utility requirements, and community facilities. Consequently, this report examines these associated impacts for each of three levels of oil discovery and production. These levels correspond to the U.S.G.S. high, low, and middle estimates of recoverable oil reserves.

Phase three related information in the community inventory to the various levels of expected oil industry activity. It identifies potential problems in the availability of community facilities and utilities, housing, and other vital community services. The report then reviews available means of solving those problems. It indicates alternative policies and programs for fulfilling needs generated by OCS development and, at the same time, minimize negative impacts on Kodiak. The City and Borough of Kodiak, various village governments, state and federal governments, and private industry should consider these alternatives.

Phase four of the study process considered the final outcome of OCS development in terms of impacts. In essence, the study develops through phases one, two and three, a forecast of oil activity as it will relate to the community existing today. Phase four describes the long-term impacts that will result from OCS development if it occurs.

For the purpose of publication, the study has been organized into two volumes. Volume I begins with the summary profile that resulted from the Community Inventory. It also contains phases two, three and four of the study profile. Volume II contains the complete Community Inventory developed in phase one of the study process. It is a useful reference document and should be updated frequently.

The majority of the work within this report is based on data compiled prior to the instigation of this study. The limited time frame and budget of this study have precluded research into new areas and development of totally original data. Even so, gathering and condensing existing information from the many sources available into this document has been a worthwhile effort. It provides a picture of Kodiak as it now exists and a scenario for the development of the Outer Continental Shelf in Kodiak.

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## COMMUNITY PROFILE

Through the process of preparing this study, a large body of information has been assembled that is descriptive of the social and economic characteristics of the Kodiak Island Borough. That information comprises Volume II of the OCS Impact Study for Kodiak.

The study has shown us that Kodiak is a very unique and vital community, both within the metropolitan area and throughout the outlying portions of the islands. The economy in Kodiak is strong, and the future holds promise of continued prosperity and economic independence. Unlike many other isolated communities in Alaska, Kodiak's size and economic importance has resulted in the provision of the full range of community facilities, utilities, and services that are necessary for a growing self-sufficient community. Table 1 shows who provides the basic public services available in Kodiak.

The study has also shown us that Kodiak has a number of problems that may negatively affect the community's quality of life and its ability to maintain its growth pattern in the future. These problems, if not addressed promptly, will be compounded with the advent of OCS oil activity.

The following profile briefly summarizes the information presented in Volume II which describes the community as it exists today and gives an indication of how its strengths and weaknesses will be affected by or will affect future development.

### ECONOMIC OUTLOOK

With an estimated current population of 9,620 people, Kodiak is among the five largest population centers in Alaska. Currently the Kodiak Island Borough is growing at a rate of approximately three percent per year. This is a healthy growth rate and one that demonstrates the economic vitality of Kodiak. The community has the potential to continue growing as long as the basic industries continue to maintain their strength. In fact, based on historical trends and the current condition of the economy, it is estimated that the population of Kodiak will double within the next twenty years. It is especially important to note that these estimates are made without consideration of any possible OCS development impact on the population. This means that Kodiak does not need the economic boom that OCS activity would bring. The community is healthy; the population and economic base are growing; and the prospects for the future are bright.

Table 1: Summary -- Services by Provider

<u>Service</u>	<u>Borough</u>	<u>City</u>	<u>State</u>	<u>Federal</u>	<u>Other</u>
Electric	-----	-----	-----	-----	X
Telephone	-----	-----	-----	-----	X
Water	-----	X	-----	-----	-----
Sewer	-----	X	-----	-----	-----
Radio, TV	-----	-----	-----	-----	X
Roads	-----	X	-----	X	-----
Airports	-----	X	-----	X	-----
Marine Freight Terminal	-----	X	-----	-----	-----
Ferry Terminal	-----	-----	-----	X	-----
Police	-----	X	-----	X	-----
Fire	-----	X	-----	-----	-----
Emergency	-----	X	-----	-----	X
Hospital	---- X	-----	-----	-----	-----
Clinics	---- X	-----	-----	X	-----
Public Health	---- X	-----	-----	X	-----
Mental Health	---- X	-----	-----	X	-----
Alcoholism Treatment	---- X	X	-----	X	-----
Public Assist.	-----	-----	-----	X	-----
Legal Assist.	-----	-----	-----	X	-----
Education:					
Primary	---- X	-----	-----	-----	X
Secondary	---- X	-----	-----	-----	-----
Higher	-----	-----	-----	X	-----
Recreation	-----	X	-----	X	-----
Parks	---- X	X	-----	-----	-----
Camping	-----	-----	-----	X	-----
Open Space	---- X	X	-----	X	-----
Cultural	-----	X	-----	X	-----

Source: Simpson Usher Jones, Inc., 1976

**EDUCATION FACILITIES**

- 1 Aleutian Regional High School
- 2 East Elementary School
- 3 Main Elementary & Junior High Schools
- 4 Kodiak Community College
- 5 St. Herman's Pastoral School
- 6 St. Mary's Elementary School

**PARKS AND RECREATION**

- 7 Abercrombie State Park
- 8 Baranof Park
- 9 Hillside Mini Park
- 10 Little League Ballpark
- 11 Spruce Street Playground
- 12 Larch Street Playground
- 13 Swimming Pool
- 14 City of the Wild Ram Site (outdoor theatre)
- 16 VFW Rifle Range, Beach & Lodge
- 16 Boy Scout Campground
- 17 Girl Scout Campground
- 18 Tennis Bowling Lanes
- 19 Cinema Theatre
- 20 Teen Center

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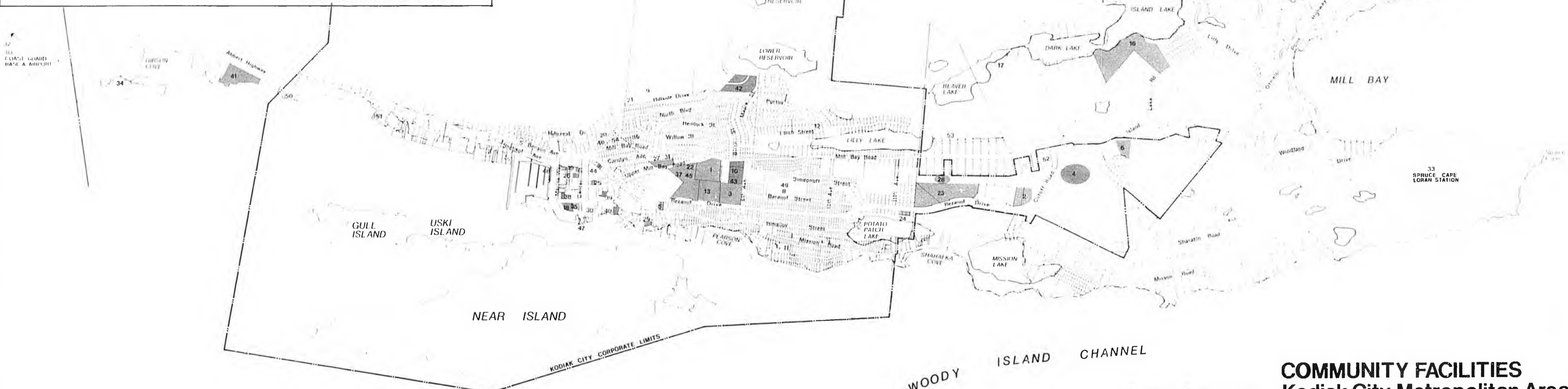
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Legend:

- Federal
- State of Alaska
- Kodiak Island Borough
- City of Kodiak
- Private

0 1000 2000 3000 Feet  
Base prepared by Tryck Nyman & Hayes



**COMMUNITY FACILITIES  
Kodiak City Metropolitan Area**

The preparation of this map was financed in part by funds from the Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, administered by the Division of Community Planning, Alaska Department of Community and Regional Affairs.

Prepared by Simpson Usher Jones Inc. for Kodiak Island Borough

## EXISTING FACTORS AFFECTING FUTURE TRENDS

There are several important factors that could affect the ability of Kodiak to maintain its growth rates and realize its potentials. The factors described below could have a stifling effect on the economy and could also adversely affect the living environment. Each of them is individually significant and should be addressed regardless of OCS development.

### Crime

Criminal activity is normally one of the first and most serious impacts experienced as a result of a "boom" economy. Recent history in Fairbanks, Valdez and a variety of smaller communities along the Trans-Alaska Pipeline route have borne this out. In Kodiak the industrialization and rapid economic growth anticipated to accompany OCS development is already being preceded by an increase in crime. Between 1975 and 1976 total criminal activity was up and the more serious and violent crimes (Part I Offenses) increased.

This situation presents a serious threat to the quality of life in Kodiak. Immediate action by local, state and federal governments is necessary in order to prepare for and combat this problem.

The potential for further rises in criminal activity is increased due to the completion of the Trans-Alaska Pipeline in the near future. As economic activity and population growth decrease in towns and cities along the pipeline, the people who found them easy places to make an illicit living will look for new places to operate. They perceive that Kodiak offers the opportunities they seek. This, along with changes in the internal characteristics of the community, could allow crime to rival fishing as Kodiak's largest industry.

It is incumbent on the community to take action that will create an atmosphere that discourages the criminal, both resident and nonresident.

### Housing

Another serious problem facing Kodiak today is a housing shortage. As indicated above, the population is currently growing at approximately three percent per year. However, over the last five years housing starts, including multifamily units, have averaged less than three percent per year. In addition, over 40 percent of the housing units in Kodiak are in fair to poor condition. Analysis of these statistics indicates that the housing market is not keeping pace with population growth. There is no surplus housing stock on the market from which a prospective home buyer or renter can choose, thus costs are high. This is evident by the small number of dwelling units for sale or for rent in Kodiak at any given time. In addition new homes built in Kodiak are normally sold and/or occupied very quickly. For example, single family homes under construction are generally sold before they are fifty percent complete.

An already inadequate housing supply coupled with an ever present desire by residents to upgrade their housing (a practice most generally achieved by moving into newer homes) creates a discouraging outlook for supplying the housing needs for Kodiak's normal population growth. Fulfilling housing needs resulting from OCS development would be impossible at the current level of housing starts.

There are several reasons why the growth in the housing market has been slow in Kodiak. First, areas available for development which have a full range of utilities are extremely limited. The areas currently served by sewer and water are developed to near capacity, and high utility installation costs discourage development of new areas.

Land availability is another problem in the Kodiak city area. Much of the land surrounding the city is owned by the government and private land available for residential development is limited both in terms of quantity and quality. Much of the available property is either too steep or too boggy to attract development.

The cost of housing is another factor which affects the housing stock in Kodiak. The average new three-bedroom house in Kodiak ranges between \$60,000 and \$80,000. In 1974 the average wage in Kodiak was just over \$1,000 per month. Applying an average increase in salaries of twelve percent per year, this same salary would be about \$1,260 per month in 1976. The purchase of a \$70,000 home, however, would require a monthly mortgage payment of approximately \$650 per month, much too high to be accommodated by the average wage. Therefore, for the average wage earner to purchase the average home in Kodiak, it would require that at least two persons within that household be employed. It may be concluded that housing costs are escalating faster than wages, thus creating a shortage of buyers for the Kodiak housing market. This in turn discourages speculative housing starts and drives up the value of existing homes and the cost of custom-built houses.

#### Commercial And Industrial Land Use

Another problem which will affect the future growth of Kodiak is a shortage of commercial and industrial property. New businesses in Kodiak have a difficult time locating on properly zoned land. This results in higher land costs thus higher consumer prices and finally a higher cost of living. In addition, a less efficient growth pattern is created within the community when businesses are forced to locate on any available commercial or unzoned property they can find rather than in places that are logical and well-suited for that particular type of business. As a point in fact, commercial services are now beginning to appear in places scattered throughout the community. Each time this happens, the potential for conflicts among land uses is increased. This can compound the shortage of prime residential land as well as inhibit the planning and evolution of efficient transportation systems.

Industrial land is also needed to accommodate growth in the fishing industry, as well as to support the nonbasic industrial activities

within the community which are a direct result of basic industry growth. There are no industrial parks in Kodiak, either planned or unplanned. Warehouse space is in short supply, and the potential for new space is limited.

These land use considerations must be addressed by the community in order to maintain the growth patterns and economic development rates that have been established. If they are ignored, they will become more serious and will have an accelerating negative impact on the economic system in Kodiak. In addressing the problems, careful planning must be considered in adopting fiscal policies which will encourage the development of additional moderately priced housing, and the provision of more commercial and industrial areas in proper locations. Considerations such as access, effect on surrounding land uses, neighborhood character, and future land use demands must be taken into account in order to effectively deal with these concerns without creating new problems.

### Social Services

In addition to these land use and economic considerations affecting the future of Kodiak, social factors affecting the quality of life in the community should also be monitored. While these factors may not directly affect the employment rates, housing costs and other developmental characteristics of the community, they do have a direct effect on the living environment in terms of convenience, esthetics and the social well-being of the residents.

Social services are particularly important to a well-balanced community. While there are many such services available in Kodiak, their capabilities to cope with some of the more serious problems is currently impaired by a lack of funds and personnel support on the part of the governmental agencies involved. This is especially true of the health and social services provided by the State of Alaska in spite of recent increases in personnel and budgets. For the most part, those agencies are still underfunded and undermanned. While programs have been established to handle many serious problems such as mental health, alcoholism and public assistance, they can actually accommodate only a relatively small part of the persons currently in need of assistance.

At present there is no indication that the demand for these services will accelerate over and above normal population growth rates. However, if in the near future Kodiak is faced with an extraordinary increase in population due to OCS development, the problems already associated with the social service programs will be further compounded by a larger demand for services and the probability of more complex problems to solve. The community and the State should address these inadequate services as an immediate priority. The level of services offered must be upgraded to adequately meet the current needs of the community and plans should also be made to prepare for the impact that may occur with the advent of a population boom due to OCS development. If not resolved, the inadequacies in the social services could have one of the most serious and most deleterious OCS related impacts on the Kodiak community.

## Recreation Facilities

Another community component that is currently below standard is adequate recreational facilities. Kodiak now falls short of meeting the community demand for neighborhood parks, indoor and outdoor winter recreational facilities, and weekend and vacation facilities around the island. Through provision of these facilities, Kodiak can mitigate many of the social problems which plague many other growing communities. The potential for rapid population growth due to OCS development makes the need for parks and recreational facilities even more acute.

## OUTLYING VILLAGES

The various villages located around Kodiak Island have many divergent characteristics while at the same time having a number of common concerns and features. Their populations range in size from over 300 to under 100. Their locational characteristics are similar in that each is located adjacent to salt water and each is near rivers or streams that offer fresh water sources.

The degree or level of development varies between the villages. Port Lions is the most highly developed with a relatively wide range of community facilities and services including, but not limited to, lighted and maintained city streets, local police protection, modern community-wide telephone service and a comparatively high level of commercial services. The other villages have far less in the way of community facilities and government services. None of the others have maintained streets, community telephone service, or local police. Most have some degree of commercial services and all have schools operated by the Kodiak Island Borough School District. The level of community water and sewer service varies from village to village.

The relationship of the villages to OCS development also varies. Some have the potential of a high level of direct impact. Old Harbor has already been approached by oil industry personnel as a possible site of an onshore service base. The village corporation sought and received assistance from the Keniag Regional Native Corporation in dealing with the oil industry; as yet no facilities are definitely planned for Old Harbor.

Ouzinkie and Port Lions also have potential for direct OCS impacts; but because of their location, they are less likely candidates for service base facilities than is Old Harbor. Like Old Harbor, the rest of the village corporations on Kodiak Island will deal with the oil industry in cooperation with Keniag, Incorporated.

The probability of indirect impacts from OCS development is high in all of the villages. All offer scenic surroundings, hunting and fishing in relative abundance. This will draw tourists and sportsmen in their off-time who seek seclusion, as well as opportunities for trophies and food.

Preparation for these impacts is imperative. The villages can gain from the impacts if that is their desire. However, the implications in terms of economic change, alteration of life styles and physical modification of the villages are extreme. With the notable exception of Port Lions, none of the villages are at all prepared for what could ultimately be the largest influx of people in their histories.

## CONCLUSION

The factors described above are significant and deserve special attention. The assets of the Kodiak Island Borough and its communities are uniquely valuable and should be protected and enhanced. The problems faced by the communities are not insoluble; they are the types of problems that are normally to be expected in a time of rapid growth. They are also the type that can be dealt with through community awareness, local action and proper planning and implementation.

OCS oil development has the potential for either strengthening already healthy communities or creating problems that could result in economic and social disruption for many years to come. The result of OCS impact will depend upon the level of oil industry activity which will occur in Kodiak and the methods that are used in planning for and coping with the impact.

A number of trends can be predicted for Kodiak regardless of OCS development. First, Kodiak will continue to grow. Along with that growth, the cost of living will undoubtedly rise moderately. Housing costs will increase until adequate, buildable land is available to accommodate a growing housing market. The residents of Kodiak can expect their problems with respect to crime, housing, recreational and open space facilities and social services to continue to worsen unless the government steps up its efforts to deal with these issues. Inherent in such an effort, would be the possibility of some increase in the cost of government and a resultant rise in taxes. This situation is one that is common to growing communities.

There are a number of ways in which these concerns can be addressed through proper planning and management tools. Regardless of whether OCS development occurs, these should be addressed as part of the upcoming Kodiak comprehensive plan.

The components of the community that would be most affected by an economic and population boom resulting from OCS development would be those problems which are already most serious. Without exception, the problems described above would become worse at an accelerated rate. Also, increased demands for transportation facilities would place an additional demand on the existing facilities, both internal and external.

In order to determine the proper methods of dealing with the impacts that OCS development might bring, it will be necessary to determine the level of oil industry impact, the resultant population increases to be

expected, and the demands that that economic and population growth will place on the basic community infrastructure. Volume I of this report assesses the demand that the oil industry will place on Kodiak. This assessment is used to determine the types of policy alternatives that are available to the community internally and what policies should be endorsed and encouraged in the state and federal governments in order to protect Kodiak's quality of living and economic viability in the forthcoming years.

## DEVELOPMENT SCENARIO

### ASSUMPTIONS: MAGNITUDE OF RESERVES

Three development scenarios, representing the U.S.G.S. high, low, and middle level of recoverable oil reserves on the Kodiak Shelf are examined in Table 2.

Table 2: Estimated Oil and Gas Reserves

	<u>Oil Reserves</u>	<u>Gas Reserves</u>
Case 1	250 million barrels	0.125 x 10 <sup>12</sup> ft <sup>3</sup>
Case 2	1200 million barrels	0.5 x 10 <sup>12</sup> ft <sup>3</sup>
Case 3	2700 million barrels	0.95 x 10 <sup>12</sup> ft <sup>3</sup>

Source: U.S.G.S. estimates in draft EIS-Western Gulf.

In Case 1, development of oil discoveries of this size would be uneconomic. Explorations are curtailed early on, and no development takes place. Case 3 represents the maximum estimate of recoverable oil and would involve a reasonable amount of development, including an offshore oil pipeline and land terminal. Case 2 is a mid-point between the two other estimates. Two methods of developing this volume of reserves are evaluated here: Case 2a using pipelines and an onshore terminal, and Case 2b using S.B.M.S., or offshore storage requiring no pipeline to shore. In each case, gas reserves are too low to warrant development. Hence no scenario involves gas pipelines or a L.N.G. (liquified natural gas) plant.

### ESTIMATED TIMETABLE OF DEVELOPMENT

Table 3 indicates what offshore development is necessary to recover the range of reserves estimated above.

Table 3: Offshore Development Plans

	<u># Oilfields Developed</u>	<u># Oil Platforms</u>	<u># Gas Platforms</u>	<u>Peak Oil Output</u>	<u>Peak Gas Output</u>
Case 1	---	---	---	---	---
Case 2	3	3	---	250,000 bpd*	---
Case 3	4	5	---	450 bpd	---

\* bpd = barrels per day

Source: Niall Trimble, Department of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

In Case 1, results from drilling are disappointing and so exploration work ceases after four years. No further offshore work is carried out.

In Cases 2 and 3, production follows exploratory drilling. Platforms are installed offshore and, in Cases 2a and 3, oil pipelines are laid to an offshore storage terminal, presumably on Kodiak Island. These pipelines are 140 and 300 miles in length, respectively, and necessitate the lay-barge and bury-barge activity.

#### Probable Timetable of Development

Assumptions used in computing a timetable for development include:

1. Sale of federal leases will be in January, 1989.
2. Upon discovery of a developable oilfield, construction of a permanent drilling platform capable of delivering oil will take five years.
3. Oilfield discovery dates, platform delivery dates, and construction timetable are as outlined in Table 4.

Oil output for each year is estimated in Table 5. Oil output levels are lower than those postulated for other parts of the Gulf of Alaska, as one may expect. However, they are still considerable in terms of American offshore oil production. Case 2 and Case 3 peak production, occurring in 1993, is equivalent to 25.9% and 46.9%, respectively, of the total 1974 U.S. offshore production.

Table 4: Estimated Timetable of Development

	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>
<u>Lease Sale</u>	1980	1980	1980
<u>Discovery Date</u>			
Field #1	---	1981	1981
Field #2	---	1982	1982
Field #3	---	1984	1983
Field #4	---	---	1984
<u>Platform Delivery Date</u>			
Field #1	---	1986	1986,1987
Field #2	---	1987	1987
Field #3	---	1989	1988
Field #4	---	---	1989
<u>Service Base Operations</u>			
		<u>Case 2a</u>	<u>Case 2b</u>
Base #1	---	1979-1980	1979-1980
Base #2	---	1982-1983	---
Base #3	---	---	---
			1982-1983
<u>Oil Terminal Construction</u>		1985-1988	---
			1984-1987
<u>Peak Production (bpd)</u>			
		<u>Case 2</u>	
Field #1	---	100,000/1986	200,000 (100,000 each in 1986,1987)
Field #2	---	100,000/1987	100,000/1987
Field #3	---	55,000/1989	100,000/1988
Field #4	---	---	55,000/1989

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

Table 5: Oil Output -- Western Gulf of Alaska  
(in barrels per day)

<u>Year</u>	<u>Case 1 Output</u>	<u>Case 2 Output</u>	<u>Case 3 Output</u>
1987	---	5,000	5,000
1988	---	40,000	45,000
1989	---	105,000	145,000
1990	---	165,000	270,000
1991	---	215,000	380,000
1992	---	240,000	435,000
1993	---	255,000	455,000
1994	---	245,000	445,000
1995	---	226,000	416,000
1996	---	204,000	355,000

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

### OFFSHORE DEVELOPMENT PLAN

#### Offshore Activity

Given the above assumptions regarding recoverable reserves, necessary development, and probably timetable of events, one can estimate the level of offshore activity over time. This information is presented in Table 6 below. Section A shows activity during the exploration phase; Section B, platform installation dates for those oilfields developed in Cases 2 and 3. In Cases 2a and 3, oil pipelines of 140 and 200 miles in length, respectively, will be laid offshore. Sections C and D give the lay-barge and bury-barge activity necessary to these operations; Section E, the number of supply boats required for each level of activity.

#### Offshore Employment

Total employment levels offshore on rigs, platforms, barges, and supply boats is set out in Table 7, while Table 8 breaks down this total by activity. Oil companies are expected to recruit personnel for this work exclusively from the lower 48. As such, the impact of these jobs on the Kodiak area should be fairly minimal. If offshore workers did move to Alaska, it would probably be to the Anchorage area.

Table 6: Estimated Level of Offshore Activity

# of Exploration  
Rigs Drilling:

<u>Year</u>	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>
1980	1	1	1
1981	2	3	4
1982	3	6	6
1983	1	4	8
1984	---	3	8
1985	---	2	5
1986	---	1	3
1987	---	---	1
TOTAL	7	20	36

# Platforms  
Installed

1986	---	1	1
1987	---	1	2
1988	---	-	1
1989	---	1	1
TOTAL	-0-	3	5

# Lay-barges  
Working

		<u>Case 2a</u>	<u>Case 2b</u>	
1984	---	1	---	1
1985	---	1	---	2
1986	---	1	---	2
1987	---	1	---	1

# Bury-barges  
Working

1985	1985	---	---	1
	1986	---	---	2
	1987	---	---	1

# Supply Boats  
Working:

1980	2	2	2	2
1981	4	6	6	8
1982	6	12	12	12
1983	2	8	8	16
1984	---	14	6	24
1985	---	15	4	29
1986	---	20	9	35
1987	---	21	10	30
1988	---	5	5	15
1989	---	11	11	16
1990	---	7	7	11
1991	---	6	6	10
1992	---	5	5	9

Source: Niall Trimble, Dept. of Community & Regional Affairs, Div. of Comm. Planning, 1977.

Table 7: Total Offshore Employment - Western Gulf OCS Area

<u>Year</u>	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
1980	139	139	139	139
1981	278	417	417	556
1982	417	834	834	834
1983	139	556	556	1,112
1984	---	763	417	1,458
1985	---	760	278	1,523
1986	---	1,005	523	1,765
1987	---	1,202	720	1,725
1988	---	610	610	1,330
1989	---	932	932	1,542
1990	---	884	884	1,432
1991	---	822	822	1,370
1992	---	700	700	1,248

Source: Niall Trimble, Department of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

Table 8: Offshore Employment by Activity

	<u>Rigs</u>	<u>Platforms</u>	<u>Supply Boats</u>	<u>Lay-Barge</u>	<u>Bury-Barge</u>	<u>Total</u>
<u>Case 1</u>						
1980	115	---		---	---	139
1981	230	---	48	---	---	278
1982	345	---	72	---	---	417
1983	115	---	24	---	---	139
1984	-0-	---	-0-	---	---	-0-

Table 8: Offshore Employment by Activity, Continued

	<u>Rigs</u>	<u>Platforms</u>	<u>Supply Boats</u>	<u>Lay- Barge</u>	<u>Bury- Barge</u>	<u>Total</u>
<u>Case 2a</u>						
1980	115	---	24	---	---	139
1981	345	---	72	---	---	417
1982	690	---	144	---	---	834
1983	460	---	96	---	---	556
1984	345	---	168	250	---	763
1985	230	---	180	250	100	760
1986	115	300	240	250	100	1005
1987	---	600	250	250	100	1202
1988	---	550	60	---	---	610
1989	---	800	132	---	---	932
1990	---	800	84	---	---	884
1991	---	750	72	---	---	844
1992	---	640	60	---	---	700
<u>Case 2b</u>						
1980	115	---	24	---	---	139
1981	345	---	72	---	---	417
1982	690	---	144	---	---	834
1983	460	---	96	---	---	556
1984	345	---	72	---	---	417
1985	230	---	48	---	---	278
1986	115	300	108	---	---	523
1987	---	600	120	---	---	720
1988	---	550	60	---	---	610
1989	---	800	132	---	---	932
1990	---	800	84	---	---	884
1991	---	750	72	---	---	822
1992	---	640	60	---	---	700
<u>Case 3</u>						
1980	115	---	24	---	---	139
1981	460	---	96	---	---	556
1982	690	---	144	---	---	834
1983	920	---	192	---	---	1112
1984	920	---	288	250	---	1458
1985	575	---	348	500	100	1523
1986	345	300	420	500	200	1765
1987	115	900	360	250	100	1725
1988	---	1150	180	---	---	1330
1989	---	1350	192	---	---	1542
1990	---	1300	132	---	---	1432
1991	---	1250	120	---	---	1370
1992	---	1140	108	---	---	1248

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

## ONSHORE DEVELOPMENT PLAN

Offshore oil production will require onshore facilities, notably service bases with supply boat berths and, in Cases 2a and 3, pipelines and oil terminals. The size of the find determines the number of service bases and the size of the storage facilities. Choice of method in transporting the oil, i.e. either by pipeline as in 2a or by S.B.M. offshore as in 2b, also makes a big difference in onshore facility needs. Facility construction and its associated land, employment, and other needs are discussed below.

### Facility Construction

Given the January 1980 lease sale, the oil industry plans on construction onshore facilities according to the schedule outlined in Table 9.

Table 9: Onshore Construction Schedule

Case 1	Nil
Case 2a	1 base (2 berths) built 1980-1981 1 base (3 berths) built 1982-1983 1 oil terminal, capacity 250,000 bpd, built 1985-1988
Case 2b	1 base (2 berths) built 1980-1981
Case 3	1 base (2 berths) built 1980-1981 2 bases (3-4 berths) built 1981-1982; 1982-1983 1 oil terminal, capacity 450,000 bpd, built 1984-1987

Source: Simpson Usner Jones, 1977.

Service bases, with berths for supply boats, are essential to OCS development from the exploration phase through the production phase. Onshore oil storage and marine terminals are also required during the production phase of Cases 2a and 3.

The number of working supply boats determines the demand for onshore berths, and hence the necessary number of service bases. This demand is set out in Table 10.

The pattern of berth demand parallels that of the Northern Gulf: it increases rapidly over 6 or 7 years to a peak. This peak lasts but one year; then requirements fall steadily to around 2 to 3 berths -- apparently the long term demand. Communities such as Kodiak should be wary of accepting supply-boat bases if this development damages other local industries. After the first ten years or so, activity and hence employment drop to a fairly low level.

Table 10: Demand for Supply Boat Berths

<u>Year</u>	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
1980	1	1	1	1
1981	1	1	1	2
1982	1	2	2	2
1983	1	2	2	3
1984	0	4	1	6
1985	0	4	1	8
1986	0	5	2	9
1987	0	5	2	7
1988	0	2	2	3
1989	0	2	2	4
1990	0	2	2	3
1991	0	2	2	3
1992	0	2	2	3

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

In addition to supply boat berths, a service base includes other basic and supplementary facilities. These are listed below.

Basic Facilities

Berths  
Staging Areas  
Floodlighting  
Warehousing  
Open Storage  
Fueling Facilities  
Water (potable and drilling)  
Mud and Cement Supplying Facilities  
Mobile Equipment  
Agency Facilities (ship chartering, freight forwarding, customs, etc.)  
Office Accommodation  
Communications  
Refuse Removal Facilities

Spare service base facilities are now non-existent in the parts around the Western Gulf. As such, additional facilities will be needed from the start of exploration. All levels of offshore activity except Case 1 will require one small base of two berths from the beginning of exploration. No further bases are needed in Case 2b. However, Cases 2a and 3 both require one more medium base by 1984, and Case 3 would need another medium sized service facility the following year.

### Land Acquisition

Land is needed for the above additional service bases and oil storage terminals noted above. In addition, land may be required near a commercial airport.

Land needs for marine service bases have been well defined through experience in the North Sea offshore oil fields. The State Department of Community and Regional Affairs recently published the study "Marine Service Bases for Offshore Oil Development" (Tom Smyth; Alaska Consultants, July, 1976). In this study, Smyth divided land requirements into two categories: 1) land immediately adjacent to the port facilities; and 2) backup land for ancillary uses. The land adjacent to the port is needed for the quay apron, silos, transportation corridors, tank storage, and warehousing. The backup lands are necessary for open storage, office facilities and other supplementary facilities. The space required to accommodate these facilities during the exploration phase of development at a North Sea service base location is shown in Table 11.

Table 11: Land Use, Space Per Offshore Rig, and Space Per Berth\*  
Selected Service Base Servicing Exploration Phase  
Scottish Sector, North Sea

	<u>Area</u>	<u>Space per Rig</u>	<u>Space per Berth</u>	<u>Space per Berth (2)</u>
<u>Recurring Requirements:</u>				
Quay apron & silos	1.50	.38	.50	.50*
Warehousing	1.25	.31	.42	.62
Open storage	11.50	2.87	3.83	5.75
Offices	.50	.12	.17	.25
<u>Non-Recurring Requirements:</u>				
Workshops	.00	.00	.00	.00
Tank Storage	.25	.06	.08	.12
Other	.00	.00	.00	.00
<b>TOTAL</b>	<b>15.00</b>	<b>3.75</b>	<b>5.00</b>	<b>7.25</b>

\* Space calculated in acreage

(1) Assuming two (2) berths

(2) Assuming the apron behind the third berth is unused.

Source: Alaska Consultants, Inc.

It is assumed that the North Sea average of 7.25 acres of land per berth during the exploration period will apply to the Western Gulf of Alaska. As drilling progresses at a more rapid rate during development, Smyth estimates that each berth would require approximately 8 acres at the service base.(1) Using this figure, additional land needs for service bases are outlined in Table 12.

Table 12: Land Requirements - Service Bases

Case 1	Nil
Case 2a	40 acres - (16 acres in 1979, +24 acres in 1982)
Case 2b	16 acres in 1979
Case 3	72 Acres (16 acres in 1979, +24 in 1981, +32 in 1982)

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

Land needs for crude oil storage and terminal depends upon the level of production. Case 2a requires an oil terminal capacity of 250,000 bpd; Case 3, a capacity of 450,000 bpd. According to the previously referenced draft Crude Oil Storage and Marine Terminals profile, the smaller terminal would require about 100 acres; the larger about 150 acres. However, if the only land available is hilly or unstable, as is common in Kodiak, storage capacity could be reduced some 60 percent. Consequently, a larger site may be necessary: some 250 acres in Case 2a, and 375 acres in Case 3.

Additional land may also be required near a commercial airport, as indicated in Table 13. According to a forecast by the Gulf of Alaska Operators' Committee, approximately half as much land is required at the airport as is required at the marine service base. Using this assumption, the following additional land would be needed near the Kodiak airport.

Table 13: Additional Land Requirements

Airport

Case 1	Nil
Case 2a	20 acres (8 in 1979 + 12 in 1982)
Case 2b	8 acres in 1979
Case 3	36 acres (8 in 1979; +12 in 1981; +32 in 1982)

Oil Terminals

	<u>Suitable Ground</u>	<u>Hilly or Unstable Ground</u>
Case 1	Nil	---
Case 2a	100 acres	250 acres
Case 2b	Nil	---
Case 3	150 acres	375 acres

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Total estimated land requirements for each level of development are summarized in Table 14.

Table 14: Total Land Requirements

	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
Service Bases	---	40 ac.	16 ac.	72 ac.
Airport	---	20	8	36
Oil Terminals	---	<u>100-250</u>	---	<u>150-375</u>
Total Acreage Needed		160-310	24	258-513

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Onshore Employment

Labor needs for construction, administration, and facility operations are examined here. These are then combined with offshore employment needs to get total labor requirements. Finally, using the percentage of total jobs occurring in the coastal zone, employment levels in that area are set out by year. The labor force required to build the oil terminal is outlined in Table 15.

Table 15: Oil Terminal Labor Force

	<u>Year 1*</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>
Case 2a - 250,000 bpd	150	600	1,200	300
Case 3 - 450,000 bpd	200	1,000	1,900	600

\* As mentioned in the previous section, Year 1 is 1985 in Case 2a and 1986 in Case 3.

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977.

Terminal operations employment is: Case 2a, 150 personnel; Case 3, 250 personnel.

These figures enable us to calculate onshore employment by activity. Table 16 below gives onshore employment figures for administration jobs; rig, platform, service base, and terminal associated jobs; and construction work for each case.

Table 16: Onshore Employment by Activity

<u>Year</u>	<u>Adminis- tration</u>	<u>Service Bases</u>	<u>Rig Associated</u>	<u>Platform Associated</u>	<u>Terminal</u>	<u>Construction</u>	<u>Total</u>
<u>Case 1 - Low Find:</u>							
1980	15	15	25	---	---	---	55
1981	30	15	50	---	---	---	95
1982	45	15	75	---	---	---	135
1983	15	15	25	---	---	---	55
<u>Case 2a - Moderate Find (pipeline)</u>							
1980	15	15	25	---	---	75	130
1981	45	15	75	---	---	150	285
1982	90	30	150	---	---	100	370
1983	60	30	100	---	---	200	390
1984	45	60	75	---	---	---	180
1985	30	60	50	---	---	150	290
1986	55	75	25	100	---	600	855
1987	80	75	---	200	---	1200	1555
1988	80	30	---	180	75	300	665
1987	120	30	---	260	150	---	560
1990	120	30	---	260	150	---	560
1991	120	30	---	240	150	---	540
1992	120	30	---	200	150	---	500
<u>Case 2b - Moderate Find (S.M.B.):</u>							
1978	15	15	25	---	---	75	130
1979	45	15	75	---	---	150	285
1980	90	30	150	---	---	---	270
1981	60	30	100	---	---	---	190
1982	45	15	75	---	---	---	135
1983	30	15	50	---	---	---	95
1984	55	30	25	100	---	---	210
1985	80	30	---	200	---	---	310
1986	80	30	---	180	---	---	290
1987	120	30	---	260	---	---	410
1988	120	30	---	260	---	---	410
1989	120	30	---	240	---	---	390
1990	120	30	---	200	---	---	350
<u>Case 3 - High Find (Pipeline):</u>							
1978	15	15	25	---	---	75	130
1979	60	30	100	---	---	250	440
1980	90	30	150	---	---	300	570
1981	120	45	200	---	---	200	565
1982	120	90	200	---	---	200	610
1983	75	120	125	---	---	1000	1320
1984	85	135	75	100	---	1900	2295
1985	135	105	25	300	125	600	1290
1986	160	45	---	380	250	---	835
1987	200	60	---	440	250	---	950
1988	200	45	---	420	250	---	915
1989	200	45	---	400	250	---	895
1990	200	45	---	360	250	---	855

Source: Niall Trimble, Dept. of Community and Regional Affairs,  
Division of Community Planning, State of Alaska, 1977.

A summary of total onshore employment levels follows (Table 17). These figures, added to the offshore employment numbers (Table 7 on page 16) produces total direct employment from OCS development, Table 18.

Table 17: Total Onshore Employment

<u>Year</u>	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
1980	55	130	130	130
1981	95	285	285	285
1982	135	370	270	570
1983	55	390	190	565
1984	---	180	135	610
1985	--	290	95	1320
1986	---	855	210	2295
1987	---	1555	310	1290
1988	---	665	290	835
1989	---	560	410	950
1990	---	560	410	915
1991	---	540	390	895
1992	---	500	350	855

Source: Niall Trimble, Department of Community & Regional Affairs, Div. of Community Planning, 1977.

Table 18: Total Employment - Onshore and Offshore

<u>Year</u>	<u>Case 1</u>			<u>Case 2a</u>			<u>Case 2b</u>			<u>Case 3</u>		
	<u>On</u>	<u>Off</u>	<u>Total</u>	<u>On</u>	<u>Off</u>	<u>Total</u>	<u>On</u>	<u>Off</u>	<u>Total</u>	<u>On</u>	<u>Off</u>	<u>Total</u>
1980	55	139	194	130	139	269	130	139	269	130	139	269
1981	95	278	373	285	417	702	285	417	702	440	556	996
1982	139	417	552	370	834	1204	270	834	1104	570	834	1404
1983	55	139	194	390	556	946	190	556	746	565	1112	1677
1984	---	---	---	180	763	943	135	417	552	610	1458	2068
1985	---	---	---	290	760	1050	95	278	373	1320	1523	2843
1986	---	---	---	855	1005	1860	210	523	733	2295	1765	4060
1987	---	---	---	1555	1202	2757	310	720	1030	1290	1725	3015
1988	---	---	---	655	610	1275	290	610	900	835	1330	2165
1989	---	---	---	560	932	1492	410	932	1342	950	1542	2492
1990	---	---	---	560	884	1444	410	884	1294	915	1432	2347
1991	---	---	---	540	822	1362	390	822	1212	895	1370	2265
1992	---	---	---	500	700	1200	350	700	1050	855	1248	2103

Source: Niall Trimble, Dept. of Community & Regional Affairs, Div. of Community Planning, State of Alaska, 1977.

## SUMMARY OF EMPLOYMENT

The pattern of employment growth and decline is similar to that shown for the Northern Gulf licenses in many respects:

1. The different scenarios vary considerably in expected levels of employment. In 1986, the number of Western Gulf jobs could be 0, 1,900, 700, or 4,100 depending on whether Cases 1, 2a, 2b, or 3 came about. Obviously an accurate forecast of employment in this area is still impossible.
2. Employment rises rapidly to a peak, generally around 1986-1987, and then falls sharply. However, the number of jobs does not fluctuate so rapidly in Case 2b.
3. Choice of method of transportation, pipeline or S.B.M., once again makes a critical difference to the impact on the economy. In Case 2a the job count reaches almost 2,800 in 1987, when the count for Case 2b, the S.B.M. mode, is only 1,000 jobs.

Despite the similarities between the Northern and Western Gulf, there are two distinct differences in employment:

1. The general level of activity is much smaller. The highest employment figure recorded for the top scenario, Case 3, is just over 4,000. In the Northern Gulf, equivalent figures for the two top scenarios were 6,800 and 10,600. This is partly because oil reserves are probably smaller; primarily, though, gas reserves are so limited in the waters around Kodiak Island that there is virtually no possibility of a gas pipeline or L.N.G. plant.
2. The absence of gas developments cushions the severe decline from the peak level of employment found in the Northern Gulf. There, employment by 1990 was generally around 40 percent of peak. In comparison, the proportions in the West are 43.3 percent and 51.8 percent of peak for Cases 2b and 3, respectively. Clearly the reduced level of construction will mean that employee reductions will not be quite so dramatic as they might in the Northern Gulf experience.

### Employment in the Coastal Zone

Separate calculations for employment in the coastal zone have also been performed for the Western Gulf. That portion of onshore employment which occurs in the coastal zone is outlined in Table 19.

Relating the figures in Table 19 to Table 16, Onshore Employment by Activity, gives the total coastal zone employment. Results are summarized in Table 20 and Table 21.

Table 19: Onshore Employment in Coastal Zone

<u>Activity</u>	<u>% of Jobs in Coastal Zone</u>
Administration	0%
Base Operations	100%
Rig-Associated	50%
Platform-Associated	50%
Terminal Operations	100%
Construction	100%

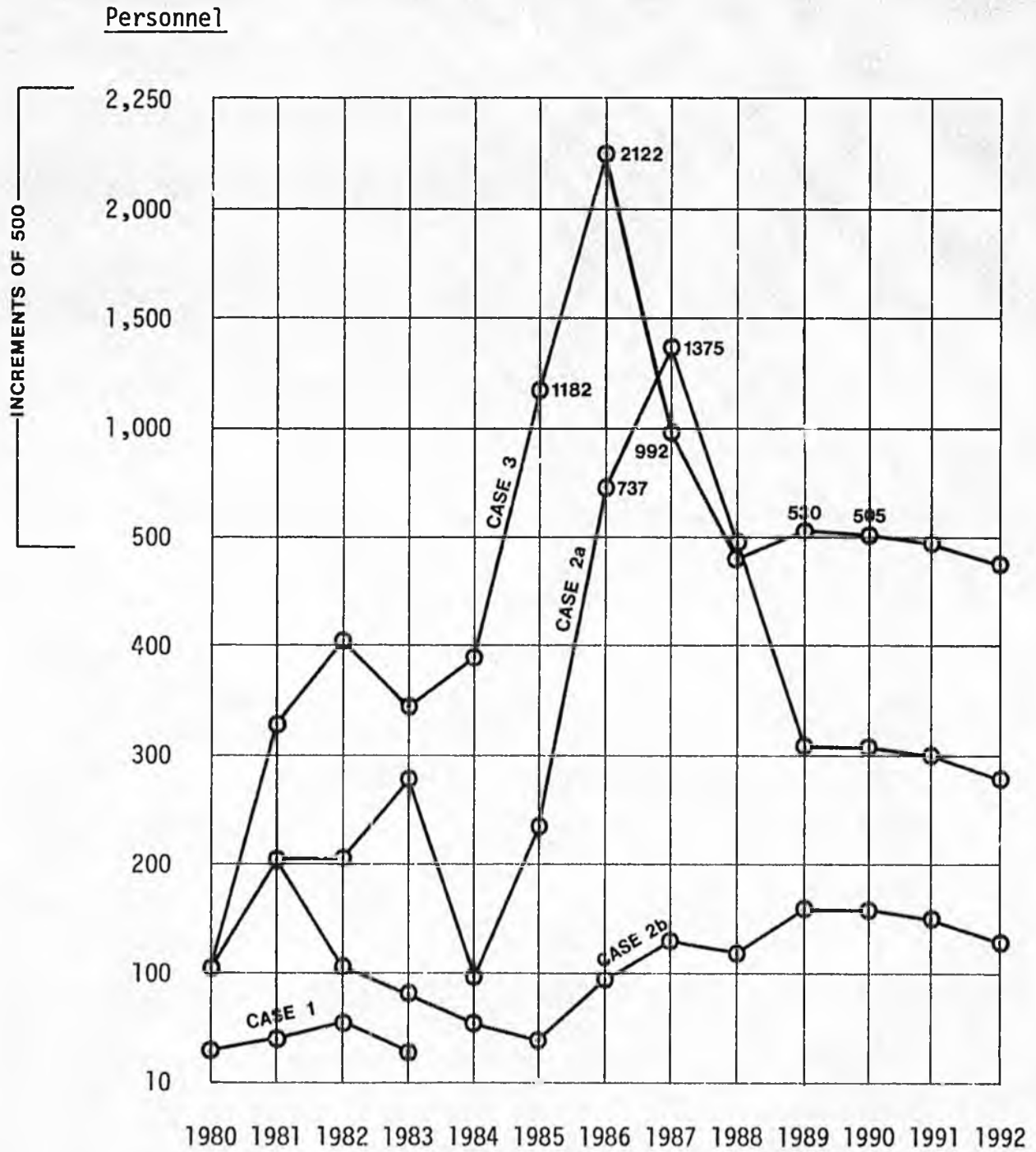
Source: Niall Trimble, Dept. of Community and Regional Affairs, Div. of Community Planning, State of Alaska, 1977.

Table 20: Coastal Zone Employment - Western Gulf of Alaska OCS

<u>Year</u>	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
1980	27	102	102	102
1981	37	202	202	330
1982	52	205	105	405
1983	27	280	80	345
1984	---	97	52	390
1985	---	235	40	1182
1986	---	737	92	2122
1987	---	1375	130	992
1988	---	495	120	485
1989	---	310	160	530
1990	---	310	160	505
1991	---	300	150	495
1992	---	280	130	475

Source: Niall Trimble, Dept. of Community and Regional Affairs, Div. of Community Planning, 1977.

Table 21: Coastal Zone Employment  
From Western Gulf of Alaska OCS Activities



Source: Niall Trimble, Depart. of Community & Regional Affairs, Division of Community Planning, State of Alaska, 1977.

For both Cases 2a and 3, employment grows moderately from 1980 to 1984, and then grows explosively for the short period 1985-1986 while construction labor forces build up. A very sharp decline follows, with employment levels falling by 80 percent. In Case 3, employment in the coastal zone falls from 2,100 in 1986 to 500 in 1988. Thereafter the labor force should remain relatively stable.

#### MISCELLANEOUS REQUIREMENTS: WATER, GRAVEL

OCS development will generate a variety of less significant needs. Many will not be identified until later in the development process. However, several are predictable now, including water and gravel requirements.

Fresh water is normally used in large quantities for offshore drilling: mixed with chemicals, it makes the drilling fluid or "mud" used to displace rock cuttings. According to the Materials Supply Profile published by the Department of Community and Regional Affairs, approximately 600,000 to 900,000 gallons of "drill water" is utilized for each exploratory well drilled offshore. Since production wells are normally shallower than exploration wells, we assume that 600,000 is the average water requirement for both exploratory and development wells.

According to the development scenarios, in 1989 the peak number of wells will be drilled: an estimated 21 wells in Case 2 and 39 in Case 3. This will require 12.6 million and 23.4 million gallons of water, respectively, or approximately 47,547 or 64,110 gallons per day for drilling operations alone. The Kodiak municipal water system is already used to capacity and could not, therefore, provide anywhere near this amount of water. Consequently, drill water must come from alternate sources, possibly Seward or from water wells drilled on Kodiak Island near the marine service bases. New drilling techniques utilizing salt water could also be used extensively in the Western Gulf to reduce expenses of transport and/or development of water sources. Although salt water in drilling mud is normally somewhat more expensive than fresh water, it may be more economically feasible here considering transportation and development costs.

Most drilling and other industrial supplies will not be shipped from Kodiak, for Kodiak does not have the supply houses necessary to supply materials to drilling operations on a continuing basis. Although materials may be bought in Kodiak in emergencies, this would not be the normal mode of operation.

Large amounts of gravel, primarily for concrete mixing, will be needed for marine service bases, terminals and oil storage facilities. Kodiak has no extensive sources of commercial grade gravel: blasting is the primary source of aggregate. Although it is impossible to determine how much gravel is needed, the Kodiak Island Borough will undoubtedly receive requests for quarry permits. The Borough should be prepared with policies and development standards to apply to these requests.

## PROBABLE LOCATION OF ONSHORE DEVELOPMENT

In the Western Gulf, the oil industry must decide where to locate onshore facilities. This decision is affected by Northern Gulf operations as well as factors relating to mode of operation. Basically, three alternate modes of operation are possible: 1) using Seward for onshore service bases throughout both exploration and development phases; 2) using Seward during initial exploration phases with a partial or total move to Kodiak as development and production progress; or 3) using Kodiak Island for onshore facilities throughout the entire exploration, development and production phases. Many decisions must be made and information known before a final decision on one mode.

A number of interrelated factors will affect the oil industry's decisions. No one factor will solely determine which mode is used; each will contribute to the final decision. An understanding of these factors and their relationships, explained below, is crucial in estimating potential impacts of decisions on operational modes.

### Factor 1: Cost of Exploration versus Probability of Discovery

Any time a new oil field is developed, the oil industry is taking a gamble. National averages indicate that only one out of three potential oil fields contain sufficient quantities of petroleum products to economically warrant development. Consequently, oil companies normally utilize as little capital as possible in exploring new fields. Apparently this is the approach they are taking in the Gulf of Alaska.

Oil companies have already taken actions that indicate they will utilize existing facilities during the exploration phases of OCS development as much as possible. In the short run this decision may mean greater inconvenience to the industry due to lengthy transportation distances, expensive short-term land costs, and insufficient onshore facilities. However, if economical quantities of oil are not found, the oil companies will, in the long run, save themselves the expense of developing needless new facilities.

The oil industry took the "minimum investment during exploration" approach in their development of Upper Cook Inlet. As the initial exploration wells were being drilled during the late 1950's and early 1960's, the offshore rigs in Cook Inlet were supplied mainly out of Anchorage. This included the supply boats and the crew boats. This approach shifted, however, when oil deposits were discovered and production platforms went into operation in the mid-1960's. At that time the oil industry selected Kenai as a permanent center for onshore service operations due to its close proximity to the oil fields and other favorable aspects. New facilities were built, subcontractors and supply companies located their operations in Kenai and crew change and material supply operations were carried out there.

Based on the recent industry statements and their past experience both in Alaska and nationally, it is believed the oil industry will once

again depend on existing facilities during the exploration phase of development in the Northern Gulf of Alaska. Communities whose facilities are being considered to supply the exploratory efforts are believed to be Seward, Cordova and Yakutat. Of these sites, recent trends indicate that Seward is favored by some companies as the initial base of operations.

Seward is particularly attractive because it has a year-round deep water port, a railhead, highway access, available industrial land and a relatively favorable political climate. In addition, it is midway between the Northern and Western Gulf lease areas. Exxon has already gained control of 32 acres in Seward. Thirty of those acres are three miles to the north of town and have both road and rail access. The remaining two acres are located on the waterfront within the city limits of Seward. In addition it is reported that Texaco is currently looking for industrial land in the Seward area. Shell and Arco are already depending on Seward to obtain fresh water supplies necessary to support their drilling operations in the Northern Gulf of Alaska. In addition, plans have been made by Dresser Industries, a major oil field supply company, to build a barite plant in Seward. Barite is a primary component of drilling fluid (mud).

While using Seward as a water source, Shell and Arco (formerly with Mobil as the SAM group) have indicated that they intend to utilize Yakutat as a service base for their operations in the Northern Gulf. However, feelings within the oil industry indicate that the adverse political climate and the lack of required facilities in Yakutat have discouraged other OCS operators from locating there. (2)

While Shell and Arco will probably continue to use Yakutat as a base for Northern Gulf development, they will have to establish another, closer service base if they pursue development of the Kodiak Shelf. Seward and Kodiak will be the two most likely sites. If the other major oil companies choose Seward as a base for the exploration of the Kodiak Shelf, Shell and Arco will probably locate there initially. It is a frequent practice for oil companies to locate their onshore service facilities in close proximity to one another. This practice enables them to share facilities such as airports, heliports, and dock facilities. It also means subcontractors and supply companies can serve an entire oil field from one location, a situation far more preferable than establishing numerous, smaller facilities at scattered bases.

As noted above, the oil industry's interest in Seward is only a trend and is a result primarily of their activity in the Northern Gulf. At this point there is still a great deal of speculation, and it is probable that Kodiak will be given more consideration as a service base site for the exploration phase on the Kodiak Shelf in the Western Gulf. That decision will be based on the costs of building and operating facilities in Kodiak compared with the cost of operating out of Seward. The potential results of that comparison are directly related to the following factor.

## Factor 2: Location of Service Bases for Northern Gulf Development

Decisions made within the next two years by the oil companies concerning their mode of operation in the Northern Gulf of Alaska could have a tremendous affect on their final decisions on how to handle operations in the Western Gulf. As indicated above, decisions have already been made to provide service bases for the Northern Gulf initially in Seward and Yakutat. As the development phase in the Northern Gulf proceeds, it may become advantageous for the oil companies to abandon the initial exploration phase service bases in Seward and locate comprehensive service bases closer to the oil fields. For the purposes of discussion, one likely site for such a remote comprehensive onshore service facility would be Icy Bay. The Chugach Native Association has land available in Icy Bay for service bases and has indicated an interest in working with the oil companies in locating such bases there. If this were to happen, then the Seward base would tend not to develop into a comprehensive service base although some activity would still originate from there. This could tend to diminish the role of Seward in the development of the Kodiak Shelf. The oil companies would then have the option of developing remote comprehensive service facilities in Kodiak or utilizing the existing although noncomprehensive facilities in Seward.

On the other hand, if the decision is made to continue to operate out of Seward throughout the exploration, development and production phases of the Northern Gulf oil fields, then it can be assumed that the same Seward service base would be appropriate for use in the exploration of the Kodiak Shelf. In that case, the oil industry would not have the necessity of developing new comprehensive service bases for the exploration phase of the Kodiak Shelf, although that alternative would not be eliminated. If oil was subsequently discovered in the Western Gulf, then the industry would have to decide whether or not the development of new service bases on Kodiak Island would be less expensive in the long run than continuing to operate out of a comprehensive service base in Seward.

In summary, if the oil industry decides to utilize Seward as a comprehensive onshore service facility for the development of the Northern Gulf, then the probability is high that they would utilize the same service base for their initial activity in the Western Gulf. If, however, the industry decides to build a remote service facility closer to the lease areas in the Northern Gulf, then it is possible that they would decide to build a similar onshore facility on Kodiak for the development of the Kodiak Shelf. Again, this decision is related to the following factor.

## Factor 3: Location of Lease Sale Area in the Western Gulf

This is one of the most obvious determining factors affecting the location of service bases for the Western Gulf. As can be seen in Map 1, the lease area on the Kodiak Shelf extends in a northeasterly southwesterly direction on the eastern side of Kodiak Island from the southern tip of the island almost to the tip of the Kenai Peninsula. If oil reserves are discovered near the northern end of the lease sale area, then the feasibility of using Seward as an onshore service facility during one or

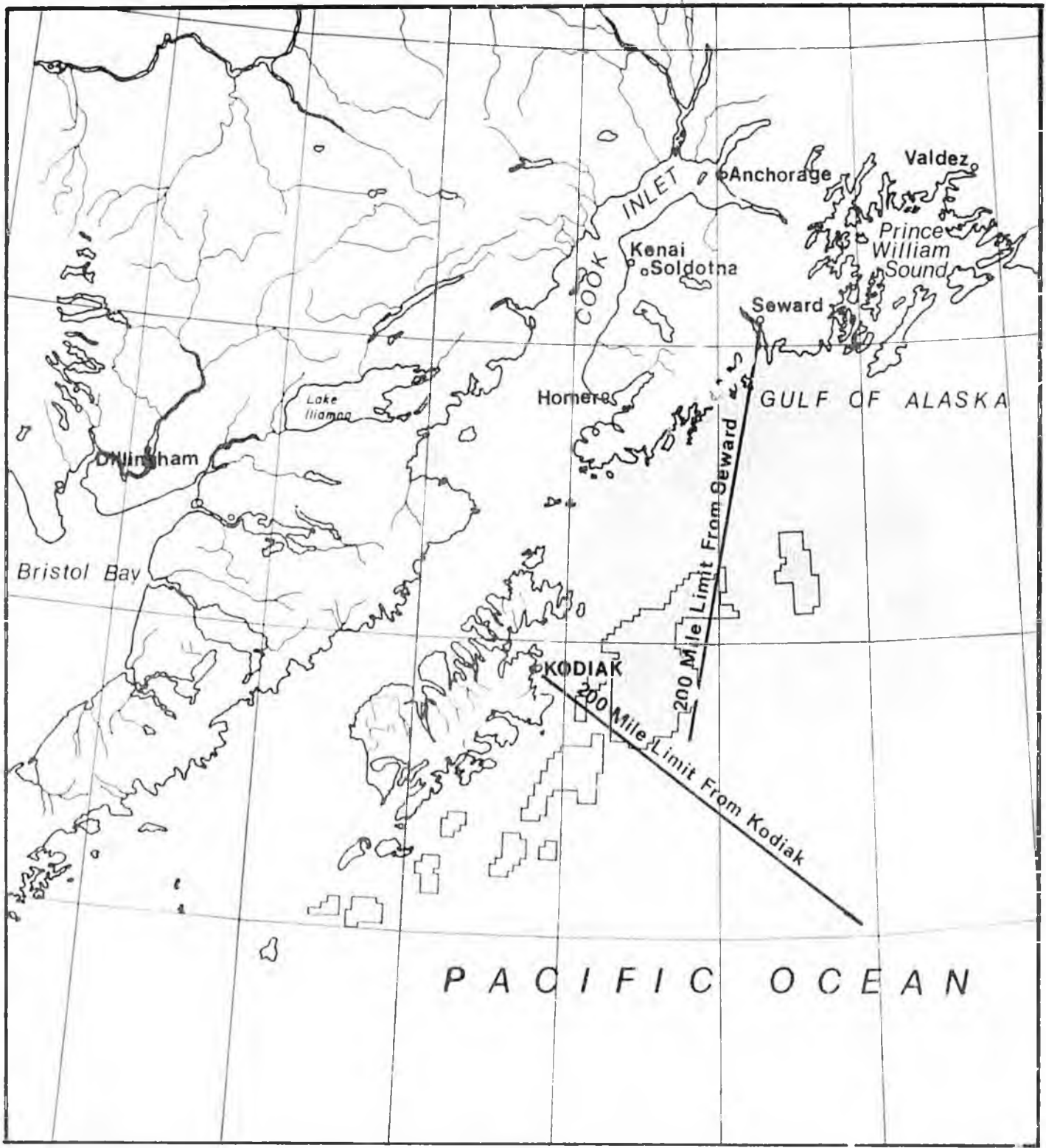
more of the phases will be greatly increased. However, if oil is discovered near the southern tip of the lease area, the utilization of Seward throughout the exploration, development and production phases could easily be infeasible. The oil industry has indicated that the service bases should be within two hundred miles of the oil development areas. Map 1 shows the extent of the two hundred mile radius from both Seward and Kodiak. This two hundred mile figure is not necessarily absolute. Depending upon transportation costs and facility development costs, decisions might be made to operate onshore service facilities further than two hundred miles from the rigs.

This question will be partially answered at the time the lease sales are held. If the industry leases land in the northern half of the lease sale area, then the probability of using Seward will be increased. However, if the majority of leases are in the southern half, then the probability of using Kodiak Island as a service base site would be higher. The final answer to the question will be known only at the time that oil is actually discovered and the delineation wells are drilled that will determine the size of the fields to be developed.

#### Factor 4: Air Support Facilities

An important consideration in determining the location of onshore service facilities is the capability of the various candidate sites to accommodate both commercial and noncommercial air support services. The majority of the supplies needed to operate the exploration and development rigs will be transported from the service facility via work boat regardless of whether the onshore facilities are located in Kodiak or Seward. However, certain items such as some perishables as well as equipment and personnel needed on the platform for drilling emergencies will come by air. Helicopters will be used to transport these items to the platforms. In most cases, however, the industry will attempt to utilize commercial air carriers between the nearest airport and supply centers such as Anchorage to keep helicopter flight time as low as possible. For instance, assume a particular tool was needed at a platform on the Kodiak Shelf as quickly as possible. Assuming adequate airline schedules, it would be less expensive and faster to put the tool on a commercial jet from Anchorage to Kodiak and then on a helicopter from Kodiak to the oil platform than it would be to ship the tool to Seward and then fly the tool by helicopter from Seward to the oil platform. The same is true of personnel, both in the case of emergency technical personnel as well as entire drilling crews.

Information from the oil industry to date indicates that the helicopters that will be used in the Gulf of Alaska are the Sikorski S61 and the Bell 212. (3) The larger of the two is the S61. It has a maximum range of 450 miles which will allow it to fly a maximum of approximately 200 miles to a platform with a 50 mile reserve range. Thus over half of the lease area on the Kodiak Shelf is out of range of the helicopters if they were to be flown from Seward. On the other hand, almost all of the lease area is within the 200 mile range from Kodiak. See Map 2.



WESTERN GULF OF ALASKA  
OIL LEASE SALE AREAS

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Prepared by Simpson Usher Jones Inc. for Kodiak Island Borough.

# OIL LEASE SALE LOCATION MAP

In addition to helicopter traffic, it will be necessary to utilize Hercules airplanes during the development of the Kodiak Shelf. At present the Seward airport cannot accommodate aircraft of this size. The Seward airport has two runways. Runway 12/30 has a length of 4750 feet. Runway 15/33 is 2300 feet long. The surface on both runways is a light BST with a 40,000 pound maximum load. This will not accommodate a Hercules-type airplane. In addition the Seward airport has no instrument landing system (ILS). Aircraft operating out of Seward must utilize visual flight rules (VFR). According to the State of Alaska Division of Aviation, there is little chance that the Seward airport could ever accommodate ILS equipment because of terrain problems. Kodiak, on the other hand, does have an ILS system capable of handling both helicopters and cargo aircraft traffic. The runways at Kodiak are longer, the longest being 7500 feet, and there is no practical weight limit on the runways. Consequently, from a flight operations standpoint, the Kodiak airport is ideally suited for OCS development related air support while the Seward airport is incapable of providing such air support.

In order to accommodate the air service operations, it is necessary to have a number of onshore facilities located at the airport. These include a number of onshore employees involved with expediting, aircraft maintenance, and loading and unloading aircraft. In addition warehouse space, office space, aircraft maintenance facilities, and apron area would be required. At present the Seward airport has no area available for the development of these types of facilities. The airport is adjacent to land owned by the Alaska Railroad, which is not available for development of support facilities. There is no lease space available on the apron for support facilities and little chance of expansion. Kodiak has ample area for these types of facilities. In addition to the apron that is currently being used for commercial aircraft, the Kodiak airport has at lease two separate apron areas that could be used for air support facilities. Ample land is available around the airport that could be developed with industrial facilities to support OCS development.

Another factor concerning air support services is the lack of adequate commercial air carriers in Seward. Because of the small size of the airport, the lack of facilities, the low weight capacity and the absence of ILS equipment, the Seward airport cannot accommodate commercial jet air carriers. Kodiak is currently served by both Wien Air Alaska and Western Airlines. Wien Air Alaska currently operates an average of two flights a day from Anchorage and Western operates three flights per week from Seattle to Kodiak during the spring and summer months. Therefore, platform crew change operations could easily be carried out in Kodiak but would be difficult and inconvenient to be operated through Seward.

Because of these factors and based on past experiences and indications from the oil industry, it seems logical that Kodiak will be the base of air support operations for the OCS development on the Kodiak Shelf. While there is no absolute necessity that marine support facilities be located in close proximity to the air support facilities, it is assumed that for economic, coordination and convenience purposes the oil industry would prefer to have those facilities located close to each other. This factor will have a significant influence on the industry's decision as to the location of their onshore marine service facilities.

#### Factor 5: The Availability of Land and Port Facilities

Sources within the oil industry have indicated concern over utilizing Kodiak for onshore marine service bases. Their concerns center around a perceived lack of available land, inadequate port and transportation facilities and inadequate supplies of water to be used in the drilling operation. At present the port facilities within the City of Kodiak are being used to their capacity (see Volume II, Transportation Facilities). In addition, land is not available near these port facilities that could be used for warehousing, office space and outdoor storage necessary for an onshore service base. Consequently, if service bases are located on Kodiak, completely new facilities will have to be built. The one exception to this is the former Chiniak tracking station that is currently controlled by the Koniag Regional Native Corporation. Chiniak does have a number of facilities that would be needed as part of an onshore service facility. These include office structures, housing quarters, repair and maintenance facilities, some warehouse space, an airstrip and an infrastructure of utilities and roads. In addition land is available for additional development of outdoor storage areas and warehousing. The Chiniak facility does not currently have any port facilities, although studies are now being conducted to determine the feasibility of developing a port facility at the site. Preliminary indications from Koniag Corporation are that port facilities to serve rig tenders and general supply boats would cost approximately 25 to 30 million dollars. The Port of Seward, however, does have adequate port facilities to handle the marine services needed to supply the materials to rigs operating during the exploration on the Kodiak Shelf. It will be necessary, if Seward is selected as a comprehensive service base site, to develop additional open storage, warehousing and office space. However, the cost of these is substantially less than the cost of developing new port facilities in Kodiak. A decision on this factor will be heavily influenced by Factor 6.

#### Factor 6: Transportation Costs

As indicated above, during the exploration phase the oil industry will probably try to minimize their costs by utilizing existing facilities whenever possible. This factor would point to a utilization of Seward during that exploration phase. However, if and when oil is discovered on the Kodiak Shelf, the cost of developing permanent onshore facilities in Kodiak will have to be weighed against the cost of transportation from Seward. This will in turn be affected by the location of the discovery wells in the Western Gulf and the availability of lands and facilities in Kodiak. It may be determined that in the long run the cost of developing new facilities in Kodiak would be too high to outweigh the transportation costs and inconvenience involved in utilizing Seward as a permanent service facility. In that case, the end result would probably be marine service facilities operated out of Seward and air service facilities operated out of Kodiak. However, the amount and location of oil discoveries on the Kodiak Shelf could be such that a new permanent base would be feasible on Kodiak Island.

### Factor 7: Political Climate

At present the oil industry has indicated some uncertainty over the political climate in Kodiak with reference to OCS development. The residents and local governments of Kodiak have not made a strong collective statement either for or against the encouragement of oil development facilities on Kodiak Island. If the people of Kodiak were to indicate a strong desire to boost their economy through encouraging OCS development on the island, then the probability of locating permanent service base facilities in Kodiak would be strengthened. However, if the community were to take a hostile position towards oil development, the industry would be less inclined to move there.

One of the most important factors in the development of an oil field is timing. While the oil industry can accommodate and even plan for some delays caused by an unfavorable political climate, they will avoid those delays if possible. Here again, the political climate in Kodiak is not a sole determining factor. Clearly the factors affecting the final decision on service base locations make the issue quite complex. However, that complexity gives the Kodiak community increased influence over the decisions affecting the future development of the area. For instance, if it were made clear to the oil industry that Kodiak welcomed its presence politically and socially, and if the local governments adopted policies that would foster the development of the needed facilities such as ports, additional airport facilities, water supplies and industrial parks, then the oil industry would find it relatively easy to justify moving to Kodiak if other factors so indicated. On the other hand, if Kodiak made it clear that the oil industry was not welcome and if no move was made to accommodate the industry with industrial facilities, then Seward would remain the location of onshore facilities as long as it was economically feasible. Regardless of the direction Kodiak takes, economics will rule the final decision made by the oil industry. However, because of the Kodiak community's location, it has the opportunity to affect those economic considerations to a certain degree by its attitude toward oil development.

### Factor 8: Facility Requirements During Production Phase

Facility requirements depend not only on the amount of recoverable oil reserves, but also on the method of production. One method involves transporting oil from the production platforms to shore via pipeline, with an onshore storage terminal. In this case, the onshore pipeline terminal is located as close as possible to the oil fields, thus minimizing costs and oil spill potential. Consequently, when oil companies begin constructing permanent production platforms, Kodiak should prepare for the development of pipeline terminals, onshore crude oil storage facilities, and marine terminals.

Alternately, the single buoy mooring system (S.B.M.S.) method uses offshore marine terminals and storage facilities. This study examines facility requirements for both methods of production.

Even the high U.S.G.S. estimate of gas reserves is very low and almost certainly insufficient to warrant development. As such, no gas pipelines or L.N.G. plants are anticipated.

### Conclusion

Considering the above factors, the "most likely" operational mode for Cases 2 and 3 appears to be the second, which uses Seward as a base during the exploratory phase and transfers to Kodiak during development and production phases. In Case 1, Seward would be the base during exploration, as there is no production, then would move to Kodiak. Specifically, the oil industry would begin initial development in summer of 1980 by providing marine support services to exploratory rigs from Seward and air support services from Kodiak. At the same time it investigates a probable site for an onshore service facility on Kodiak Island should a major oil strike occur. Upon discovery and delineation of a commercially producible oilfield on the Kodiak Shelf in 1981, construction of service bases on Kodiak Island would begin. If the oil industry has agreed with Kodiak residents to locate development away from population centers, it will probably locate the base near the southern end of the existing road system, either at Chiniak or on the north side of Ugak Bay. Less probable is locating it somewhere between Chiniak and the Coast Guard Base, either in Kalsin Bay or Middle Bay. In Cases 2a and 3, an oil storage facility and a marine terminal would probably be sited within this area also, possibly near the service base for convenience.

Information presented in the preceding section should prove extremely useful to the community in determining and gauging the actual schedule of oil activity during the next ten to twenty years. Although based on estimates, it uses oil development experiences in other areas along with data on the Kodiak Island Borough. Actual development should be compared with these estimates to adjust impending impacts, so that the community is always cognizant of the level of activity and associated impacts.

## PROJECTED IMPACTS

### ENVIRONMENTAL IMPACTS

In spite of numerous past and ongoing studies, little concrete knowledge regarding the effects of oil development exists. Kodiak Community College, the Alaska Department of Fish and Game, the Northwest Fisheries Center of the National Marine Fisheries Service, as well as a number of private and public entities are upgrading and expanding the data base. Even so, research is sometimes a slow process and results are often inconclusive. In addition, offshore oil development activities in the North Sea have just begun, and information on impacts, especially long term, is still coming in.

This difficulty in predicting impacts is demonstrated in the rough draft of the BLM/OCS Environmental Impact Statement of the Western Gulf. A tremendous quantity of information about the natural environment discusses potential impacts of OCS development, analyzing numerous species of flora and fauna in the marine and terrestrial environment. However, the authors admittedly had difficulty quantifying impacts. Even so, the document is enlightening and should be "required reading" for anyone seriously concerned with short and long term effects of OCS development.

Following is a review of the potential impacts on both the physical and socio-economic environment of Kodiak Island Borough. These were identified in the BLM/OCS document or result from work done in this study.

#### Physical Environment - Offshore

Two basic sources of impacts could result from OCS development: 1) spills which inject crude oil or other associated substances into the natural environment, and 2) bottom disruption. Impacts of each are discussed in turn.

#### Oil Spills

The likelihood of spills introducing oil into the natural environment is quite high. If so, there will be impacts, and some could be extreme. However, the relative seriousness of the spill is unknown until it occurs. Pipeline accidents, oil and gas well blowouts, spills resulting from fires, tanker accidents, chronic minor spills and natural seeps, as well as a variety of accidental spills resulting from the malfunction of drilling and transportation equipment, could all cause oil spills. Some potential effects of these spills are extremely negative.

A major oil spill could contaminate or kill fish, a vital concern to the Kodiak economy. Kodiak's economy would definitely be adversely affected

if this contamination caused a loss of catch or gear. The probable frequency of oil spills and the significance of their impacts upon the natural environment has not been quantified. However, the BLM/OCS office, in their Draft Environmental Impact Statement, have estimated that over an assumed 25-year production life of the Kodiak Shelf oil fields, approximately 433,000 barrels of crude oil and other materials will be spilled based on historical data concerning other oil fields in the high find development scenario. They have also indicated that in this same case, during the years of peak activity and production up to 10,700 barrels of oil could be spilled within one year, and that throughout the production period a total of 30,000 barrels could be spilled by tankers, both within this area or along their transportation routes and at their destinations. (4) Historical data indicates that by far the great majority of the oil spilled into the natural environment will be minor in size as well as in environmental impact. It is anticipated, however, that at least a few oil spills will have a major potential impact (over 1,000 barrels) that could have lasting effects. An estimated 5,500 oil spill incidents will occur over the 25-year course of oil production in the Western Gulf of Alaska. Because of the distance of the lease areas from shore and the natural characteristics of crude oil including evaporation rates, dispersion characteristics and weathering, the BLM/OCS office has estimated that a spill would have to be 1,000 barrels in size to have a significant ecological impact. (5) It must be remembered that the conclusions of the Draft Environmental Impact Statement are based on averages and probabilities, and that spills much smaller than 1,000 barrels could create significant ecological impact if located in the right place at the right time.

The segments of the natural environment that could be affected by oil spills and malfunctions is extremely broad. They include: 1) modification of the food web due to contamination from petroleum hydrocarbons (PHC); 2) impacts on marine habitats; and 3) impact on primary sources of food and on various organisms. These impacts are not limited just to marine life. An offshore oil spill could easily have a serious effect on land mammals and birds in terms of bodily contact and alteration of the food web. The species most susceptible to the impacts of OCS development are brown bear, deer and elk. (6)

#### Bottom Disruption

Sea floor disruption can result from two sources: 1) physical disturbances of the surface of the sea floor due to placement of platforms, anchors and other mechanical paraphernalia associated with development and production; and 2) chemical and biological changes resulting from the settling of crude oil products from an oil spill.

Experiments and actual experiences related to OCS development indicate that as oil spills into salt water, certain parts evaporate, some parts dissolve into the water, and others remain relatively intact and settle on the sea floor. According to BLM/OCS, the fouling of sediments on the sea floor in significant quantities results in the lack of production of food and habitat and thus an absence of the normal sea life species. Petroleum hydrocarbons (PHC) can also mix with sand and gravel, forming

a solid material which is deposited on the bottom of the ocean and added to the food web. This obviously depends on the volume, frequency and degree of occurrence of this phenomenon. It is impossible now to determine what the environmental impacts will be due to this type of activity.

The other form of bottom disruption, physical alteration, is somewhat more predictable and its impacts are normally less significant. The area of disruption of a permanent platform is normally confined to within two acres and thus permanently removes an extremely small area from the ocean floor. Each permanent platform would remove 1 to 1.5 acres of sub-sea surface from the habitat available to marine life. The effect of pipeline construction on or below the ocean floor would be more significant, although still relatively minor considering the total area of the Kodiak Shelf. According to a recent study by the Woods Hole Oceanographic Institution, 1976, bottom disruption and removal of sea floor by offshore production platforms will normally have negligible adverse effect on the marine life production capabilities of the area.

### Physical Environment - Onshore

Impacts on the natural environment that could result from OCS development would be generated by human activity: construction, operation of OCS development, and population pressures. These impacts would generally be similar to those resulting from any major industrialization effort, and could affect air quality, water quality, habitat, land forms, and the full range of animal and plant life that occupy the area.

#### Air Quality

The air quality of the area surrounding OCS development on land, as well as at sea, can be impacted through a number of sources. One of the most obvious sources of air pollution is particulate concentrations created by construction activity. It is anticipated that the construction of marine service bases, crude oil storage facilities and tanker terminals will involve intensive construction activity over a number of years. Depending upon soil conditions, atmospheric conditions and mitigating measures taken by construction personnel, the potential for particulate (dust) pollution is high. In addition, construction vehicles and heavy equipment, most of which utilize fossil fuels as a power source, can, if not properly maintained and equipped, pollute the air with exhaust matter. This kind of pollution will also be generated by population increases and the subsequent increase in vehicular usage. Another source of air pollution is fires, both accidental and deliberate. The occurrence of a major crude oil fire at a storage facility could have a devastating effect on air quality over a long period of time. Modern design techniques and safety equipment are thought to be adequate to prevent and/or extinguish any such fires. However, the possibility of their occurrence still exists.

The degree of cumulative impacts as a result of air quality degradation will be determined by the atmospheric conditions and the concentration

of sources. In Kodiak air current movements are strong and frequent, and the projected population concentrations are relatively low in terms of air pollution potential. Thus significant air pollution problems are not anticipated as a result of OCS development. However, it must be remembered that depending upon the magnitude of the source and the atmospheric conditions at the time any one incident could catastrophically affect air quality.

### Water Quality

Potential impacts on the quality of fresh water within the Kodiak Island group will also be generated primarily by human activity. Construction projects in or near streams or lakes could result in significant degradation due to alteration of the courses and/or beds of these water bodies as well as through contamination by particulates and chemicals. Special attention must be paid to the location of construction projects and methods of operation with respect to the potential for such impacts.

In addition, construction activity could affect runoff characteristics by altering land forms. Excavation penetrating aquifers could also affect subsurface water quality. Both surface and subsurface water qualities could be adversely impacted by chronic and/or catastrophic onshore spills. Petroleum products spilled on the surface could be carried through runoff or absorption into these water sources. Depending upon the amounts, types and characteristics of these foreign substances, the effects could vary in duration.

### Habitat Disruption or Destruction

As indicated in previous sections, the amount of land required for direct and indirect OCS related facilities will be relatively high in terms of other single activities currently on Kodiak Island. Whenever land is disturbed and/or developed, habitat is altered or possibly destroyed. One exception is when facilities are located in already industrialized areas within the City of Kodiak environs. BLM/OCS has estimated in their Draft Environmental Impact Statement that in the event of a high find, up to 1,100 acres of land could be utilized for support and supply facilities, production and treatment facilities, crude oil terminals and pipeline rights-of-way. (7) When compared to the total land area within the Kodiak Island Borough, this acreage is relatively insignificant. Even so, many ecosystems and habitat areas on Kodiak Island are very sensitive and specialized. Location of OCS related industrial facilities on or through relatively small specialized areas could have a significant impact on the future of life forms in the surrounding area. Facilities must be situated where the potential for disruption of significantly sensitive habitat areas is avoided or minimized.

## SQCIC-ECONOMIC IMPACTS

### Local Population

Population increases in Kodiak correlate to the level of offshore development of the Western Gulf OCS. They are a function of the nature of employment, duration and type of labor requirements, and the extent to which the local community accepts and/or encourages population growth.

As indicated in the Demographic Inventory, Volume II of this study, Kodiak's population is currently growing by approximately 3.4 percent per year. Based on this growth rate, Kodiak's population should double by 1995 without OCS activity in the area. This rate represents a healthy economy and indicates the desirability of Kodiak as a residence.

Projected population increases from OCS development will further increase that population growth rate. Estimated projections are based on the following assumptions:

1. Any new onshore facilities, including service bases and oil terminals, will be located in the Kodiak Borough. Thus the bulk of direct employment required to operate those facilities will also be within the Borough.
2. Anchorage will be the headquarters and work location of the administrative and support staff, as is currently industry practice.
3. All long term onshore operations personnel (service bases, terminals) will reside on Kodiak Island. Workers tend to relocate close to their place of employment when employment is long term. Conversely, jobs of short term duration, such as construction and drilling, will discourage workers from relocating to the job site. Therefore resident population levels do not necessarily correspond to employment levels, especially in the exploration and development phases. However, variances will decrease in magnitude as oil production begins and long term employment increases.
4. Local demand for indirect labor will increase as the population growth from oil activities spawns concomitant growth in supply, transportation, service and other businesses.

These assumptions are all based on practices in the North Sea and are presented in tabular form in Table 22.

Table 22: Formula for Population Change

<u>Employment Activity</u>	<u>Percent of Total Jobs in Kodiak</u>
Onshore:	
Administration	0%
Base Operations	100%
Platform-associated	50%
Rig-associated	50%
Terminal Operations	100%
Construction	100%
Offshore:	
Rigs	0%
Lay-Barge	0%
Bury-Barge	0%
Supply Boats	40% years 1-3; then 80%
Platforms	40% years 1-3; then 80%

Source: Niall Trimble, Depart. of Community & Regional Affairs, Div. of Comm. Planning, 1977

Using the above formula in conjunction with the employment levels by activity (Tables 6 and 8 in previous section), we can determine the OCS-related population changes over time for each development scenario as shown in Table 23.

Combining the population changes resulting from OCS development with the projected population resulting from normal growth (Table 35 in Volume II) gives the projected population with development. These estimates, based on four levels of OCS impact, are presented in Table 24 for the years 1978 through 1992. Also included in Table 25 is the cumulative year-by-year percentage change in population.

As shown in Table 25, population increases will vary from year to year. The average yearly increase for the 15 year period from 1978 to 1992 ranges from 3.46 for Case 1 (no development) to 5.47 for Case 3 (high

find) -- some 61 percent higher than the "normal". The population doubles from the 1975 figure in Case 3, and progressively later for Cases 2a, 2b, and 1. Variations in population increase rates correspond to the labor needs of the oil industry and corresponding characteristics of jobs. For both Cases 2a and 3, employment grows moderately from 1980 to 1984, and then grows explosively for the short period 1985-1986 while construction labor forces build up. A very sharp decline follows, with employment levels falling by 80 percent. In Case 3, employment in the coastal zone falls from 2,100 in 1986 to 500 in 1988. Thereafter the labor force should remain relatively stable. As indicated earlier, the existing growth rate in Kodiak is about 3.4 percent per year.

Table 23: Total OCS-Related Population Changes in Kodiak

	Case #1			Case #2a			Case #2b			Case #3		
	No Find			Moderate Find (pipeline)			Moderate Find (S.M.B.)			High Find		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
1980	129	64	193	229	63	292	229	63	292	229	38	292
1981	209	126	335	488	189	677	488	189	677	898	154	1052
1982	290	190	480	713	378	1091	581	378	959	977	230	1207
1983	129	92	221	684	363	1047	420	363	783	1054	528	1582
1984	---	---	---	436	590	1026	290	272	562	1199	792	1991
1985	---	---	---	553	620	1173	209	181	390	2110	957	3067
1986	---	---	---	1437	761	2198	500	802	1302	3507	1635	5142
1987	---	---	---	2471	1729	4200	742	1290	2032	2582	2430	5012
1988	---	---	---	1315	1045	2360	677	1045	1722	2177	2335	4512
1989	---	---	---	1420	2563	3983	936	2563	3499	2419	4241	6660
1990	---	---	---	1420	2431	3851	936	2431	3367	2306	3938	6244
1991	---	---	---	1355	2261	3616	871	2261	3132	2241	3768	6009
1992	---	---	---	1226	1925	3151	742	1925	2667	2112	3432	5544

Source: Niall Trimble, Dept. of Community and Regional Affairs, Division of Community Planning, State of Alaska, 1977

Table 24: Kodiak Population - 1978-1992  
Under 4 levels of OCS Impact

<u>Year</u>	<u>Case 1</u> <u>No Find</u>	<u>Case 2a</u> <u>Pipeline</u> <u>Moderate Find</u>	<u>Case 2b</u> <u>No Pipeline</u> <u>Moderate Find</u>	<u>Case 3</u> <u>High Find</u>
1978	10,634	10,634	10,634	10,634
1979	10,996	10,996	10,996	10,996
1980	11,563	11,662	11,662	11,662
1981	12,092	12,434	12,434	12,809
1982	12,637	13,248	13,116	13,364
1983	12,791	13,617	13,353	14,152
1984	12,997	14,023	13,559	14,988
1985	13,439	14,612	13,829	16,506
1986	13,896	16,094	15,200	19,038
1987	14,368	18,568	16,090	19,380
1988	14,857	17,217	16,579	19,369
1989	15,362	19,345	18,861	22,022
1990	15,884	19,735	19,251	22,128
1991	16,424	20,040	19,556	22,433
1992	16,982	20,133	19,649	22,526

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Table 25: Projected Population Growth Rate With OCS

<u>Year</u>	<u>Case 1</u>	<u>Case 2a</u>	<u>Case 2b</u>	<u>Case 3</u>
1978	3.4	3.4	3.4	3.4
1979	3.4	3.4	3.4	3.4
1980	6.0	6.1	6.1	6.1
1981	4.6	6.6	6.6	9.8
1982	4.5	6.5	6.0	4.3
1983	1.2	2.8	1.8	5.9
1984	1.6	3.0	1.5	5.9
1985	3.4	4.2	2.0	10.1
1986	3.4	10.1	9.9	15.3
1987	3.4	15.4	5.9	1.8
1988	3.4	7.2	3.0	-0-
1989	3.4	14.6	13.8	13.7
1990	3.4	2.0	2.1	0.5
1991	3.4	1.5	1.6	1.4
1992	3.4	0.4	0.5	0.4
Average	3.46	4.85	4.51	5.47

Source: Niall Trimble, Department of Regional Affairs,  
Div. of Community Planning, State of Alaska, 1977

The first significant population increase with OCS is in 1980, when all cases jump to a 6.0 percent growth rate. This represents the initial influx of OCS related work force. Growth rates then return to normal in Case 1. They increase again in 1981 in the other cases, and then decline through 1984 due to the short term nature of exploration jobs. Growth rates then climb abruptly in proportion to the numbers of construction workers building the service bases and terminals, hitting a peak of 15.4 percent in 1987 in Case 2a; 13.8 percent in 1989 in Case 2b; and 15.3 percent in 1986 in Case 3. All three cases have over 13 percent growth rates in 1989, which dramatically drop off to 0.5 percent or less within three years. Development is essentially completed then, and growth rates return to the normal rates established prior to OCS activity.

Population impacts from OCS development are substantial: 1992 population is 18.5 percent more under Case 2a development than with normal growth; 15.7 percent higher under Case 2b; and 32.6 percent higher under Case 3. With a large oil discovery, 1985 population approximates the 1992 population without oil related industrialization.

Obviously this growth will impact all aspects of the Kodiak community. A review of those impacts follows.

### Public Services

#### Water, Sewer, and Road Services

Little information is now available on existing land use, gross areawide densities, and their relationships to existing community utilities and services; data will be developed in the aforementioned comprehensive plan. Ongoing and future engineering studies will determine water, sewer, and road requirements. With more detailed information, more detailed conclusions will result. All this information must be coordinated through a cohesive planning process to determine current trends of development and future development potentials. Only with a coordinated community development planning effort can Kodiak Island Borough and its various communities adequately prepare for OCS development.

Enough information is available, however, to allow generalized estimates of road and public utility required necessary to serve projected population increases. The assumptions used in making these estimates include:

1. Population estimates and estimated population characteristics are based upon the development scenarios of low, medium and high finds. If those scenarios change, population estimates will change correspondingly.

2. Kodiak local governments and residents will want new residential development within the Kodiak metropolitan area to be served with basic public services (water, sewer and roads). This is assumed because rapid community development without these services could lead to serious environmental problems. This trend is evident in Kodiak in the Island Lakes area.

3. A substantial amount of land will be developed or redeveloped, including resubdivision, as a result of rapid population growth. Relatively large areas of the undeveloped land near the City of Kodiak is now subdivided. However, many of those subdivisions represent "paper plats" which do not have the basic community facilities (water, sewer and roads). Consequently, it may be desirable, subject to future decisions upon community goals, to resubdivide some land to accommodate different land uses and densities.

4. When raw land is developed or redeveloped, approximately 28 percent on a gross area basis will be dedicated to road rights-of-way. This percentage is based on extensive experience in land development and application of modern subdivision design techniques. It includes both rights-of-way internal to a subdivision, as well as collector and arterial roads.

5. The average right-of-way width in Kodiak will be 60 feet. This assumption is based on current planning procedures and practices in the Kodiak community.

6. Lineal footage of water and sewer required to serve newly developed land on a gross area basis equals the lineal feet of roads within that same area.

The assumptions described above are based on the most recently available information concerning Kodiak as well as pertinent information typical of public services in general. The relevancy of these assumptions to the level and type of activity that occurs in the future should be monitored so that any adjustments in the estimates that follow can be based upon those changes.

The methodology utilized in making public service impact estimates is not intended to make detailed financial assessments and capital improvement plans. Nor is it intended as an infrastructural design tool. Due to the lack of land use data, information is not available on the lineal footage of existing road and utilities available for development or redevelopment at the present time. This methodology can be utilized, however, as a general guide in demonstrating the magnitude of impacts that can be expected in Kodiak.

In order to determine the impacts of OCS development on public services, the amount of land that will be served by public services and the density of development that is expected to occur must be determined. In the absence of a set of community goals and objectives, estimates have been made based upon the basic residential zoning districts in the Kodiak Island Borough Zoning Ordinance. Density was determined as follows.

First, 28 percent of the land on a gross acreage basis (or 12,197 square feet per acre) was subtracted for the purposes of road rights-of-way. The remaining land, 31,363 square feet per acre, was divided by the lot sizes allowed in the zoning ordinance. Then the dwelling units allowed per lot were allocated based on the requirements of the zoning ordinance. With some simple arithmetic we can then determine the amount of land per dwelling unit. The formula is as follows:

1 Acre - 28% = Developable Land Per Acre (DLA)

DLA/Minimum Lot Size = Number of Lots Per Acre (LPA)

LPA x Maximum Allowed Dwelling Units Per Lot = Dwelling  
Units Per Acre (UPA)

The Kodiak Zoning Ordinance allows a minimum lot size of 7200 square feet in any residential zone. The densities within the R-1, R-2, and R-3 zones vary, depending upon the zone and the actual lot size involved. An example of the formula described above based on the R-1 zone would be as follows:

43,560 square feet (1 acre) - 12,197 (28%) = 31,363 (DLA)

31,363 sq. ft. divided by 7200 sq. ft. = 4.35 (LPA)

4.35 lots x 1 unit per lot (R-1) = 4.35 (UPA)

An example of a higher density zone is available through a review of the R-3 zone, which requires 2,000 sq. ft. per dwelling unit. If a landowner desires to build a six-unit apartment under the R-3 zone he would be required to provide a 12,000 square foot minimum lot. Thus the last two lines of the formula would read as follows:

31,360 sq. ft. divided by 12,000 sq. ft = 2.61 (LPA)

2.61 lots x 6 units = 15.7 (UPA)

Similar density figures can be developed for all of the zoning districts and any residential development proposal.

To obtain the gross land area required per dwelling unit, including rights-of-way, we divide the square footage in an acre by the number of units per acre. Thus a six-plex in the R-3 zone would result in 43,560 sq. ft. divided by 15.7 units per acre equals 2,774.5 gross square feet of land per dwelling unit.

In order to determine the length of roads, and thus water and sewer lines to serve new residential development, we now go back to the 28 percent of land on a gross acreage basis that was allocated for rights-of-way. A simple arithmetic formula is used.

Length = area divided by width

We have already established that the normal width of road rights-of-way in Kodiak are 60 feet. Therefore, the length of road required to serve developed land is estimated as follows: 12,197 sq. ft. divided by 60

feet equals 203.3 lineal feet. Based on these formulas, we can estimate that for each acre of gross land area that is developed for residential uses, approximately 200 feet of road will be required to provide adequate access. Based on our assumption that the length of water and sewer lines is equivalent to the length of roads on a gross area basis, it is estimated that 200 lineal feet of water line and sewer line are also required to serve each acre of developed land.

By comparison, three hypothetical cases based on different development densities are presented below. Example A represents the development of new dwelling units at the maximum density allowed by the R-1 zone in the Kodiak Zoning Ordinance (4.35 units per acre). Hypothetical Example B represents new residential development based on a density of 15.7 units per acre (six-plex development in the R-3 zone). Hypothetical Example C involves one additional factor. As discussed in the section on Housing Impacts, a substantial amount of residential development could occur outside the reasonable limits of public services (water, sewer and roads). This could occur based upon the desires of the new residents or upon the goals and objectives established by the existing residents of Kodiak. For the purposes of comparison, we assumed that 50 percent of the new housing units constructed through 1988 would be beyond the limits of public services and would be developed at a gross density of .67 units per acre (1.5 acres per dwelling unit). The remaining 50 percent of the new housing will be developed within the metropolitan area at a gross density of 4.35 units per acre (R-1) and would utilize public services.

The following figure has two basic intents. First it provides a generalized estimate of the land area and public services required to serve new residential development at varying densities. Second, it allows comparison of the results of land use decisions relative to the requirements for public services. See Table 26.

Analysis of these figures reveals that the relatively low density, typical single family development indicated in Example A requires construction of 24.5 to 41.83 miles each of roadways, water, and sewer lines, depending on the development scenario used. The lower number is almost twice as much road as the City currently maintains. However, relatively high density development (Example B) will require 6.79 to 11.59 miles each of water, sewer, and roads, again depending on scenario. Hypothetical Example C calls for 12.25 to 21.12 miles of public services, about half as much as in Example A. The lower number, representing the no development scenario, is slightly below the current amount of roads now maintained by the City of Kodiak. The magnitude of the difference caused by the varying densities is further emphasized by looking at lineal feet of public services per dwelling unit. In Examples A and C, required footage is some 3.5 times more than the high density Example B.

These comparisons point out the importance of land use decisions. If the community elects to encourage high density development with a full range of community facilities and utilities, the ratio of lineal feet of public service per dwelling unit is much lower than if it decides to encourage low density development.

Table 26: Development Requirements With OCS Development

<u>Case</u>	<u># New Housing Required</u>	<u>Land Required</u>	<u>Road Required</u>	<u>Water &amp; Sewer Lines Required</u>
<u>Example "A" @ 4.35 Units Per Acre</u>				
Case 1	2814	646.9	129,380'	129,380'
Case 2a	3545	814.9	162,980'	162,980'
Case 2b	2955	679.3	135,860'	135,860'
Case 3	4804	1104.4	220,880'	220,880'

Example "B" @ 15.7 Units Per Acre

Case 1	2814	179.2	35,851'	35,851'
Case 2a	3545	225.8	45,144'	45,144'
Case 2b	2955	188.2	37,646'	37,646'
Case 3	4804	305.9	61,195'	61,195'

Example "C" @ 4.35 Units per Acre (1)

<u>Case</u>	<u>New Hous. (no Public Services)</u>	<u>Land Req. @ .67 Unit/Ac.</u>	<u>New Hous. w/ Public Services</u>	<u>Land Req. @ 4.35 Units/Ac.</u>	<u>Miles of Water, Sewer Road(2)</u>	<u>Total Land Required</u>
Case 1	1407	2100	1407	323.4	66,000'	3432.0 Ac.
Case 2a	1773	2646	1772	408.3	81,682'	3054.3 Ac.
Case 2b	1478	2206	1477	339.5	67,901'	2545.5 Ac.
Case 3	2402	3585	2402	552.2	111,514'	4137.2 Ac.

- (1) Example "C" = 50% of new housing units are beyond reasonable limits of public services -- developed at gross density of .75 units per acre (upa). Remaining housing utilizing public services -- developed at gross density of 4.35 upa.
- (2) Within Metropolitan Area

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Total land area required in Example A ranges from 647 to 1,104 acres, depending on the development scenario; in Example B, from 179 to 306 acres; and in Example C, from 2423 to 4137 acres, half of which is inside and half outside the metropolitan area.

Presumably, as development activity increases the majority of new structures will be on existing utilities and roads. Shortly after the initial impacts of OCS development and resultant population growth, the existing road and utility system will be utilized to capacity. New facilities must then be constructed to accommodate any additional growth. Given this basis, future costs of these public services are estimated. As that land served by existing road and utility lines is developed, it

will be necessary to extend those services or force new development outside the area of public services and, consequently, require extremely low densities.

Cost per lineal foot of these services in Kodiak is now quite high: an average \$180 per lineal foot for combined water and sewer service. This average is based on trunk and lateral sewers and various soil conditions. Cost of streets and street improvements, including paving, is approximately \$250 per lineal foot. However, gravel roads built to minimum standards (20 feet wide) cost approximately \$60 per lineal foot. (8) Utilizing these figures, we can calculate the potential costs of the public services based on the densities indicated in the Hypothetical Examples A, B and C. It is assumed in Example C that the housing units outside the reasonable limits of public services will have privately owned and maintained roads, water and sewer systems. Table 27 shows the cumulative costs for each case.

Table 27: Cost of Public Services\*

<u>Case</u>	<u>Miles Public Serv.</u>	<u>Sewer &amp; Water</u>	<u>Paved Road</u>	<u>Minimum Gravel Rd.</u>
<u>Example "A"/4.35 upa</u>				
Case 1	24.50	\$11,642,000	\$32,340,000	\$ 7,761,600
Case 2a	30.87	14,669,424	40,748,400	9,779,616
Case 2b	25.73	12,226,896	33,963,600	8,151,264
Case 3	41.83	19,877,616	55,215,600	13,251,744
<u>Example "B"/15.7 upa</u>				
Case 1	6.79	\$ 3,226,608	\$ 8,962,800	\$ 2,151,072
Case 2a	8.55	4,062,960	11,286,000	2,708,640
Case 2b	7.13	2,288,176	9,411,600	2,258,784
Case 3	11.59	5,507,568	15,298,800	3,671,712
<u>Example "C"/50% @ 4.35 upa; 50% @ .67 upa</u>				
Case 1	12.25	\$ 5,821,200	\$16,170,000	\$ 3,880,800
Case 2a	15.47	7,351,344	20,420,400	4,900,896
Case 2b	12.86	6,111,072	16,975,200	4,074,048
Case 3	21.12	10,036,224	27,878,400	6,690,816

\* Sewer and water @ \$90.00 per lineal foot = \$475,200 per mile.  
 Paved Road @ \$250.00 per lineal foot = \$1,320,000 per mile.  
 Minimum Gravel Road @ \$60.00 per lineal foot = \$316,800 per mile.

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Estimates assume that all new development subsequent to 1980 will require new public services, and residential development prior to 1980 will utilize existing services. In actual fact there will probably be a gradual switch from existing to new public services. The relative ratio of development within lands currently served by public services to development in newly served areas is impossible to determine on a year-to-year basis.

This information clearly shows that higher density development is more economical per dwelling unit from a direct cost standpoint. Traditionally, low density single family development does not pay for the services it requires through the taxes it generates, and medium density apartments normally pay in taxes more than their share of costs of public services. These factors should be considered when determining the mix of densities necessary to support adequate public facilities.

### Housing

Anticipating housing impacts from OCS development are calculated by multiplying the projected population increases by the estimated family size, taking into account the historical trend of a decreasing number of persons per family. (See Housing Inventory and Demographic Inventory, Volume II).

Table 28 shows the housing required between 1978 and 1992 with OCS development according to the various scenarios. Family size figures are based on historical trends in Kodiak and the population projections in the Demographic Inventory in Volume II. The table shows the total number of housing units required to support the indicated population, as well as the yearly increase in housing units necessary to accommodate the yearly population increase.

As Tables 28-31 show, demand for new housing units corresponds to population increases (Table 24) and to the type of employee activity (Table 16 in first section). This demand increases as short term employment decreases.

Peak number of additional units needed in each case is 409 in Case 1 (1985); 843 in Case 2a (1987); 769 in Case 2b (1989); and 894 in Case 3 (1989). Total additional housing needs vary from 2814 units in the low find scenario to 4804 units in the high find scenario; likewise, average number needed per year from now until 1992 range from 165.5 to 283. These are only averages, and in any given year the requirements are either well below or above that figure. However, they do represent an increase in annual housing requirements from those predicted in the Housing Inventory of Volume II.

The community must make many decisions concerning the location and type of housing to meet this expected demand. Presumably a disproportionate majority of the new housing units will be in the Kodiak metropolitan area and along the road system. This is primarily because most population increases will be due to OCS development, and employment opportunities will either be within the Kodiak metropolitan area, at service base sites, or near the road system (see Map 3).

Table 28: Housing Requirements - Case 1 - Low Find

<u>Year</u>	<u>Family Size</u>	<u>Population</u>	<u># Housing Units</u>	<u># New Units</u>
1978	3.24	10,634	3,282	127
1979	3.22	10,996	3,415	133
1980	3.20	11,563	3,613	198
1981	3.18	12,092	3,803	190
1982	3.16	12,637	3,999	196
1983	3.14	12,791	4,074	75
1984	3.12	12,997	4,166	92
1985	3.10	13,439	4,335	409
1986	3.08	13,896	4,512	177
1987	3.06	14,368	4,695	183
1988	3.05	14,857	4,871	176
1989	3.04	15,362	5,053	182
1990	3.04	15,884	5,225	172
1991	3.03	16,424	5,420	195
1992	3.03	16,982	5,604	184
Total Number of Housing Units Needed				2,689
Average Number of Housing Units Needed per Year				179.2

Source: Simpson Usher Jones, Inc. (Sontag), 1977

Table 29: Housing Requirements - Case 2a - (Pipeline)

<u>Year</u>	<u>Family Size</u>	<u>Population</u>	<u># Housing Units</u>	<u># New Units</u>
1978	3.28	10,634	3,282	127
1979	3.22	10,996	3,415	133
1980	3.20	11,662	3,644	229
1981	3.18	12,434	3,910	266
1982	3.16	13,248	4,192	282
1983	3.14	13,617	4,337	145
1984	3.12	14,023	4,495	158
1985	3.10	14,612	4,714	219
1986	3.08	16,094	5,225	511
1987	3.06	18,568	6,068	843
1988	3.05	17,217	5,645	423
1989	3.04	19,345	6,363	718
1990	3.04	19,735	6,492	129
1991	3.03	20,040	6,614	122
1992	3.03	20,133	6,645	31
Total Number New Housing Units Needed				4,336
Average Number of Housing Units Needed per Year				289

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Table 30: Housing Requirements Case 2b (S.M.B.S.)

<u>Year</u>	<u>Family Size</u>	<u>Population</u>	<u># Housing Units</u>	<u># New Units</u>
1978	3.28	10,634	3,282	127
1979	3.22	10,996	3,415	133
1980	3.20	11,662	3,644	229
1981	3.18	12,434	3,910	266
1982	3.16	13,116	4,151	241
1983	3.14	13,353	4,253	202
1984	3.12	13,559	4,346	93
1985	3.10	13,829	4,461	115
1986	3.08	15,200	4,935	474
1987	3.06	16,090	5,258	323
1988	3.05	16,579	5,435	177
1989	3.04	18,861	6,204	769
1990	3.04	19,251	6,333	129
1991	3.03	19,556	6,454	121
1992	3.03	19,649	6,435	31

Total Number New Housing Units Needed 3,430

Average Number of Housing Units Needed per Year 228.8

Source: Simpson Usher Jones, Inc. (Sontag), 1977

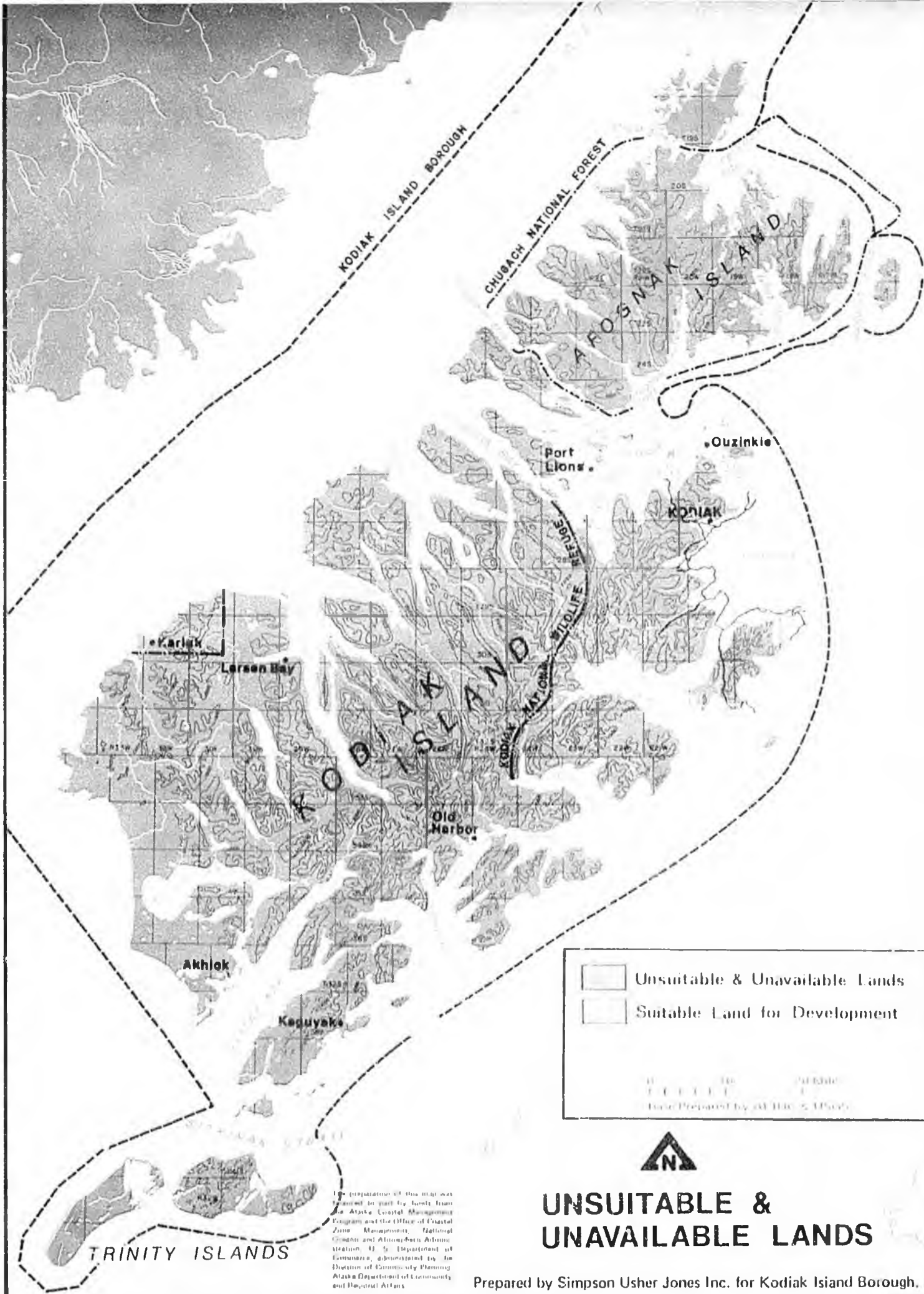
Table 31: Housing Requirements Case 3 - High Find

<u>Year</u>	<u>Family Size</u>	<u>Population</u>	<u># Housing Units</u>	<u># New Units</u>
1978	3.28	10,634	3,282	127
1979	3.22	10,996	3,415	133
1980	3.20	11,662	3,644	229
1981	3.18	12,809	4,028	384
1982	3.16	13,364	4,229	201
1983	3.14	14,152	4,507	278
1984	3.12	14,988	4,804	297
1985	3.10	16,506	5,325	521
1986	3.08	19,038	6,181	856
1987	3.06	19,380	6,333	152
1988	3.05	19,369	6,350	17
1989	3.04	22,022	7,244	894
1990	3.04	22,128	7,279	35
1991	3.03	22,433	7,404	125
1992	3.03	22,526	7,434	430

Total Number New Housing Units Needed 4,679

Average Number of Housing Units Needed per Year 312

Source: Simpson Usher Jones, Inc. (Sontag), 1977.



The preparation of this map was funded in part by funds from the Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, administered by the Division of Economic Planning, Alaska Department of Community and Regional Affairs.

  
**UNSUITABLE & UNAVAILABLE LANDS**

Prepared by Simpson Usher Jones Inc. for Kodiak Island Borough.

As indicated earlier, apparently the only suitable land available from directly related onshore facilities is either near or on the road system. This does not necessarily mean that all or even most housing will be in or immediately adjacent to the City of Kodiak. Depending on land use decisions made by the Kodiak Island Borough, a situation could easily arise whereby large numbers of housing units could be placed on the road system beyond the limits of public utilities and services but close to places of employment. For instance, if onshore service bases, marine terminals, and crude oil storage facilities are constructed near the end of the Chiniak Road at Chiniak or on Ugak Bay, personnel there who did decide to live in Kodiak permanently may choose to live relatively close to those facilities. Thus, a population center in that area is possible assuming developable land were made available for housing and ancillary commercial uses.

Conversely, if the Borough prefers to concentrate residential development in the metropolitan area, it could discourage and, in some cases, even prohibit residential development in other areas. This would affect the characteristics and, therefore, the impacts of growth related to OCS development.

#### Electrical Service

As indicated in the Community Facilities Inventory (Volume II), the Kodiak Electrical Association (KDA) has a current generating capacity of 24,918 kilowatts. At present all of KEA's generating capacity comes from diesel generating turbines.

The current kilowatt-to-population ratio is 2.5 kilowatts per person utilizing the estimated 1976 population as a base. KEA feels that their current generating capacity will be satisfactory to accommodate the expected population growth through the early 1980's. This projection does not, however, take into account additional growth resulting from OCS development. Under normal growth conditions, by 1985 the population would be 13,439 people and the kilowatt-to-population ratio would be 1.8 kilowatts per person. However, with the induced population as a result of OCS development, that 13,000 plus population will be reached one to three years earlier than expected, depending on the development scenario. In addition, the population will continue to grow at an accelerated rate for about five years after that population is reached. Therefore, it is imperative that the electric utility begin to plan for additional power demands immediately. Also, if OCS facilities locate close enough to the City of Kodiak to utilize KEA power, it is likely that the current generating capacity would not be adequate past 1982.

With this obvious need for accelerated development of additional generating capacity, the question of the source of electrical power arises. As indicated in the Community Facilities Inventory (Volume II), KEA's plant is the largest diesel electrical generating plant in the state. At present the price of diesel fuel is rising at an extremely rapid rate. If diesel power is utilized to increase capacity and thus additional fuel supplies are required at the higher rates, then the cost of electrical power will rise accordingly.

This trend indicates a need for the development of alternative power sources. Hydroelectric power generation is historically the most inexpensive method of generating electricity. Consequently, the feasibility of the Terror Lake Hydroelectric project should be investigated thoroughly.

### Law Enforcement Services

As indicated in the Community Profile and in Volume II (Public Safety Facilities), historically crime has not been a significant problem in Kodiak. However, in the last year there have been significant increases in criminal rates. This trend can be expected to continue throughout OCS development. The mobility of the new population and work force, the social and cultural differences, and pressures due to rapid population growth will result in increased crime rates. In order to cope with this situation, all of the law enforcement services should increase their effectiveness, primarily through increases in work force.

At present the ratios of police officers and public safety employees to population is relatively high in Kodiak, as is the number of law enforcement officers per thousand population. According to the 1975 Federal Bureau of Investigation, the average ratio of full time law enforcement employees (including civilians) per 1,000 population in cities under 10,000 in population in the Pacific states is 2.8 employees per 1,000 population in 1975. (9) In Kodiak, however, in 1976 the ratio of police department employees per 1,000 population was 5.1 per 1,000. However, the ratio of law enforcement officers per 1,000 in similar cities in 1975 was 2.2. In Kodiak the ratio is 2.5. This is based on an estimated city population in 1975 of 5,500 persons (see Volume II, Demographic Inventory). This ratio is about 13 percent higher than the average for cities of similar size and location. However, the high increase in crime rate justifies these higher ratios. In fact, to handle the work load required by the increase in crime, the department has proposed adding three officers to its force. This would bring the ratio of officers to population to 3 officers per 1,000 population.

In order to maintain the same police officer to population ratios throughout the rapid population growth period during OCS development, significant increases will have to be made in the police force. Table 32 shows an estimate of the required police force increases based on the growth of population of the entire Kodiak Island Borough. The estimated requirements for police force personnel was calculated in this manner for two reasons. First, it is impossible to determine the rate in which the City of Kodiak will grow relative to the entire population because of possible changes in city limits and unknown factors concerning the location of future residential units. Also, as the City of Kodiak is the only major city within the Kodiak Island Borough, most of that population spends some time within the city limits.

The current ratio of city police officers to total Borough population is 1.046 officers per 1,000. Based on the current estimated need for three new officers (see City Police Department - Public Safety Inventory, Volume II), the desirable rate would be slightly over 1.3 officers per

1,000 population. This figure is used in calculating the requirements for new police officers through the OCS development period.

Table 32: Police Force Requirements - City of Kodiak - With OCS

Year	Case 1		Case 2a		Case 2b		Case 3	
	Est. Pop.	Req.# Officers	Est. Pop.	Req.# Officers	Est. Pop.	Req.# Officers	Est. Pop.	Req.# Officers
1978	10,634	14	10,634	14	10,634	14	10,634	14
1979	10,996	14	10,996	14	10,996	14	10,996	14
1980	11,663	15	11,662	15	11,662	15	11,662	15
1981	12,092	16	12,434	16	12,434	16	12,809	17
1982	12,637	16	13,248	17	13,116	17	13,364	17
1983	12,791	17	13,617	18	13,353	17	14,152	18
1984	12,997	17	14,023	18	13,559	18	14,988	19
1985	13,439	17	14,612	19	13,829	18	16,506	21
1986	13,896	18	16,091	21	15,200	20	19,038	25
1987	14,368	19	18,568	24	16,090	21	19,380	25
1988	14,857	19	17,217	22	16,579	22	19,369	25
1989	15,362	20	19,345	25	18,861	25	22,022	29
1990	15,884	21	19,735	26	19,251	25	22,128	29
1991	16,424	21	20,040	26	19,556	25	22,433	29
1992	16,982	22	20,133	26	19,649	26	22,526	29

Source: Simpson Usher Jones, Inc. (Sontag), 1977

As can be seen, by 1992 the need for officers will increase in proportion to the population, rising by some 69 percent in Case 1 and some 123 percent in Case 3. These figures also apply to other public safety personnel, whose activity is directly related to police activity.

Kodiak must maintain a high level of law enforcement capabilities to maintain the quality of life. The "boom" that could occur will draw a higher proportion of criminals that would normally come. To avoid severe criminal and social problems, police services must remain commensurate with population.

## Educational Facilities

Rapid population growth will especially affect educational facilities in Kodiak. In the past public schools in Kodiak have generally shown increased enrollment figures as the population has grown. Between 1970 and 1974 the population within the five- to seventeen-year old age group grew at approximately three percent per year, comparable to the rate of growth for the total population. By 1974 that age group represented 28.2 percent of the total population on Kodiak Island. However, the continuation of that relative increase is difficult to project accurately for a number of reasons. First is the decrease in size of the average family in Kodiak, as described in the Demographic Inventory (Volume II). Second, families that move into Kodiak as a result of OCS development will tend to be younger and thus more likely to have children of school age. However, the fact that these people are more mobile and are in most cases moving to a new environment, often without prior knowledge of its characteristics, would tend to result in less children.

In estimating the future demands on educational facilities, we assumed that all these trends will stabilize the percentage of the population in the five to seventeen year old age group at approximately 30 percent. Table 33 shows the number of people in that age group that will result from the population growth associated with OCS development.

Table 33: Additional Classrooms Needed With OCS Development

Year	5-17 Age Group (30% of Total Population)				Classrooms Needed			
	Case 1	Case 2a	Case 2b	Case 3	Case 1	Case 2a	Case 2b	Case 3
1978	3190	3190	3190	3190	160	160	160	160
1979	3199	3299	3299	3299	165	165	165	165
1980	3469	3499	3499	3499	173	175	175	175
1981	3628	3730	3730	3843	181	187	187	192
1982	3791	3974	3935	4009	188	199	197	200
1983	3837	4085	4006	4246	192	204	200	212
1984	3899	4207	4068	4496	195	210	203	225
1985	4032	4383	4149	4952	202	219	207	248
1986	4169	4828	4560	5711	208	241	228	286
1987	4310	5570	4827	5814	216	279	241	291
1988	4457	5165	4974	5811	223	258	249	291
1989	4609	5804	5658	6607	230	290	283	330
1990	4765	5921	5775	6638	238	296	289	332
1991	4927	6012	5867	6730	246	301	293	337
1992	5094	6040	5895	6758	255	302	295	338

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

The table also shows the number of classrooms needed to maintain a 20 student per classroom ratio in the schools. At present the schools within the Kodiak metropolitan area are slightly above 20 students per classroom, and the village schools are in most cases well below that ratio. As most population growth associated with OCS development will probably be in the Kodiak metropolitan area and its environs, most classrooms will be needed there.

Now the urban area has 161 classrooms, according to the Kodiak Island Borough School District. This will meet the needs generated by population growth through 1978. After 1979 additional classrooms will be required as shown in Table 33.

### Communication Facilities

The Glacier State Telephone Company has recently expanded its facilities in Kodiak to meet estimated demands under normal growth rates to 1980. The population expected in the Kodiak Island Borough under normal growth rates in 1980 would be 11,370 people. However, the next few years will experience the accelerated population growth generated by OCS development. Again it is imperative that the telephone company begin planning now to meet that demand as it occurs. Fortunately, according to Glacier State Telephone Company, the facilities in Kodiak are capable of expansion to meet any reasonable future demands. (See Communications Inventory - Volume II.)

The demands on commercial communication facilities (radio and television) will increase according to population increases. Since they are owned by profit-making corporations whose revenues are generated primarily by advertising, it is anticipated that the level of service will increase as revenues from advertising increase. This is a normal function of the commercial market and should represent no appreciable impact on the Kodiak community.

### Recreational Facilities

Kodiak is fortunate to have a tremendous amount of park land and open space surrounding the city. The Chugach National Forest and the Kodiak Wildlife Refuge occupy the great majority of the land area of the Kodiak Island Borough. They offer good recreational facilities and opportunities. In addition Kodiak's location on the coastline near some of the best fishing areas and water recreation areas in the State further enhances the recreation opportunities available to the residents.

Neighborhood parks are another consideration, however. Currently Kodiak has less than 15 acres of neighborhood park area. According to the ratios developed in the Demographic Inventory, approximately 84 percent of the population, or 8,347 residents, currently live within the metropolitan area or on the road system. The National Park Recreation and Open Space Association recommends a minimum of 2.5 acres of neighborhood parks per 1,000 population. The ratio for Kodiak currently is 2.5 acres per 1,400

population. To bring the amount of parks into conformity with the national standards, an additional five acres is currently needed in the Kodiak metropolitan area for park lands. Based on the projected population increases due to OCS development, an additional 20 acres of neighborhood parks will be needed by 1988. See Table 34.

Table 34: Neighborhood Park Requirements - 1988 - With OCS

<u>Case</u>	<u>1988 Population</u>	<u>Total # Acres Needed</u>	<u># Additional Acres Needed</u>
1	14,857	37	17
2a	17,217	43	23
2b	16,579	41	21
3	19,369	48	28

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Again, according to the National Park Recreation and Open Space Association standards, neighborhood parks for a community the size of Kodiak should be between five and ten acres each. To accomplish this goal, Kodiak must begin planning the locations of these parks now.

#### Local Economy

Some of the largest impacts generated by rapid growth and development are felt in the economy. Many are the positive effects of economic growth: businesses flourish, job opportunities increase, and salaries rise. At the same time, however, prices and unemployment rise and those persons and families who cannot or do not partake of the higher salaries are adversely affected.

One basic cost that will probably rise as a result of an economic boom is the cost of government. As population increases, so does the demand for services provided by government. Funds to pay for those services will be generated by two sources. One is an increase in taxes. This is normally resisted by local government for a variety of reasons. The other is an actual increase in population which increases the tax base.

There is normally a lag in the services provided by government in a boom situation. Consequently, the demand for the services increases even more. In addition to this supply and demand function, increased government costs will be generated by the need for governmental provision of increased regulatory functions in a number of areas.

Rapid and increasing development demands monitoring and regulatory functions in order to preserve the health, safety and welfare of the population. These functions come in the areas of building codes, zoning, health and social services, education and police protection. All of these aspects have been discussed previously and their potential for increase has been noted.

In addition to regulatory and public service functions, additional governmental activity will be desirable in order to monitor the activities of the oil industry. Without such monitoring and the background data that it generates, the local governments cannot plan for and respond to the major phases of development.

Assigning exact numbers or percentages of increase to these factors is impossible without prior knowledge of the methods the community will utilize in approaching future growth. However, in general, increases from 10 to 15 percent per year in the cost of government would not be unexpected.

Increase in the cost of government also connotes an increase in the cost of living. The cost of living is affected not only by government but also by the increased demand and consequent costs of goods and services and housing. Housing is one of the most basic and largest cost in the cost of living index. As indicated before, demand for housing units will rise substantially during the exploration and development phases of OCS development in the event of a high find. Subsequent to those phases, the demand should return to a growth rate similar to that experienced prior to OCS development. During those periods of high demand, however, the cost of housing will be determined by the basic market function. If new development is encouraged and keeps pace with population growth, then increases in the cost of housing will be relatively normal. However, if residential development occurs at a pace slower than population growth, the cost of housing will increase.

As in the case of government services, there is a great potential lag in the provision of housing units. In the early 1980's population could jump substantially. However, most of that population growth will be based on short term employment. There could be a distinct tendency for the construction industry to avoid overbuilding during that period. Consequently, when permanent population increases do result from the longer term work in the mid-1980's, housing could be in extremely short supply.

The situation relative to basic commercial goods and services is similar to that of housing. However, the impact of OCS development should not be as direct. Most of the goods and services provided for OCS activities will be shipped from places other than Kodiak (Anchorage, Seattle, etc.). Consequently, the market function should provide basic goods and services to the population as it grows.

Impacts on basic industries could be either significant or negligible. As indicated in the Economic Inventory in Volume II, fishing is the basic industry in Kodiak. There are a number of ways in which the fishing

industry could be affected. If there is a major environmental catastrophe, the productivity of the industry could be drastically reduced. This would severely damage the economy of Kodiak despite the economic growth due to OCS development. In the absence of environmental catastrophes, the potential productivity of the fishing industry would be governed, as it is today by primarily natural instead of economic factors. The economic productivity of the industry increases due to increased local demand for fresh fish products.

The fishing industry could also be affected by a reduction in the labor force. If wages and salaries paid to workers associated with OCS development are competitive with earnings in the fishing industry, industrial activities could syphon off some of the fishing labor market. If so, the overall economic productivity of the fishing industry could be reduced. Even this impact could have beneficial qualities. If fishing productivity remains high, it is doubtful that successful fishermen would abandon their current jobs. If the fishing productivity declined because of natural factors, then the industrial activity associated with OCS development might serve as a "labor sponge" for these fishermen not able to make competitive wages. This might also reduce the intensity of fishing activity in those lean years, allowing marine resources to regenerate.

Another potential impact on the fishing industry is the increase in oil-related marine activity. As indicated, at the peak of activity as many as 12 supply boats could be making up to 300 trips per month. This would be in addition to the associated barge and tanker traffic.

Collisions are a serious result of this increased marine traffic. While the number of boats involved in oil activities will be insignificant compared to the total number of fishing boats, the frequency of supply boat trips makes collisions a hazard. This is especially true considering the frequency of weather conditions limiting visibility in the Kodiak area. A collision between a supply boat and a fishing vessel could have serious repercussions in addition to the possible loss of life and property. It could create resentment against oil-related people and a subsequent increase in social and psychological pressures. On the other hand, oil-related boats and platforms could provide navigational and emergency services.

Impacts on the fishing industry can also be caused by obstructions on the sea floor that interfere with fishing gear. Obstructions could include pipelines, production facilities, anchors associated with semi-submersible rigs, and debris. All but the latter should be marked by buoys. However, some buoys will inevitably be lost. To minimize fishing gear damage, the industry should initiate a strict buoy maintenance program. They may also establish a fund to replace or be damaged by oil-related equipment or activity.

Another adverse effect on the fishing industry results from potential competition for harbor facilities and marine services. Although Kodiak is among the top three fishing ports in the United States, the community is extremely short on harbor facilities and marine services. The small

boat harbor is hopelessly overcrowded and boats are normally parked up to four abreast at the transient docks. Competition is high for space on the grids and fuel dock. Nevertheless, through a spirit of cooperation and common purpose, the fishing boats seldom have serious conflicts. The addition of oil industry-related marine traffic could create significant problems. Harbor facilities cannot handle the 200 foot supply boats and no maintenance facilities are capable of servicing oil-related vessels. In fact, there are no dry dock facilities on Kodiak Island.

In addition, fuel supplies may not be sufficient for both oil and fishing boats. For example, in August 1976 several geophysical vessels operating on the Kodiak Shelf refueled in the harbor. In doing so they depleted the supply, and fishing boats were left without fuel. This situation can create an adverse reaction toward the oil industry as well as economically affecting the fishing industry. To avoid this competition between oil and fishing vessels, the oil industry could moor, maintain and fuel their boats at supply bases remote from the fishing ports on Kodiak Island. In addition, operators of both oil and fishing industry vessels should understand the purpose, needs and capabilities of each vessel's use.

### Transportation Impacts

As with other basic community facilities and services, OCS impacts on Kodiak's transportation system would be substantial. They can be measured in terms of the expected increases in industrial activity as well as increases in population. The potential increased demand for roads and airport facilities has already been described. Impacts, especially those associated with surface transportation, will be substantial and costly.

### Air Transportation

Considering the labor force directly related to oil development and production (not including construction workers), we can estimate the requirements for commercial air carrier service. This kind of shift or "hitch" work has been common in the oil fields of Alaska.

During the peak years of 1987 in Case 2a and 1986 in Case 3, 1375 and 2122 people will be employed, respectively, in the offshore/onshore support services. If a three week on, one week off crew change schedule is utilized, then 25 percent of that work force will change crews each week. Consequently, 319 or 530 people per week will leave their jobs for home, assuming most workers do not move to Kodiak.

At present Wien Air Alaska flies up to 14 flights into Kodiak per week, and Western Airlines flies three flights a week to Kodiak from Seattle for seven months of the year. During the summer, then, a total of 17 flights a week to Kodiak. The Boeing 737 aircraft that Wien uses carries 112 persons; however, Wien often has cargo on the same aircraft. Based on an average two-to-one passenger to cargo area ratio, it can

carry approximately 900 persons per week into and out of Kodiak.(10) The Western plane carries almost all passengers, giving an average capacity of 110 passengers and allowing 330 passengers in and out of Kodiak per week. This gives Kodiak a total commercial air carrier capacity of 1230 passengers per week. The addition of 319 employees, as in Case 2a, would require an extra three flights per week; 530 workers, as in Case 3, would require five extra flights.

In addition to the employees directly related to OCS development, construction crews will be moving in and out of Kodiak. It is impossible to estimate the volume and frequency of their travel. However, if the local government isolates OCS industrialization from population centers, the work force will live in construction camps at the construction site. Constructors would then probably go to the crew change mode of operation. Added to these employees will be the increased population due to economic development and the increased transient assuming a relatively large number of "boomers" or "camp followers" will arrive in Kodiak on a regular basis.

Along with passenger traffic increase comes an increase in cargo volume. Additional cargo capacity will be needed primarily to supply the everyday goods necessary to support an increased population, although there may be an added increase due to the OCS related supplies utilized for the construction camps, marine service bases, and offshore rigs. Again, it is difficult to estimate the increases in cargo necessary without extensive research into airline records. However, based on the information available, an additional two flights per week from Anchorage would be required for purely cargo purposes in the event of a high find.(11)

This brings the total increase in flights into the Kodiak airport to a potential five to eight per week, or a 29 to 47 percent increase in commercial air carrier activity. This would give a total of 22 to 25 flights per week, or about three flights per day, into Kodiak on a year round basis.

### Marine Transportation

The impacts on marine transportation facilities will also be significant. As indicated in the Transportation Inventory (Volume II), City of Kodiak dock facilities are currently operating at their maximum capacity. In the last year, 165 vessels have utilized the city dock facilities and have moved 205,000 tons of cargo to and from Kodiak. That cargo volume represents no extraordinary industrial activity. We can assume that the demand for cargo tonnage will increase at least in proportion to population growth, not including increases in cargo due to OCS-related activity. Since the capacity of existing facilities is limited, their use for OCS-related cargo should be avoided.

In 1976 the ratio of cargo tonnage at the city dock per population was approximately 21 tons per person based on the estimated population of the Borough. Table 35 gives the total tonnage through 1992 based on population growth anticipated by OCS development.

Table 35: Estimated Tonnage\*- Kodiak Cargo Dock - With OCS

<u>Year</u>	<u>Case 1 No Find</u>	<u>Case 2a Mod Find Pipeline</u>	<u>Case 2b Mod Find S.B.M.</u>	<u>Case 3 High Find</u>
1978	223,314	223,314	223,314	223,314
1979	230,916	230,916	230,916	230,916
1980	242,823	244,902	244,902	244,902
1981	253,932	261,114	261,114	268,989
1982	265,377	278,208	275,436	280,644
1983	268,611	285,957	280,413	297,192
1984	272,937	294,483	284,739	314,748
1985	282,219	306,852	290,409	346,626
1986	291,816	337,974	319,200	399,798
1987	301,728	389,928	337,890	406,980
1988	311,997	361,557	348,159	406,749
1989	322,602	406,245	396,081	462,462
1990	333,564	414,435	404,271	464,688
1991	344,904	420,840	410,676	471,093
1992	356,622	422,793	412,629	473,046

\* Estimated at 21 tons/person

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

Over the next 16 years cargo weight increases steadily by some 65 percent in Case 1 and 119% in Case 3. Since current dock facilities are operating at capacity, additional facilities will be required. It is not necessarily true that the frequency of vessel berthings will increase commensurate with the total tonnage increase. As Kodiak demands more cargo tonnage, it will become more economical for shippers (in this case, Sealand) to devote more cargo space on board each ship to Kodiak. There will undoubtedly be some increase in berthings, but the magnitude of increase is impossible to determine. Even so, under current conditions of 165 berthings per year, an average 2.2 days per berthing is available for unloading. As the frequency of berthings increases, the time available to load and unload ships decreases. As this happens, the need for storage and maneuvering space on the dock will become more critical. The City of Kodiak should expand port facilities as demand increases, and plans should be formulated now to keep abreast of community requirements.

## Surface Transportation

Surface transportation between the airport and the service bases will generate additional transportation needs, as will transport of freight by barge and ship from the "Lower 48" or ports in Alaska (Seward or Anchorage) into the service base. Without knowing the size of the ships involved, it is impossible to estimate the frequency of trips needed to supply the 800,000 to 1.2 million tons of freight involved in the highest estimated level of development, Case 3. However, marine traffic is sure to increase substantially.

Industrial vehicular traffic between the service bases and the City of Kodiak will also increase if the bases are located on the highway system. This increase will be lower than that for marine traffic, as the bulk of drilling materials will be transported via ships and barges. (12) If it proves a significant increase, though, the roadbed along the Chiniak Highway must be upgraded. Bridges on the highway are relatively new and can support large semi-tractor/trailer trucks, according to the Highway Department (see Volume II - Transportation Facilities).

## SUMMARY OF IMPACTS

Based upon the discussions and assumptions made in the preceding sections, it is clear that the total environment, both natural and human, will be subject to significant changes throughout the OCS development depending upon the level of oil activity. In Cases 2 and 3, the population will increase dramatically and change the social, economic and environmental characteristics of Kodiak Island. Public services will be in demand and possibly in short supply. Prices and the cost of living will increase at a rate never before experienced by the indigenous population of Kodiak. The everyday life of the resident of Kodiak will change as activity increases.

Many people are concerned that the quality of human life will be drastically and adversely affected. To some extent this is undeniable. However, in large part, the assessment of the quality of human environment is subjective. Presumably, most current residents live there because they like the attributes of Kodiak. From their standpoint the changes will undoubtedly degrade the quality of life. However, new residents who move there as a result of OCS development may feel that the quality of life may improve.

The potential for impacts on the natural environment are indeed frightening. In a "worst case scenario", large areas of land could be destroyed, the resources of the abundant sea could be reduced or destroyed, the quality of water, both fresh water and salt water, could be severely degraded, and the air around Kodiak could turn to a hazy brown. Conversely, if strict controls are placed on industry activities and if the oil development process is fortunate enough to be free of natural catastrophes and significant human error, the final assessment of impacts on the natural environment could be minimal. The potential for each case is there. Much depends upon the residents' level of concern, the efficiency of the

government in its regulatory functions, the responsiveness and responsibility of the oil industry, and, perhaps most important, the cooperation of nature.

## ALTERNATIVE POLICIES AND PROGRAMS

There are a number of methods available to the Kodiak community and its governments that will allow preparation for and some degree of control over the impacts of OCS development. As has been indicated earlier, the actions of the oil industry have the potential of affecting all segments of the social and economic structure of Kodiak and almost all locations in the Kodiak Borough. Some of these impacts will be more significant than others; however, all of them need to be addressed by the community.

The community should be constantly aware that the most effective way to control impacts of any development, including OCS related activities, is to control the source of those impacts. This does not necessarily mean imposed or totalitarian control; cooperative control can be even more effective. In this case the source of the impacts is OCS activity. However, in the case of each individual impact there is also a subsource, i.e., marine traffic, environmental degradation due to construction, population growth, etc. In each case some form of control over those subsources would be the ideal method of mitigating the impacts. In a totalitarian government control of the impact sources would be a basic function of government and would be relatively uncomplicated in terms of the power of government. However, that situation would also give rise for opportunities for abuse of the control, both over the activities and the people affected by the impacts. In the United States, in order for a community to gain the level of control that will be effective in determining negative impacts, cohesive actions on the part of the entire community is necessary. Any OCS community has the power to control OCS related development to a certain extent. In order to do so, however, it requires a tremendous amount of human energy. Public officials and the residents of the community have to be knowledgeable of the operational modes, attitudes, and methods of the oil industry. In addition, the community must identify the factors which can give them a good bargaining position. Those that are already available should be strengthened. Any others that are possible should be developed. Alternative courses of action should be formulated with respect to dealing with the oil industry and the direct and indirect impacts that can be expected. A wide range of community input should be received prior to settling on the utilization of one of those alternatives. When that decision is made, and only after it is made, the community can begin to effectively exert a controlling influence on their future with respect to OCS development.

In a step designed to begin that decision making process, the Kodiak Island Borough has recently signed a contract with the State Department of Community and Regional Affairs that will provide funds for the preparation of a Comprehensive Plan and an economic adjustment strategy intended to allow the community to prepare for the impacts of OCS development. The funds are being made available through the Federal Economic Development Administration and the Department of Housing and Urban Development.

These studies will include a set of comprehensive goals and objectives, a land use plan, an economic base study, a community facilities study, a housing study, a transportation plan (both internal and external), an implementation plan, a capital improvements plan and a government services program. The results should provide detailed recommendations for policies and programs to be pursued in each area based on the goals and objectives. This will be Kodiak's first opportunity to express its desires and needs in relation to OCS oil development. The strategies formulated will give direction to the governments and the oil industry concerning the community's intended approach toward OCS activities and their impacts.

The program and policy areas discussed below are intended to provide the impetus for direction that those studies should take. They are discussed in terms of alternatives. Without the input and information developed in the forthcoming studies, no final decisions can be made concerning the exact policies and programs that should be implemented. However, some recommendations are made where specific problems have been identified.

### LAND USE POLICIES

Almost any economic activity requires the use of land. OCS development is no exception. Land is very important to the oil industry both in terms of dollars and convenience. Land will also be required by the community as a result of the indirect impacts of OCS development. Population growth will require land for housing, commercial activities and community facilities. All of these areas should be addressed by the community as they formulate their land use policies.

### Industrial Site Planning for OCS Activities

There are a number of methods available for community control and/or regulation of OCS projects. In the coming years the local governments will be faced with numerous decisions concerning OCS related development projects as well as projects resulting from population growth and community expansion. In evaluating the suitability of industrial facilities related to OCS development, the community should know what stage of OCS development activity is involved in the facility, the scale and size and duration of the project, the type of activity that will be carried out as a result of the project, complete information concerning the ownership, management and ultimate responsibility for all aspects of the project, and the need for any public services that will be required by the project. Also, prior to making a final decision, the community must determine, either through assistance from the project sponsor or assistance from other governmental agencies (the state and federal government) or through its own staff, what the environmental, economic and social implications of the project might be. (13) There are two primary methods available to gain this information.

The most direct method of control is ownership. The community can either own the land or own the facility itself. If it owns the land, it

can lease it or it can sell it. Leasing is an extremely powerful method of control. A lease can contain many stipulations. The local government has almost no restrictions on the type of requirements they can include, such as the type of facility involved, the operational methods of the projects, the scale and magnitude of the project, design review requirements, and mandatory scheduling restrictions.

If the local government elects to sell land to the sponsor of an OCS related facility, the sale can affect almost any aspect of the ensuing development. However, control through deed restrictions is not as direct nor is it as effective as the controls that can be placed on a lease document.

The community also has the option of actually building the facilities through a public development corporation or an independent authority. The complete facilities can then be leased to the industry operatives. Pros and cons are associated with special purpose authorities. They offer a method of obtaining financing and funds other than those utilized by local governments. They also offer the opportunity to oversee a particular development with personnel who have the specific technical and professional expertise in the related field. Authorities can unfortunately be extremely complicated and redundant in terms of the powers that they exercise. Special purpose authorities are used throughout the United States for the development and control of ports, airports, housing programs and public services and facilities.

An alternative to creating a special purpose authority would be for the local governments to build and own the required industrial facilities as public facilities. Financing for an endeavor such as this could come from the oil industry itself.

The major method of controlling or affecting the impacts of OCS development is through regulations. Local governments in Alaska are charged with the responsibility to provide guidance and regulation in a number of fields. The resultant regulations have the potential of being extremely powerful in terms of effective control over OCS related projects. The types of regulations available include zoning ordinances, building codes, comprehensive planning and associated so-called specific area planning, capital improvements scheduling and growth phasing, and specific regulations developed for the purpose of controlling OCS development.(14)

The most common and probably the most affective of these regulations in terms of their potential for control over OCS industrial projects is the zoning ordinance. Through the use of a zoning ordinance, local government has the opportunity to establish land use limitations, dimensional requirements which include height, lot coverage, building placement, noise requirements, parking regulations, access requirements, review processes and a variety of other specialized regulations and requirements. Through judicious use of zoning powers, the Borough can determine the exact location and size of a particular zone that will allow OCS development. It should be noted, however, that these tools must not be used indiscriminately. One of the most basic concepts of planning, and one that has been upheld by the courts repeatedly in recent years, is that

zoning patterns and ordinances must be based upon comprehensive planning decisions that have already been made and published by the community. Without the proper background and implementation procedures, the zoning ordinances stand a good chance of being declared unconstitutional if taken to court.

The comprehensive plan is also a good tool for the regulation of industrial activities. It should indicate the type of development that the community expects to see, and the locations within which that development should occur. Within the comprehensive planning process, the community may include neighborhood plans or specific area plans. These are normally much more detailed in their scope and recommendations concerning land use and development.

Another strong method of control and/or regulation of OCS development is the environmental review process which is available through the federal government when federal funds are utilized. However, the local government has the authority to establish environmental criteria and review procedures for specific types of development. These can be used to affect the operational modes as well as the location of OCS related facilities.

Many of the above stated direct and indirect regulatory and control processes are currently available in the Kodiak Island Borough. However, a number of them are not available and have not been considered. The following recommendations are made based on obvious needs that currently exist in Kodiak. Acceptance and implementation of the recommendations should be based on goals and objectives that are developed during the comprehensive planning process.

#### Recommendations

1. To the extent possible, the Kodiak Island Borough should discourage the location of OCS related industrial facilities within the Kodiak metropolitan area or in any of the other villages on Kodiak Island. The location of such facilities within those areas would be extremely disruptive to the traditional lifestyles, community structures, and social and economic characteristics. Also none of the communities provide the services and facilities required by the oil industry; consequently, an attempt to provide those facilities would result in an extreme hardship on the community for many years to come. The Borough should insist that the oil industry be self sufficient and willing to pay its own way in terms of the impacts resulting from facilities directly related to OCS development and the indirect impacts created by population growth accompanying OCS development.

2. As stated, the community is beginning a comprehensive planning process. A great deal of attention should be devoted to this on the part of the public officials as well as the residents of the community. Extraordinary measures should be taken to involve the community in the process so that an educated, cohesive and unified position can be taken by all of the residents of Kodiak Island on subjects of future growth and industrialization.

3. The Borough should completely revise its land use regulations in conjunction with the new comprehensive plan. As part of this revision process, the Borough is urged to look at new and innovative land regulation techniques such as planned unit developments, specific area plans, contract zoning, and conditional use permits.

4. The transportation portion of the comprehensive plan should include an official streets and highways plan that delineates major and minor arterials, collectors and neighborhood streets as well as standards for construction and traffic loads for those streets.

5. A complete detailed six year capital improvements program should be developed and adhered to.

In addition to these recommendations for specific programs and policies, the community should investigate the feasibility of utilizing the following methods of OCS control.

1. Special purpose authorities.
2. Financial and staff assistance from state and federal agencies.
3. The possibility of cooperative and/or joint agreements with the oil industry for development of OCS facilities.

#### Residential Policies

The current housing problem in Kodiak will become more severe unless action is taken now to solve the problem. The community must determine its goals and objectives and desires as well as its capabilities. The type of housing, the density and the location at which housing should be placed should be specifically identified. Also important are the obstacles present that could inhibit the development of housing in Kodiak. These could include financing, community facilities and utilities, and land. Assistance is available from both state and federal agencies as well as private consultants in solving these problems.

A number of approaches can be taken in dealing with housing problems. They must be coordinated with the comprehensive planning effort and an adopted set of goals and objectives.

One of the first tasks necessary will be to determine what lands are appropriate and available for housing development. Plans must be made for the provision of a full range of community services and facilities (water, sewer, roads, electricity) to that land. Without this action, housing development in the future will be haphazard, scattered and provision of public services in the future will be significantly more expensive.

The community should also encourage utilization by developers and public agencies of federal and state housing programs. Numerous programs are available ranging from assistance to the housing occupant to mortgage

insurance and direct assistance to contractors. It is also possible for the local governments to set up housing authorities through federal programs and thus be able to develop the housing themselves.

It will be important during certain phases of the OCS development for the community to have made provisions for temporary housing. During periods of high intensity, short term employment the demand for housing will be especially high. This "spill over" housing could be developed through mobile home parks with temporary water, sewer and electric facilities that could either be converted or removed when the demand for such housing decreases.

One of the most serious housing problems in Kodiak is cost. Throughout the various phases of OCS development that problem will become consistently more serious. It is important for the community to institute programs and policies that will help alleviate escalating cost trends to the extent possible. Rapid inflation of land costs can be stabilized through the passage and strict adherence to comprehensive plans.(15) If a landowner or prospective land buyer knows that the land in question has been planned and zoned for a specific use, the value of that land will not only be established and maintained, but the potential for speculative increases in land costs will be reduced.

Escalating construction costs can also be counteracted through a number of public policies. These are primarily centered around zoning and the provision of public services. As we have pointed out previously, higher densities will normally decrease public costs. They will also result in lower cost per unit to the consumer. Higher density housing does not necessarily mean that the living environment within those units is degrading. Through modern zoning and design techniques, townhouses and condominiums with adequate recreational and design amenities can be encouraged. The result can be very attractive residential projects on relatively small amounts of land. Such projects have the potential of a greater efficiency of public utilities and roads and less expensive building costs compared with the quality of the units involved.

This concept applies to almost any type of housing development. Through the use of incentives, the local governments can allow the housing developer an opportunity for a high rate of return on his investment in return for the provision of greater amounts and qualities of amenities.

### Recommendations

The following recommendations are made for consideration by the local community.

1. In the capital improvements program and the comprehensive plan, the community should indicate exact areas where public utilities and facilities are to be extended. They should also specify the timing of the provision of those services. This will allow both public and private entities to prepare for development well in advance of its occurrence

and thus reduce escalation in land costs and result in improved physical planning. There is no question that as population grows housing units will be built, and in many cases public facilities, utilities and roads will have to be extended to them. If their location and densities are predicted in advance, the cost of providing those services could be reduced.

2. The rewrite of the zoning ordinance should include conditional use or special exception provisions in order to provide the local governments with the tools necessary to encourage innovative quality development. These will also provide the decision makers with a review and veto power over both residential and other types of development that are not in compliance with the comprehensive planning principals.

3. The community should develop and adopt a mobile home park ordinance and indicate on the comprehensive plan map, as well as the zoning map, areas in which it can be utilized. This will help to provide the spill over housing on a temporary basis and, if developed for permanent use, can allow moderate income families to own their own homes. Mobile home parks can be developed in an extremely attractive manner, assuming the inclusion of appropriate design and recreational amenities. The value of the mobile homes involved can actually appreciate over the years rather than depreciate, which has historically been the case in Kodiak.

#### Auxiliary Commercial and Industrial Policies

As the population in Kodiak grows as the result of normal growth trends or at an accelerated rate due to OCS development, the demand for commercial services and ancillary industrial uses will increase. There will be many development proposals placed before the community that are not directly associated with OCS activities. The community must be ready to analyze and make decisions concerning those developments with respect to the community goals. In reviewing commercial and industrial projects, information similar to that required for review of OCS related projects needs to be determined. In addition communities should analyze the market area that would be served by commercial projects. This will have an impact on the analysis of the locational characteristics of the project. In addition the communities should analyze the potential land use conflicts that could result from the location of commercial uses. In order to do so, information has to be gathered on current trends in Kodiak and their appropriateness to the communities' goals and objectives. This should be done as part of the comprehensive planning process. An important aspect of commercial and industrial projects are the traffic flows that will be created by their locations. Adequate streets that will prohibit the use of noncommercial (i.e., residential/recreational) streets for industrial or commercial oriented traffic should be provided. An official streets and highways plan would be extremely valuable in this type of analysis.

## Recommendations

1. Kodiak should concentrate all major commercial development in the downtown area. The zoning ordinance could aid in doing this by providing incentives or bonuses for design amenities in this area. The incentives could be in the terms of height increments, density or intensity allowances, and a variety of other dimensional factors. Also, in order to encourage development in the downtown area, the community should consider the addition of municipal parking lots or structures in the downtown area. If the problems of vehicular congestion continue to worsen, retail shoppers will tend to go to outlying shopping centers for their commercial services. Consequently the downtown area could actually decline in relative importance to the retail industry as the population increases.

2. While encouraging major commercial development in the downtown area, the planning authorities should allow for small neighborhood shopping facilities. These facilities should provide the commercial services that are needed to supply residential areas with their day-to-day commercial needs. It should not include commercial services that are provided on a community wide basis or other retail and heavy commercial outlets that are not necessary for the support of day-to-day needs. If these neighborhood commercial areas are kept small, they will not detract from the downtown area. This will help to reduce land use conflicts as well as traffic conflicts in and around residential areas by reducing the demand to drive downtown each time a small purchase is necessary. This balance between downtown and neighborhood commercial areas is critical and should be addressed in detail in the comprehensive plan.

3. Kodiak should consider the promotion or development of industrial/commercial parks. By concentrating industrial/commercial uses that are not necessary for day-to-day shopping needs or appropriate for the downtown area, both the community and businesses involved can benefit. This type of development will promote better use of land and public facilities, as well as enhance the esthetic qualities of commercial development. It also offers the opportunities for businesses that offer commercial services to other businesses to locate near their clients. This can be accomplished through the zoning ordinance as well as through municipal land leases and/or municipal development corporations.

## TRANSPORTATION POLICIES

Transportation is Kodiak's lifeline. Its importance will increase throughout the phases of oil development, both from the standpoint of increased industrial requirements as well as because of population increases. The transportation characteristics of Kodiak are such that a significant rise in the cost of transportation can have a tremendous effect on the cost of living. The transportation system in Kodiak has three primary subcategories. They are (1) external transportation (transportation to and from the island from other points in Alaska and the Lower '48), (2) internal transportation (transportation to the

various parts of the island), and (3) local transportation within the communities. The community with the most obvious need for transportation planning and facilities is the city of Kodiak. The following will be a review of the alternatives available to the Kodiak Island Borough in preparing the transportation system for the impacts of OCS development.

### External Transportation

Kodiak's external transportation system is based on the marine and airport facilities. They will have to be maintained and expanded in order to keep pace with future demands. One way to accomplish this difficult and expensive task is through a port or transportation authority. An authority can often deal with the problems of developing and maintaining the port, airports, and harbor facilities more efficiently than local government. This alternative could be accomplished solely by the City or Borough or through a joint authority with the State. At present land for the port facilities in Kodiak is limited, and efficient land use is critical. It will also be necessary in coming years to expand that facility. A significant amount of funds will be necessary for the development of port facilities to keep pace with the demands. One advantage of an authority is its ability to raise funds and obtain financing. It can provide the opportunity to improve the transportation facilities and thus attract transportation oriented businesses to locate on and around the facilities that they utilize.

As indicated in the development scenarios, there could be a large increase in air traffic into the Kodiak area. Passenger and cargo services will be necessary to accommodate the OCS development directly as well as the growing population of Kodiak. In order to accommodate this traffic, it is expected that airport facilities will be expanded. As has been indicated, the oil industry will require land, warehousing space, and maintenance facilities at the airport. The commercial air carriers will undoubtedly need additional space for their operations. Planning for this type of development in conjunction with upgrading airport facilities is not normally part of a community comprehensive plan. Funds for airport master planning are available through the Federal Aviation Administration. Without proper planning, the Kodiak airport could develop into an inefficient community facility with significant land use and safety problems.

The Borough should also encourage the State of Alaska to increase its ferry service to Kodiak. A port or transportation authority could help in this field by providing facilities and funds to upgrade that service.

### Internal Transportation

As population pressures increase in Kodiak, recreational demands will also increase. There will be a demand for transportation throughout the Kodiak Island group. As population grows in the outlying villages, either as a result of OCS development or natural growth trends, access to the Kodiak metropolitan area will become more important also. Air

carrier service to the villages will increase; consequently, safety and cost problems could arise. The Borough should investigate the possibility of an Air Systems Study for the Kodiak Islands to insure that the airport facilities around Kodiak Island are adequate to handle projected demands.

In addition, there will be increases in demand for noncommercial access throughout the Borough. Facilities to meet these demands could be accomplished through a system of secondary roads leading to small docks and boat launching ramps at strategic points, at least on the northwestern part of Kodiak Island. This would allow transportation from the relatively nearby communities without the use of commercial carriers. Again this could be handled through a transportation authority or as a capital project administered by the Borough itself.

### Local Transportation

Traffic, especially in the City of Kodiak, could be a major problem associated with OCS development. One of the concepts that needs to be considered in addressing these problems is the separation of commercial, industrial and normal vehicular traffic whenever possible. The Borough also needs to develop standards as part of their official streets and highways plan for the various classifications of roads. This can help to create throughways that avoid traffic impediments. The possibility of public transportation should also be addressed in the future. Funds are available through the Federal Department of Transportation and the Department of Housing and Urban Development for demonstration projects and facilities. While the present population will probably not support a public transportation system, by the end of the projected development phase of OCS activity a system may be needed. Also, as traffic increases in Kodiak, the potential for pedestrian/vehicular conflicts will increase. A trail system would help avoid this as well as provide additional recreational opportunities.

### Recommendations

The following recommendations are made with respect to all of the subcategories of transportation needs on Kodiak Island.

1. The Borough and/or City should investigate the feasibility of a transportation authority. The authority should be comprehensive, with powers over the port, airports, the OCS transportation facilities, and should operate in close coordination with the Public Works Department of the City of Kodiak. This will allow for a comprehensive approach to transportation on Kodiak. It will open new avenues of funding that may make it possible to upgrade the transportation system consistent with the demands that could be placed upon it in a relatively short time.

2. The recommendation is repeated here that the Kodiak Island Borough develop, adopt and strictly implement and enforce an official streets and highways plan.

3. The State Division of Aviation should be urged to apply to the Federal Aviation Administration for funds to prepare a master plan for the Kodiak Airport in accordance with FAA Advisory Circular A/C 150/5070-6.

4. The community should address the future of the city of Kodiak's general aviation airport near the downtown area. This airport has many advantages but also has the potential for future disadvantages as population increases. FAA funds may be available to study the future growth potentials and/or land use conflicts that could result from dramatically increased air traffic operations at that airport.

#### COMMUNITY FACILITY, UTILITY AND PUBLIC SERVICE PROGRAMS

In previous sections the capabilities of and projected demands on community facilities, utilities and services have been identified. Also suggestions for provision of those facilities, utilities and services have been offered. Without the guidance provided by adopted goals and objectives as part of a comprehensive plan, this study can go no further. The following section will briefly summarize the problems identified and suggest principal sources of funds available to help the community in finding solutions.

#### Housing

As indicated above housing is and will be a major problem in Kodiak throughout the OCS development process. To meet the anticipated demand, the existing housing stock is important and must be maintained. New housing development must be encouraged in order to meet the demands that will be placed on the housing market in the future. Because of the rising demand and escalating costs, there will be an inevitable increase in the cost of housing also. In many cases this rising cost of housing will be offset by increased salaries. However, fixed and low income people and families could be severely impacted. Consequently, the maintenance and upgrading of the existing housing is especially important.

#### Maintenance and Upgrading of Existing Housing Stock

The community should encourage the upgrading and enhancement of neighborhood areas that are deteriorating under current conditions. Continued deterioration in certain areas (see Housing Inventory - Volume II) will remove that housing from the housing market.

Funding for housing maintenance and rehabilitation is available primarily through federal sources. The Housing Community Development Act of 1974 provides funds for neighborhood redevelopment. The City of Kodiak is an entitlement city under that Act and is currently in the process of upgrading the Aleutian Homes area with paved streets and storm drainage

in hopes that some of the poorly maintained houses within that area will be improved. The Kodiak Island Borough has obtained discretionary funds through the Act for the last two years and has been investing them in public facility improvements within the villages. This should help to maintain the housing stock in those areas.

Rehabilitation loans are also available through HUD under Section 312 of the Housing Act of 1964. These are direct federal loans to finance rehabilitation in urban renewal and code enforcement areas which are identified by the local government. By financing rehabilitation to bring the property up to applicable code requirements, the loans prevent unnecessary demolition of basically sound structures. The limit on these loans is \$17,400 per dwelling unit. Any property owner in urban renewal or concentrated code enforcement areas is an eligible applicant as long as he can demonstrate that the loan can be repaid. Repayment requirements vary.

Another program through the Department of Housing and Urban Development is entitled Housing in Declining Neighborhoods. It provides mortgage insurance to purchasers to rehabilitate housing in older, declining residential areas. It is designed to provide adequate housing for low and moderate income families. HUD insures lenders against loss on mortgage loans to finance the rehabilitation of older, declining but still viable areas where conditions are such that normal requirements for mortgage insurance cannot be met. The terms of the loans vary according to the HUD/FHA programs under which the mortgage is insured. Any home owner or project owners eligible for FHA mortgage insurance is eligible for these loans.

There are many programs available to assist in the development of new housing. The majority of the federal programs available are administered through the Department of Housing and Urban Development. A review of the significant programs appropriate for Kodiak follows:

#### HUD Housing Programs

1. Home Mortgage Insurance Program. Through this program HUD insures commercial lenders against loss and encourages lenders to invest capital in the home mortgage market. The Federal Housing Authority insures the loans made by the private financial institutions for up to 97 percent of the property value and for terms of up to thirty years. Any applicant is eligible as long as he can make the cash downpayment and the mortgage payments.

2. Home Ownership Assistance for Low and Moderate Income Families (Revised Section 235). This program enables eligible families to afford new or rehabilitated homes that meet HUD standards. The Federal Housing Administration insures mortgages and makes monthly payments to lenders to reduce interest to as low as five percent. The homeowners must contribute 20 percent of their adjusted income to monthly mortgage payments and must make a downpayment of 6 percent of the total cost of buying the home. There are dollar limits on the loans and sales prices. In

Alaska the limit is \$29,000 (\$33,000 for homes for five or more persons). The income limit for initial occupancy is 95 percent of the area median income.

3. Home Ownership for Low and Moderate Income Families. This program insures lenders against loss on mortgage loans to finance the purchase, construction, or rehabilitation of low cost one to four family housing. The maximum insurable loan for an owner-occupant is \$29,000 in Kodiak. For a larger family (five or more persons) the limit is \$33,000. Higher mortgage limits may apply to two to four family housing. Income level for initial occupancy is 95 percent of the area median income.

4. Condominium Housing. This program insures mortgages made by private lending institutions for the purchase of individual family units and multi-family housing projects. Sponsors may also obtain FHA insured mortgages to finance the construction or rehabilitation of housing projects which they intend to sell as individual condominium units. Any qualified sponsor may apply for a blanket mortgage covering the project, and any credit worthy person may apply for a mortgage on individual units in the project.

5. Mobile Homes (Title I). The purpose of this program is to facilitate financing of mobile home purchases, thereby providing alternative lower cost housing. The FHA insures mobile home loans made by private lending institutions. Loans may be insured up to \$12,500 in twelve years on a single modular unit and for \$20,000 over fifteen years on double module units. Any person able to make the cash investment and the mortgage payments is an eligible applicant.

6. Mobile Home Courts. This program helps finance construction or rehabilitation of mobile home courts. FHA insures mortgages made by private lending institutions on the entire site. Mortgages in Kodiak would be limited to \$5,850 per individual mobile home space within each space. The park must be located in an area approved by FHA in which market conditions show a need for such housing. Eligible applicants include investors, builders, developers and others who meet FHA requirements.

7. Multifamily Rental Housing. Through this program, the FHA insures mortgages made by private lending institutions to finance the construction or rehabilitation of multifamily rental housing by private or public developers. The project must contain at least eight dwelling units. FHA requires that the housing financed under this program be able to accommodate families with or without children at reasonable rents. Funds under this program can be applied for by investors, builders, developers and any others who meet the FHA requirements as long as the housing project is located in an area approved by the FHA for rental housing and in which the market conditions show a need for such housing.

8. Existing Multifamily Rental Housing. Through this program FHA insures to purchase or refinance existing multifamily projects originally financed with or without federal mortgage insurance. HUD may insure mortgages on existing multifamily projects with or without requiring substantial rehabilitation. The project must contain eight or more units

and must be at least three years old. Again, investors, builders, developers and any others who meet FHA requirements may apply.

9. Multifamily Rental Housing for Low and Moderate Income Families (Section 221(d)(3) and (4)). This program is designed to help finance construction or substantial rehabilitation of multifamily rental or cooperative housing for low and moderate income or displaced families. Units financed under this program may qualify for assistance under Section 8 of the Housing and Community Development Act of 1974 if occupied by eligible low income families. Eligible applicants include public agencies; non-profit, limited-dividend or cooperative organizations; and private builders or investors who sell completed projects to such organizations. Tenant occupancy is not restricted by income limits except in the case of tenants receiving subsidies under the program.

10. Low Income Public Housing. Through this program local public housing agencies develop and operate low rent public housing projects. They finance them through the sale of bonds and notes. HUD furnishes technical and professional assistance in planning, developing and managing the projects and gives two kinds of financial assistance: preliminary loans for planning; and annual contributions to pay off the bonds and notes, assure low rents and maintain adequate services and reserve funds. Rents are based on the residents ability to pay, contribute to the cost of the managing, and operating the housing. The only eligible applicants for this type of program are public housing agencies established by local governments in accordance with State law.

11. Direct Loans for Housing for the Elderly or Handicapped (Section 202). This program makes long term direct loans to eligible private nonprofit sponsors to finance rental or cooperative housing facilities for elderly or handicapped persons. The current interest rate is based on the average rate paid on federal obligations during the preceding fiscal year. Eligible applicants include private nonprofit sponsors and eligible tenants include households with one or more persons, the head of which is at least sixty-two years old or is handicapped.

12. Indian Housing. Through this program indian housing authorities develop and operate rental and home ownership projects financing them through the sale of bonds and notes. HUD furnishes technical and professional assistance in planning, developing and managing the projects and also gives financial assistance in the form of annual contributions to pay off the bonds and notes. For rental projects the contributions also assure low rents and maintain adequate services and reserve funds. The indian housing authority is responsible for all maintenance costs on these projects. Rents that are based on the residents' ability to pay contribute to the cost of managing and operating the housing.

#### Water and Sewer Programs

The need for new and expanded water and sewer facilities in Kodiak as a result of OCS development has already been demonstrated in preceding sections. In order to fund the necessary construction of water

and sewer projects, it is obvious that the Kodiak community will need financial assistance. Listed below are several programs administered by both the state and federal government from which funds can be obtained for the needed facilities.

State Programs - The following is a list of state programs.

1. Water and Sewer Aid. This program is administered by the State Department of Environmental Conservation and provides financial assistance to pay the cost of capital improvements for water supply and sewage systems. The program is financed through State bonds which are sold to provide a fund from which grants of one half of the nonfederally funded portion of a project (to a maximum of 50 percent) may be paid to a municipal applicant. Any municipality within the State of Alaska is eligible to apply.

2. Village Safe Water Program. This program is also administered by the Alaska Department of Environmental Conservation. Eligible applicants include any community which has between 25 and 600 people residing within a two mile radius. The purpose of the program is to provide for safe water and hygienic sewage disposal systems and bathing and laundry facilities in remote Alaskan villages. The program is financed through State bonds which are sold to provide a fund which can be used for construction of facilities.

Federal Programs - The following is a list of federal programs.

1. Construction Grants for Waste Water Treatment Works. This program is designed to assist and serve as an incentive in the construction of municipal sewage treatment works which are required to meet the State and federal water quality standards. The program is administered by the Office of Water and Hazardous Materials of the Environmental Protection Agency. The funds can be used for the construction of municipal waste water treatment works with some limitations. Eligible applicants include any municipal, intermunicipal, state, interstate agency or indian tribe having jurisdiction over disposal of wastes.

2. Water Pollution Control - Area-wide Wastewater Treatment Management Planning Grants. This is another grant program administered by the Office of Water and Hazardous Materials of the Environmental Protection Agency. Its objective is to encourage and facilitate the development and implementation of areawide wastewater management plans. In order to apply for the funds, the applicant must be designated by the Governor and by the administrator of the Environmental Protection Agency as the official areawide waste treatment management planning agency for a given area. The applicant must also agree to develop a plan and a continuing planning process for the entire designated area.

3. Mortgage Insurance - Experimental Projects Other than Housing. This program is administered by the Housing Production and Mortgage Credit Division of FHA in the Department of Housing and Urban Development. Its objective is to provide mortgage insurance to help finance the

development of group medical facilities or subdivisions or new communities that incorporate new or untried construction concepts intended to reduce costs, raise living standards and improve neighborhood design. HUD/FHA insures lenders against loss on mortgage loans through this program. These loans may be used to finance the purchase of land and to develop building sites for subdivisions or new communities including water and sewer systems and streets where new technologies are incorporated.

4. Water and Waste Disposal Systems for Rural Communities. This program administered by the Farmers Home Administration of the Department of Agriculture is designed to provide basic human amenities, alleviate health hazards and promote orderly growth of rural areas by meeting the needs for new and improved rural water and waste disposal systems. The funds may be used for the installation, repair, improvement or expansion of a rural water system including distribution lines, wells, pump facilities and costs related thereto. The installation, repair, improvement or expansion of a rural waste disposal system including the collection and treatment of sanitary storm and solid wastes, are all eligible activities. Eligible applicants include municipalities, and in Alaska boroughs, as well as associations, cooperatives and corporations operated on a nonprofit basis and Indian tribes on federal and state reservations. The facilities shall primarily serve rural residents. The service area cannot include any area in any city or town having a population in excess of 10,000 inhabitants according to the latest decennial census. Also the applicant must be unable to finance the proposed project from its own resources or through commercial credit at reasonable rates and terms, and they must have the legal authority necessary for constructing, operating and maintaining the proposed facility or service. Funds under this program come in the form of guaranteed loans or project grants.

#### Recreational Programs

As indicated earlier, the Kodiak Island Borough has recently assumed the areawide parks and recreation power authorized under State statutes. Also the City of Kodiak currently operates a parks and recreation program (see Recreation Facilities Inventory - Volume II). The following is a review of State and federal programs available to assist in the development of additional parks and recreation facilities in the Kodiak area.

State Programs - The following is a list of State programs.

1. Land and Water Conservation Funds (Bureau of Outdoor Recreation Grants). This program is administered by the Division of Parks of the State Department of Natural Resources. Both cities and boroughs may apply for funds under this program. The funds may be utilized to provide assistance in planning, acquisition and development of outdoor recreation areas and facilities. The program is financed utilizing federal funds from the Bureau of Outdoor Recreation on a 50/50 federal-local matching basis.

2. Trails and Footpaths. This program is also administered by the Department of Natural Resources. Its purpose is to provide for the

establishment of public ways for trails and footpaths. Any city or borough within the State can apply. Up to one percent of the total yearly State and federal matching monies combined under the Federal Aid Highways Program may be appropriated annually from the general fund of the Department of Natural Resources in order to fund this program.

Federal Programs - The following is a list of federal programs.

1. Outdoor Recreation Acquisition, Development and Planning. This program is administered by the Bureau of Outdoor Recreation, Federal Department of the Interior. Its purpose is to provide financial assistance to the states and their political subdivisions for the preparation of comprehensive statewide outdoor recreation plans and acquisition and development of outdoor recreation areas and facilities for the general public to meet current and future needs. It may be used for a wide range of outdoor recreation projects such as picnic area, intercity parks, camp grounds, tennis courts, boat launching ramps, bike trails, outdoor swimming pools, and support facilities such as roads, water supply, etc. Facilities must be open to the general public and not limited to special groups. Development of basic rather than elaborate facilities is favored. Priority consideration generally is given to projects serving urban populations and the funds are not available for the operation and maintenance of facilities. As indicated above under State Programs, all applications for these funds must be processed through the State Department of Natural Resources. Eligible applicants include any borough or city within the State of Alaska.

2. Parks and Recreation Technical Assistance. This program is administered by the National Parks Service, Department of the Interior. The objective of the program is to provide technical assistance to State and local agencies in planning, developing and managing their park and recreation areas so as to help meet the park and recreation needs of the nation. The program consists of technical and advisory services on such matters as agency organization, operation and maintenance of park systems, personnel training, historical and archeological programs, and general development planning. Eligible applicants include indian tribes, states, and local units of government.

Port and Harbor Facilities

As has been pointed out, the Kodiak small boat harbor is already overcrowded. In addition, the City of Kodiak cargo dock is currently operating at its capacity. The addition of OCS related cargo demands and vessel activity in the area will severely impact these facilities in case of moderate or large oil strick. Aid for the development of expanded or new facilities is available through the following programs:

1. Boat Harbor Aid - This program is administered by the State of Alaska, Department of Public Works. Its purpose is to aid local governments in the construction of floats, docks, grids, launching ramps and other

related small craft harbor facilities. Any city, borough, or community or interested group desiring harbor facilities may apply. Upon approval of an application, the State of Alaska will construct the public improvements requested. The program does not include direct financial grants or loans. The program is supported through the watercraft fuel tax revenue and utilizes 100 percent State money. The money is distributed project by project and is variable legislature by legislature.

2. Port Facilities Development - This program is also administered by the State Department of Public Works. Its purpose is to aid municipalities in the improvement of municipally owned and operated port facilities. Any municipality desiring port facilities or port facility improvements can apply. In Kodiak the program could pay up to 80 percent of project costs for port improvements. The State funds utilized are appropriated by the legislature and are normally the result of general obligation bond authorizations. The money is distributed project by project and it is variable from year to year.

### Public Law Enforcement Programs

The crime rate in Kodiak increased over 100 percent within the last year (see Public Safety Facilities Inventory Volume II). At present public safety facilities are overtaxed. During the process of OCS development in Kodiak it will be necessary to upgrade and expand those facilities. Principle sources of funding for such facilities are described below.

1. Law Enforcement Assistance Comprehensive Planning Grants - This program is administered by the Law Enforcement Assistance Administration (LEAA) of the Department of Justice. Its objective is to provide matching grants to states for the operation of law enforcement and criminal justice planning agencies which develop and administer comprehensive statewide law enforcement and criminal justice improvement plans. States are the only eligible applicants for this program; however, their activities under this program can be of benefit to Kodiak.

2. Law Enforcement Assistance - Improving and Strengthening Law Enforcement and Criminal Justice - This is another LEAA program designed to implement the law enforcement and criminal justice programs developed under the LEAA comprehensive planning grants. Through this implementation program, states are allowed to improve and strengthen their criminal justice system through a variety of methods, including construction of new facilities. The type of assistance involved are project and formula grants depending upon the individual program.

The programs described above will help to solve the financial needs of the community generated by OCS development. There are many more State and federal programs available for various public facilities, utilities and services. In order for the community to be aware of all of the financial assistance sources available, the two following publications should be obtained: (1) The Catalog of Federal Domestic Assistance published by the Executive Office of the President, Office of Management and Budget, Washington, D.C., 20503; (2) the Alaska State Aid Catalog published jointly by the Department of Community and Regional Affairs and the Alaska Municipal League.

## ESTIMATED LEVEL OF CAPITAL IMPROVEMENT REQUIREMENTS

As indicated in the Impacts Section of this report, substantial public facilities must be constructed and updated throughout the process of OCS development; these include water, sewer, roads, port facilities, educational facilities, parks and recreation facilities and police facilities. One of the most common methods of financing capital improvements by public bodies is through bonding. Both the City of Kodiak and the Kodiak Island Borough have the authority to issue bonds. The majority of the public services provided to the Kodiak metropolitan area are provided by the City within the city limits; however, the Borough does have area-wide education and parks and recreation powers that will require facilities in the future.

The Constitution and laws of the State of Alaska permit local governments to issue general obligation bonds only if a bond authorization ordinance is approved by a majority of those voting on the question at a regular or special election. Prior to the election, notice of the total existing bond indebtedness must be published together with information concerning the cost of debt service on current indebtedness and total assessed valuation within the municipality. Unlike many other states, however, there is no constitutional or statutory limit on the permissible amount of general obligation indebtedness in terms of a percentage of total assessed valuation.

The Charters of the City of Kodiak and the Kodiak Island Borough do not impose any additional restrictions upon the issuance of general obligation bonds.

Assuming, therefore, that they would be able to obtain the approval of the voters for the issuance of new bonds, the principal constraint is not legal, but financial. Bonds would not be marketable unless prospective purchasers were able to be convinced that that amount of the existing general obligation indebtedness was not an unduly large proportion of the assessed valuation.

It is somewhat difficult to evaluate the present ability of Kodiak's local governments to attract investors for their general obligation bonds. The City's most recent issue was sold through the Alaska Bond Bank. The issue of the Bond Bank which provided funds to purchase the last general obligation bonds issued by the city was rated "A" by Moody's and Standard and Poors, which is a good rating. The security for the bonds was more than simply the taxing capability of the City of Kodiak, however, since state appropriations provide an additional source of payment for Bond Bank bonds. The Borough has yet to issue bonds through the Bond Bank; however should they do so, it is assumed that they would have a similar rating.<sup>(16)</sup>

Following a review of projected capital costs required during the period of OCS activity, i.e., until 1992. (See Table 36.) These costs are not intended for budgeting or detailed financial purposes. They do indicate the magnitude of fiscal impacts that OCS development will generate. Without the benefit of an approved set of goals and objectives,

only estimates of which projects will be built and the type of development is possible.

The cost figures shown for water, sewer and roads are based on Hypothetical Example "C". The educational system costs are based on 20 room schools at 20 students per room. Public Safety costs are based on the need for additional jail space and the upgrading of the headquarters building. The port facilities costs are based on the need for additional storage space as well as anticipated improvements to the dock facility itself.

Table 36: Projected Capital Projects & Costs - Kodiak Metro Area\*

<u>Case</u>	<u>Water/Sewer Systems(each)</u>	<u>Road System (1)</u>	<u>Public Safety (2)</u>	<u>Port Facil. (3)</u>	<u>Educational Facil. (4)</u>	<u>Total</u>
Case 1	\$ 5,881,200	\$10,025,400	\$ 1,000,000	\$ 1,400,000	\$25,500,000	\$49,687,800
Case 2a	7,351,344	12,670,858	1,000,000	1,400,000	30,200,000	58,973,546
Case 2b	6,111,072	10,524,624	1,000,000	1,400,000	29,500,000	53,646,768
Case 3	10,036,334	17,284,608	1,000,000	1,400,000	33,800,000	72,557,856

\*Based on Hypothetical Example "C"

1. Based on average cost of \$155/foot.
2. Upgrade and expand City Jail facility and offices.
3. Additional storage and quay area and port upgrading - City.
4. New school facilities at \$5,000 per student - KIB.

Source: Simpson Usher Jones, Inc. (Sontag), 1977.

In addition to the projects shown in Table 36 additional monies could be necessary for projects in the outlying villages. At this point, without knowledge of the intent of the community, the Kodiak Island Borough and the various communities towards their future development, it is impossible to predict the cost and timing for the purposes of capital improvements.

#### ECONOMIC POLICIES

As has been indicated earlier, the economic system in Kodiak will undoubtedly be severely impacted as a result of OCS development. Under normal conditions the economic functions of supply and demand without unreasonable government interference will allow a given local economy to maintain a relatively stable balance between cost of living and income. However,

in a "boom" economy situation, as is expected in Kodiak, the capabilities of a local economy are surpassed in terms of keeping pace with the rising demands for goods and services. Consequently, the cost of living can rise dramatically. This will be one of the most important issues facing the local governments on Kodiak Island in the years to come.

A tremendous amount of damage can be done to the base of the local economy if economic growth is not directed in constructive areas. A basic goal of a local community during the OCS development process should be to strengthen the non-oil related segments of the economic base. In doing so the community can help to keep demand for goods and services from outstripping the capabilities of the local economy. If this can be successfully accomplished, the rate of increase in the cost of living can be controlled.

As indicated, at present the most important basic industry in Kodiak is fishing. During OCS development there will be opportunities to develop additional basic industries, including tourism and construction. The question of tourism is one that will have to be addressed by the community in their comprehensive plan. While it can help broaden the economic base of a community, it can also have adverse effects on the life styles through the addition of large numbers of non-resident people, as well as adding to the cyclical characteristics of the economy.

Tremendous increased demand for transportation facilities, public services, housing and commercial facilities could be forthcoming during OCS development. In order to meet these demands the community must help foster the development of the local businesses providing those goods and services. This can be done by promoting funding sources and improved technical capabilities within the businesses. At the same time, however, it will be necessary to transfer the cost of development, especially in the fields of public services, to the private businesses in order to keep taxes at a reasonable level.

At present, the canneries in Kodiak are the highest taxpayers. Seven of the top ten taxpayers are canneries and in 1975-76 those seven canneries had a combined valuation of over \$14,000,000. However, the oil industry will become the highest taxpayer in Kodiak, given a moderate or high oil strike. Depending on the development scenario and the type of facilities developed in Kodiak, over \$150,000,000 in facilities will be built during OCS activity. At a tax rate of 5.5 mills, the tax generation on value of that magnitude would be in excess of \$1,000,000 per year. However, the additional \$1,000,000 per year will not pay for the public services required to accommodate anticipated development. Consequently, additional capabilities and funding sources will be needed.

The community has several options in approaching this problem. It can generate additional taxes from the oil industries through franchises, fees, special taxes and various other means of municipal revenue generation. If this is the only approach, the oil industry could resent it, and lengthy court battles would be easily possible. In the meantime, revenues would not be forthcoming. Another approach is encouraging oil industry involvement in the development of the community. This can be done in

several ways. In order to encourage the growth of local businesses, loan funds could be set up at relatively low interest rates. This could help to provide the financial resources needed for new businesses to be started as well as expansion of existing businesses. This would help those businesses meet the demands for goods and services. The oil industry would be able to recover its costs through the interest rates, and at the same time help to keep the cost of living down within the community.

One effective way to foster the development of required housing is to involve the oil industry in that development process. Through wholly owned subsidiary development corporations, the oil industry could provide the housing and public facilities necessary to serve the population and at the same time make a profit on the development. In order to encourage such activity, the community, especially the Borough, could joint venture with the oil industry in promoting residential development. The Borough has large areas of land to the north of Kodiak which are suitable for residential development. Through a joint venture agreement, the Borough could use the land as their investment in the development, and the oil industry could develop the land and/or buildings as the demand increased. The Borough would make a profit in return for their portion of the investment in addition to fostering the provision of the public facilities required. The tax base would also be increased. The oil industry would be aiding the community to provide facilities and housing while at the same time making a profit on the development projects. This type of arrangement also offers the oil industry a public relations advantage. By doing so it would show its responsiveness to the needs of the community at no cost to themselves.

This type of development process would not necessarily result in unfair competition with the local development businesses in the community. The Borough, through its joint venture agreements with the oil industry, could require that local subcontractors and contractors be used to the extent possible. This would serve to help strengthen the construction industry in Kodiak rather than bring in construction companies from outside the area. Consequently, the overall economic base of the community would be strengthened.

In summary, while the oil industry could have some very significant impacts in Kodiak, it can also be a major factor in helping to mitigate those impacts. Cooperation with the industry and utilization of its funds to the mutual benefit of the community and the industry will help combat inflation and provide the public services needed to serve the population growth generated by OCS development. This type of cooperation is encouraged.

NOTES AND REFERENCES

## NOTES AND REFERENCES

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