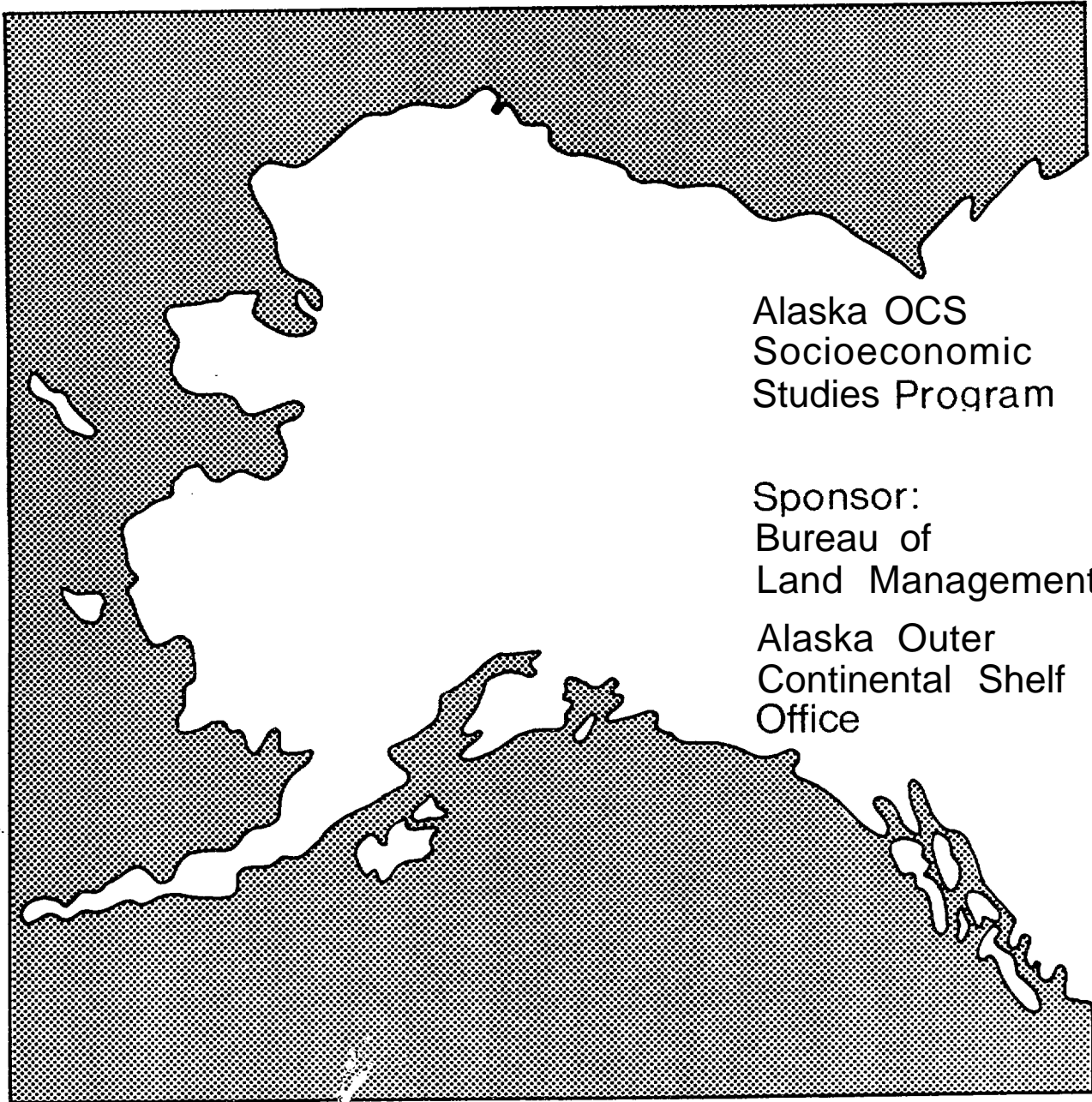Technical Report
Number 34

Alaska OCS
Socioeconomic
Studies Program

Sponsor:
Bureau of
Land Management

Alaska Outer
Continental Shelf
Office

Northern **Gulf** of Alaska
Petroleum Development Scenarios
Economic and Demographic Impacts

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

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

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

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

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

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

NORTHERN GULF OF ALASKA PETROLEUM DEVELOPMENT SCENARIOS:
ECONOMIC AND DEMOGRAPHIC IMPACTS

PREPARED FOR

BUREAU OF LAND MANAGEMENT
ALASKA OUTER CONTINENTAL SHELF OFFICE

III

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM
NORTHERN GULF OF ALASKA PETROLEUM DEVELOPMENT
SCENARIOS: ECONOMIC AND DEMOGRAPHIC IMPACTS


Prepared by
Lee Huskey and William Nebesky
Institute of Social and Economic Research
University of Alaska


June 1979

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# I. INTRODUCTION

## Background

The United States, because of the progressive depletion of U.S. petroleum reserves, has become increasingly reliant on foreign energy supplies. Concern over the reliability of these foreign supplies has led the federal government to establish policies aimed at increasing domestic energy supplies. Because of their high potential as a source of oil and gas, the U.S. Outer Continental Shelf (OCS) figures significantly in the future energy program of the United States.

Although Alaska has historically played a small role in the U.S. energy supply, production at Prudhoe and future development of the Alaska OCS will increase its importance. It has been projected that by 1985 over 25 percent of total domestic crude oil production could be from Alaska (Federal Energy Administration, 1976). Through 1974, Alaska had produced only one percent of the total cumulative petroleum production in the United States (U.S. Geological Survey, 1975); however, the development of existing oil and gas reserves and the exploration for additional reserves will center importantly on Alaska. Alaska accounts for over one-fourth of the identified oil and gas reserves in the United States, and an estimated one-third of all undiscovered recoverable domestic oil reserves are in the state. Since over 60 percent of the estimated undiscovered OCS reserves in the United States are in Alaska, Alaska is particularly important to the OCS program (U.S. Geological Survey, 1975).

The development of Alaska's petroleum reserves is also important to the Alaskan economy. Changes produced by past petroleum development in the state have been major. The rapid changes in the Alaska economy and population associated with the development in Upper Cook Inlet and Prudhoe Bay created strains on the Alaskan society and environment. At the same time, these developments generated the most prosperous economic period in the state's history as well as prospects of continued prosperity through the next decade. The development of petroleum reserves in Alaska's OCS will also affect the population and economy of Alaska.

### The Purpose of the Study

The nature of the changes which result from Alaskan OCS development will not necessarily resemble those caused by past petroleum development. One objective of the current study being undertaken by the Institute of Social and Economic Research (ISER) for the Bureau of Land Management's OCS Studies Program is to provide the information needed to anticipate the major dimensions of the economic and social impacts of the proposed oil and gas developments in the Northern Gulf of Alaska. To achieve this objective, ISER will provide a series of economic and population forecasts through 2000 under several alternative scenarios for petroleum development in the Northern Gulf. By contrasting these forecasts with a base case forecast, which does not include the proposed development, it is possible to assess the major dimensions of the impacts of OCS development on population, employment, income, and the state's fiscal position.

This study is part of the Bureau of Land Management's Alaska OCS Socio-economic Studies Program. The objective of this program is to assess the potential impacts of proposed lease sales in the federal offshore areas of Alaska. The study of the impacts of OCS development in the Northern Gulf of Alaska is one of a series of studies describing lease sale impacts. Already completed is a study of the impact of the joint federal-state sale in the Beaufort Sea (ISER, 1978); future studies will be conducted for lease sales in the Western Gulf of Alaska, the Lower Cook Inlet, and the Bering Sea-Norton Sound. The studies program is concerned with many aspects of OCS impact on many different levels. The major objective of this study is to examine only a portion of OCS impact, the statewide and regional economic and demographic impacts.

In order to assess the impact of the proposed Northern Gulf OCS development, the study must accomplish two additional objectives. First, an understanding of the existing state and regional economies must be developed. The important economic relationships need to be understood in order to say anything about future growth and the effect of OCS development on the economy. Secondly, the study will develop a process for economic impact assessment. Rapid growth associated with OCS development will affect most economic variables; a much smaller number is important, and information on these dimensions of impact will describe the effect of rapid growth on the state and regional economies. The process of economic impact assessment will consist of the selection of the major variables to analyze and the appropriate questions to ask about each of these.

<u>Study Design</u>

This study consists of three major parts: a baseline study of the economies of the state and its Gulf of Alaska region, a base case projection describing the future economy without Northern Gulf development, and an examination of the impact of Northern Gulf development.  This section describes the relationship of each of these parts to the impact assessment and the methodology chosen to make the necessary projections.

EXAMINATION OF PAST ECONOMIC GROWTH

Examining the past growth of the Alaska economy and the economy of the Gulf of Alaska region provides an understanding of the way the economy works.  This type of examination is implicit in the development of economic models.  Making this analysis explicit will emphasize those aspects of economic growth which are important.  The two aspects of the economy which will be emphasized in such a process are the important causes of growth and the economic relationships which transfer growth between sectors of the economy.  An examination of the historical period will provide an indication of the types of response we can expect to OCS petroleum development.  In addition, the historical growth and development of these economies provide a point of comparison for future economic growth, both OCS and non-OCS related.

THE BASE CASE

Petroleum development in the Northern Gulf of Alaska will affect both the structure and size of the Alaska economy. Changes in the economy

which result from the development of the OCS resources can be defined
as the impact of this development.   This impact can only be described
as changes from a certain pattern of economic growth which would have
occurred without OCS development.   The non-OCS base case is developed
to provide a reference point for the analysis of the impacts of OCS
development.   Comparing a projection of economic activity with OCS
development to the base case will isolate the impacts of development.


THE ROLE OF SOCIOECONOMIC PROJECTIONS

The uncertainty of the future, though it may increase the problems associ-
ated with making projections, increases the importance of these projections.
Decision makers in both the public and private sectors need information
about the future in order to plan their actions.   The more uncertain the
future events, the more important is some projection of them. Projections
serve two important purposes--they serve as a means of determining future
demands and needs for services, and they allow policy makers to test the
alternative effects of various policies.

Models are used to test the relative efficiency of alternative policy
choices.   When models explicitly include policy variables, such as tax
rates, or variables directly affected by policy, such as the level of
petroleum employment, they can be used to test the effects of policies
described by these variables.   By making separate projections under vari-
ous assumptions about policy choices, the effects on important variables
such as population or employment can be compared.   Alternative policy
choices can be compared in terms of their relative costs and benefits.

Projections increase the information available to decision makers for making policy choices.   Many present policy choices have important future implications which must be considered by policy makers.   For example, current policy decisions regarding Northern Gulf OCS petroleum development will have their major effect in the middle of the next decade. By providing descriptions of the most probable future levels of important variables, socioeconomic projections serve as a framework for making policy choices.


METHODOLOGY

This section describes the methodology used to make the projections of Alaskan economic growth in both the base case and OCS development cases. Two econometric models, statewide and regional econometric models, are used to make the projection.   This section will describe the models used and their strengths and weaknesses.


The Statewide Econometric Model

The basic model to be utilized in the analysis of the OCS development scenarios is the statewide econometric model of the Alaskan economy developed in the Man-in-the-Arctic Program (MAP) presently being conducted by the Institute of Social and Economic Research of the University of Alaska.   There are three components of this model: an economic model, a fiscal model, and a demographic model.   The basic structure of the model is shown in Figure 1.

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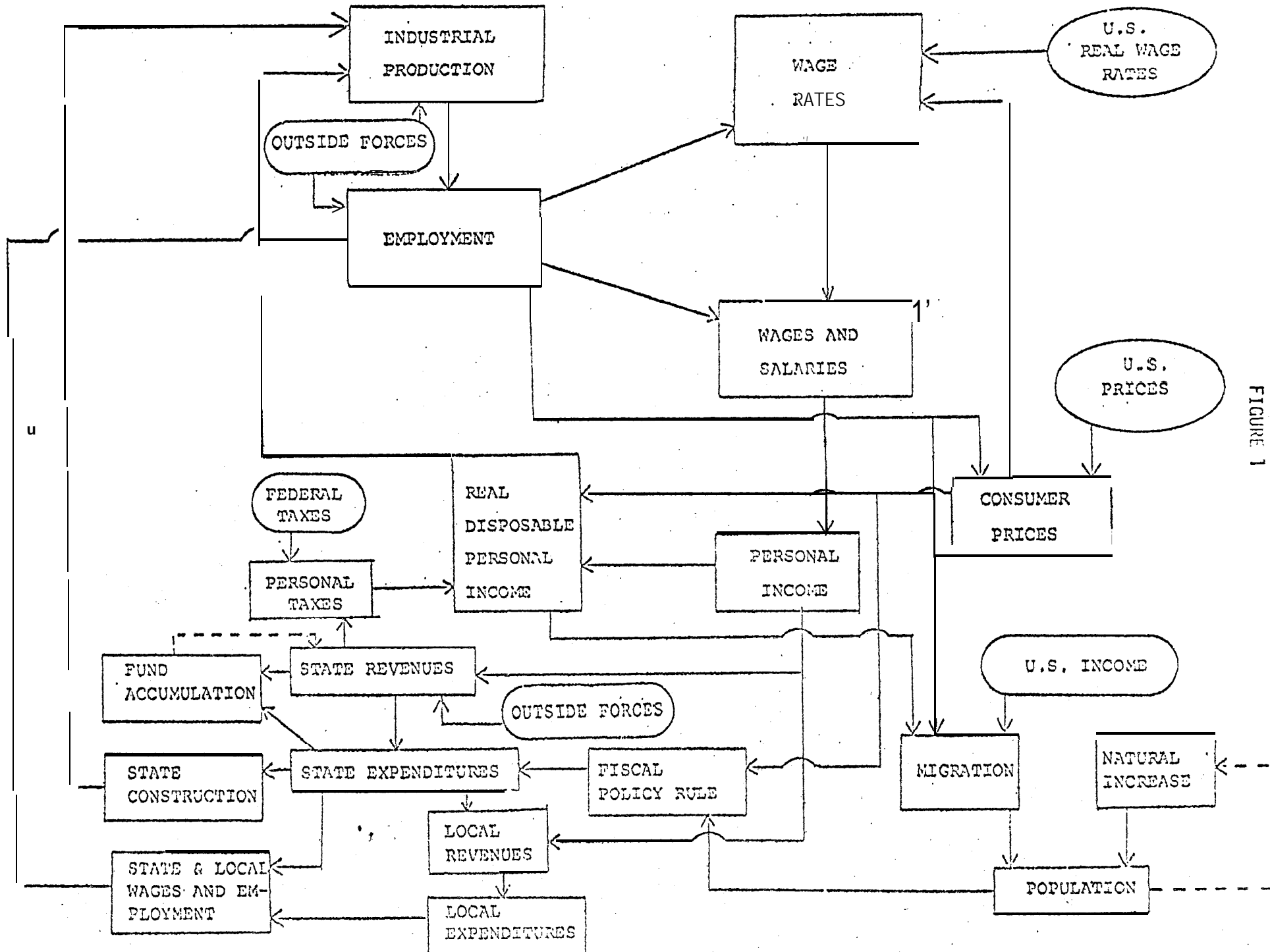
FIGURE 1

The economic model is divided into exogenous or basic sectors and endo-
genous or nonbasic sectors.   The level of output in the exogenous sectors
is determined outside the state's economy.   The primary reason for the
nonbasic sector is to serve local Alaskan markets, so the level of out-
put is determined within the Alaskan economy. The basic industries in
the model are mining, agriculture-forestry-fisheries, manufacturing,
federal government, and the exogenous component of construction. The
nonbasic industries are transportation-communication-utilities, wholesale
and retail trade, finance-insurance-real estate, services, and the remain-
der of construction.

In the model, industrial production determines the demand for labor and
employment; employment is that level needed to produce the required output.
Employment and the wage rate determine wages and salaries," the most import-
ant component of personal income.   The Alaskan labor market is an open one
with equilibrium achieved through migration of individuals.   Because of
this, the most important determinant of Alaskan wage rates are U.S. wage
rates; wages are also affected by rapid growth of employment in Alaska.
An estimate of disposable personal income is made by adding an estimate
of nonwage income to wages and salaries and adjusting this by deducting
income taxes.   The level of real disposable income is found by deflating
disposable personal income by a relative price index;  the major deter-
minants of Alaskan prices are U.S. prices, the size of the economy, and
the growth rate of the economy.   Incomes determine the demand for local
production; incomes and output are simultaneously determined.

Population is determined based upon a projection of each of its components--
births, deaths, and migration. The model uses age-sex-race specific sur-
vival rates and age-race specific fertility rates to project births and
deaths for the civilian population.  Total civilian population is found
by adding civilian net migration to the natural increase. Net migration
is determined by the relative economic opportunities in Alaska.  In the
model, these are described by employment changes and the Alaskan real
per capita income relative to the real per capita income of the United
States.  An exogenous estimate of military population is added to deter-
mine total population.

The fiscal model, which provides important pieces of information for the
economic model, also provides a framework for analyzing the effects of
alternate fiscal policies.  The fiscal model calculates personal tax pay-
ments in order to derive disposable personal income.  The fiscal model,
based on an assumed state spending rule, also calculates personnel ex-
penditures, state government employment, and the amount spent on capital
improvements which determines a portion of employment in the construction
industry.  All three submodels are linked through their requirement for
information produced by the other submodels.

The Regional Econometric Model

The regional model provides an allocation of employment, income, and
population in the state to seven regions of the state.  These regions
are shown in Figure 2.  The economic component is similar in each region

FIGURE 2. MAP REGIONS
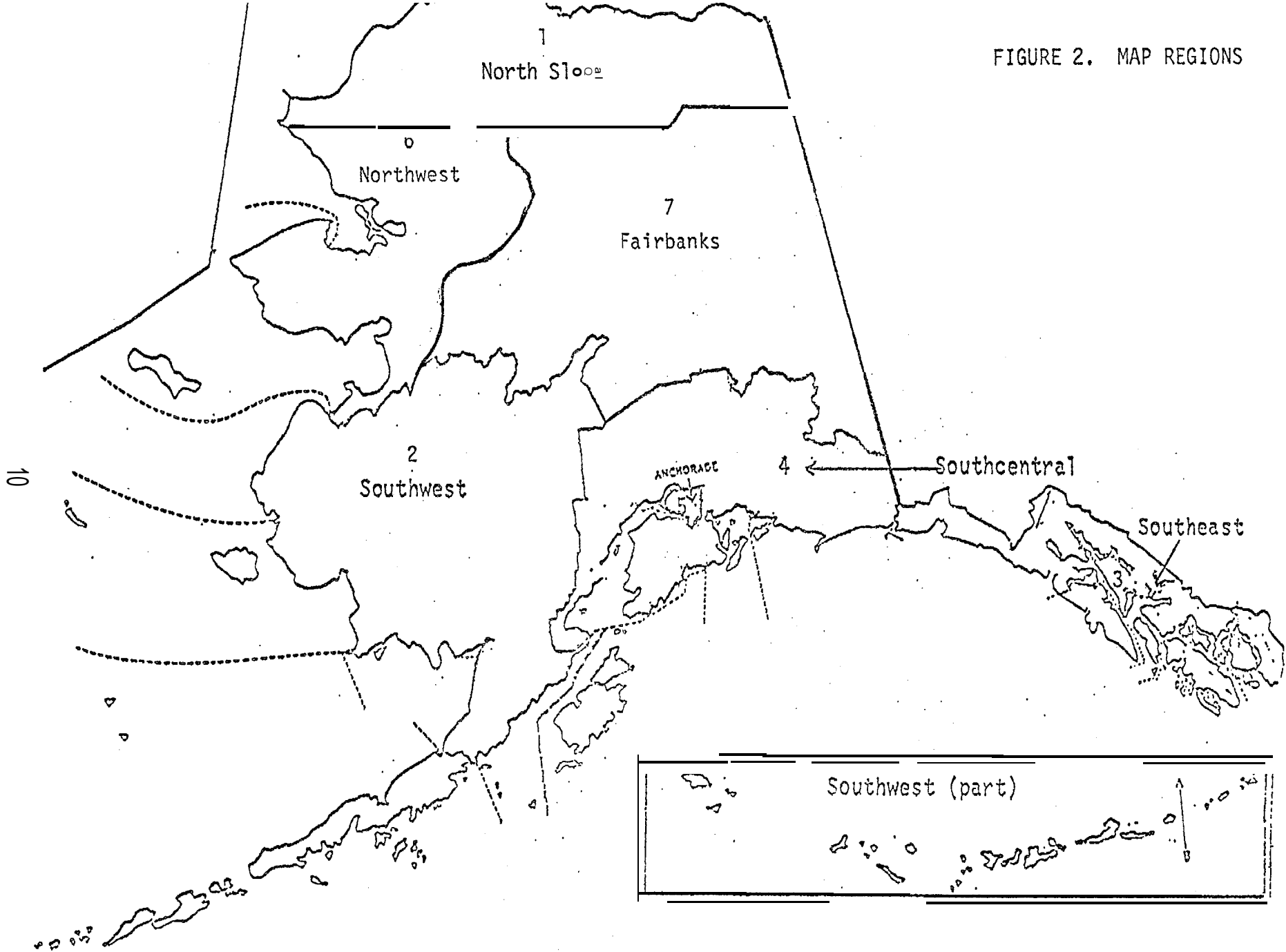
to that of the state model. The major difference is that some regional economies are influenced by economic activity in other regions; the most notable of these is Anchorage. The demographic component of the regional model is much simpler than that component of the state model. Regional population is estimated as a function of employment. Regional population is estimated in two components--enclave and nonenclave population. A weighted average of the nonenclave population to nonenclave employment ratio for the state and the lagged value in the region is multiplied by the nonenclave employment to estimate nonenclave population in the current year. The weights used to determine regional population in this study equal the proportion of state population for the lagged regional popula- tion to employment ratio and one minus this proportion for the state ratio. Enclave employment is added to nonenclave population to determine total regional population. Enclave employment includes the military and major construction projects such as the trans-Alaska pipeline. The regional model has no fiscal component and must accept an exogenous pattern of wage and salary payments to state and local government workers. Usually the pattern of wage and salary payments used is taken from a similar state model projection. Estimates of regional employment, population, and income in the regional model are constrained to total to equivalent variables from the state model results.

STRENGTHS AND LIMITATIONS

The models used in this analysis have several strengths and weaknesses which must be considered when examining the reported results. The prin- cipal strength of these models is that they capture the essence of the

Alaska growth process.  Export base industries and government create growth directly through hiring and indirectly through the demand generated by their employees for locally produced goods and services.  Incomes earned by these export base workers and the workers who supply the goods and services provide the base of the economy.  Compared to two alternative forms, the economic base and input-output models, the econometric specification of this type is preferred, since it captures the dynamics of industry growth.  The economic base model is useful for projecting marginal changes but assumes that changes in the support sector are proportional to changes in basic sector employment.  This misses both the feedback effect of the growth of the support sector incomes and the change in the responsiveness of the support industries over time.  While input-output models more precisely define the interindustry flows of purchases of goods and services, they represent the economy only at a particular point in time. The econometric approach can capture some of the changing relationships over time, and these are described by historic changes or incorporated by the modeler.

The limits on the econometric method define the limits on the acceptance of the resulting projections.  No model is able to capture revolutionary changes which violate the assumptions upon which the model is built, unless structural change has been foreseen and incorporated by the modeler. The limitations of the model increase the more the model is extended into the future and the more vocationally precise the model is expected to be. In other words, more confidence should be placed in the 1985 results than in those for 1995, and statewide projections are more likely to be "correct" than regional results.

Another important limitation of this model is that the projections should be considered contingent. The accuracy of the projections depends on the continued relevance of the model's historical structure and the accuracy of the assumptions about the level, timing, and distribution of the exogenous variables. One result of this contingency is that the projections may not necessarily agree with the actual levels of the projected variables for any given year. Projections are based on the average historical relationships between the projected variables and important exogenous variables. This leads to two reasons why projections in any year may differ from the actual levels of projected variables. First, estimates of the level of important exogenous variables may differ from the actual levels. Secondly, in any given year, the relation between projected and exogenous variables may differ from the historical average. Cyclical effects may cause yearly divergence from the general trend of economic growth. The relationships described by the model, while they may not predict actual levels in any particular year, describe the general trend of future Alaskan economic growth.

The final limitation of the results concerns the projection of the regional distribution of state growth. These results are merely allocations of the projected statewide totals to the regions. This should not be assumed to be a detailed analysis of the regional economies and should not replace such analysis.

ASSUMPTIONS

Once the model is given, the base case is defined by the assumptions about the future levels of the exogenous variables. There are four major types of assumptions required to define a development scenario. First, there are assumptions about the growth of exogenous industries in both the petroleum and nonpetroleum sectors. Secondly, assumptions about the level of state petroleum revenues are needed. Thirdly, assumptions about the change in certain national variables are needed. Finally, an assumption must be made about the way state expenditures grow in the future.


GENERAL METHODOLOGY FOR ANALYSIS

The general approach to be pursued in the analysis of the impacts of Northern Gulf OCS development will be as follows: A set of scenarios will be developed which contain no Northern Gulf OCS development. These scenarios will be run using the MAP model and will serve as points of comparison for each alternate Northern Gulf scenario. Each of the Northern Gulf development scenarios will then be run. Each of these runs will then be compared to the appropriate base run to examine the impact of this hypothetical development on the major dimensions of the Alaskan economy.


<center>Overview</center>

The remainder of this report will analyze the historical growth of the state and regional economies and the projections of future growth, both with and without OCS activity in the Northern Gulf. The effect of

alternative Northern Gulf development scenarios will be examined.
Part II describes the historical growth in Alaska and its Gulf of Alaska
region.   Part 111 presents the projection of economic activity in a
base case which contains no offshore activity in the Northern Gulf.
Parts IV-VI then describe the impacts of alternative Northern Gulf
development scenarios.   Part VII attempts to capture the uncertainty
attached to these estimated impacts by examining the sensitivity of the
results to several of the uncertain elements of the scenario.   Finally,
Part VIII summarizes our major findings.

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## II. THE ALASKAN ECONOMY, 1965-1976

### Introduction

The historical period serves as a point of reference for discussing potential future growth. Examining past economic changes provides us with information not only on what happened, but also on how things happened. By understanding how things happened in the past, we can acquire an understanding of the process of growth in the Alaskan economy. Without some specific assumption about how this process would change in the future, we would not expect the future growth to be qualitatively different. Knowledge of the changes in the levels of and the relationships between economic variables in the past allows us to assess the possible future economic effects of potential changes,

In this section, we will examine the Alaskan economy between 1965 and 1976. This was a period associated with tremendous growth and was chosen to provide a long-term look at the changes in the economy. The period contains three significant events: the major Upper Cook Inlet oil development, the Prudhoe lease sale, and the construction of the trans-Alaska oil pipeline. We are interested in the comparative activity in three separate periods: before 1970, after 1970, and the peak years of Trans-Alaska Pipeline System (TAPS) construction, 1973-1975. The PrudhoeBaylease sale in 1969 marked the beginning of Alaska as a major petroleum economy. Comparing the economy before and after this date will illustrate the effects of this change.

This section has three objectives. The first objective will be to describe what happened during this period in terms of major economic variables. The second objective of this section will be to describe the Alaskan economy's growth process. The growth process includes both the factors causing growth and the response of the economy to these changes. Finally, we will attempt to describe the effects of the past growth on indicators of economic welfare such as unemployment and per capita income. Gaining an understanding of the economy during this period will allow us to understand better the probable effects of future potential OCS activity.

## Growth of Aggregate Indicators

Economic growth is a multidimensional process for which there is no single summary measure of either the level of growth or the welfare associated with that growth. Economic growth is usually defined in terms of the change in the level of certain economic indicators. This is only one aspect of growth; the effects of growth on the process of change and the level of economic welfare are also important. This section will describe the change in some major economic variables, while the other aspects of growth will be discussed later. Table 1 describes the change in the level of three aggregate indicators of economic' activity: employment, population, and personal income. These do not exhaust all of the possible indicators of economic activity, but they do describe the general economic trends during the period.

TABLE 1.   GROWTH OF EMPLOYMENT, POPULATION
AND PERSONAL INCOME, ALASKA
1965-1976

| | Population | Employment[2] | Personal Income[3] ($ Million) |
|---|---|---|---|
| 1965 | 265,192 | 70,530 | 858 |
| 1970 | 302,361 | 92,476 | 1,412 |
| 1971 | 312,930 | 97,584 | 1,557 |
| 1972 | 324,281 | 104,243 | 1,698 |
| 1973 | 330,365 | 109,851 | 2,008 |
| 1974 | 351,159 | 128,178 | 2,436 |
| 1975 | 404,634 | 161,313 | 3,514 |
| 1976 | 413,289 | 171,714 | 4,133 |
| Annual Average Percent Change | | | |
| 1965-1976 | 4.12 | 8.43 | 15.36 |
| 1970-1976 | 5.35 | 10.87 | 19.60 |

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[1]All estimates State of Alaska Department of Labor, Research and
Analysis Section, Population Estimates by Census Division, except 1970
which is April 1970 Census of Population.

[2]Alaska Department of Labor, Statistical Quarterly, various years.

[3]U.S. Department of Commerce, Bureau of Economic Analysis, Regional
Economic Information System, July 1978 printout.

Population grew at an annual average rate[1] of 4.1 percent throughout the period. The state experienced over a one percent greater growth rate in population after 1970. Of the growth in population between 1965 and 1976, over 75 percent occurred after 1970. The most rapid increase occurred during the period of trans-Alaska pipeline construction when total population increased by 15.2 percent between 1974 and 1975.

Growth in population is determined by the growth in employment. Total nonagricultural wage and salary employment grew by almost 150 percent between 1965 and 1976. Employment growth averaged a rate of 8.43 percent per year during the period. After 1970 employment grew at a faster average rate of 10.9 percent pet- year. More than 78 percent of the growth in employment occurred after 1970.

Personal income is the final measure of aggregate economic growth. Persona? income is shown in Table 1 in nominal dollars. Its growth reflects both real economic growth and the increases in prices. Nominal personal income increased at an average rate of 15.4 percent per year throughout the period. As in population and employment, the major growth in personal income occurred after 1970.

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[1]The average annual percent change or average annual rate of growth is used extensively throughout this paper as an indicator of the functioning of the economy. This term is equal to that yearly percentage change which would have to occur to obtain the end-year projection. This indicator is calculated as follows: Let $B = A(1+r)^t$ where A and B are the start and end values of some variable; t is equal to the duration of the period of interest; and r is the average annual percent change. Given A, B, and t, solve for r.

Overall, these aggregate indicators illustrate a rapidly growing economy. The major growth in the period occurred after 1970 when the economy was influenced significantly by the construction of the trans-Alaska pipeline. Growth in the population occurred at a rate which was slower than the growth of either employment or personal income.

## The Causes of Growth

Three major events shaped the growth of the state during this period. The first was the development of the Upper Cook Inlet oil and gas fields during the late sixties. The second major event was the Prudhoe Bay lease sale in 1969, which produced a major source of revenue for the state and began an era when the state became a major oil producer. Finally, the construction of TAPS beginning in 1974 led to the most rapid growth during the period. This section will examine the Alaskan growth process in an attempt to relate these events and other factors to the growth of the Alaskan economy.

Traditionally, the growth of regional economies is described by economic base theory; the practical application of this theory is widely used in regional analysis. Economic base theory states that a region grows primarily as a result of increased export activity to other regions. The demand for these exports is not influenced by activity within the region, so the level of economic activity is fixed by external factors. The local support sector exists to serve the basic sector and the population associated with it. Growth occurs as a two-part process; the expansion of the export sector leads to an expansion of the local support sector.

One of the strongest statements in support of this theory was made by North . He argued that the growth of exports was the most important reason for growth in a region; he presented economic base theory as a long-run theory of economic growth (North, June 1955). In response, Tiebout argued this theory was not a theory of economic development and it was only valid in the short run. Tiebout pointed out that nonexport sectors such as government and local investment may generate growth even in the short run. Tiebout argued that the importance of exports as a determinant of regional income is inversely related to the size of the region (Tiebout, 1956). Anything which increases regional income would lead to economic growth through the expansion of the support sector. Tiebout expanded the explanation of the causes of growth, Regional growth may result not only from an expansion of the export base but also from improved technology, an increase in trade within the local economy, and the expansion of nonexport sectors. This section will attempt to assess the role of each of these factors in the growth of the Alaska economy.


BASIC SECTOR GROWTH

The growth of the export base or basic sector is one of the major causes of economic growth. The basic sector was still a major force determining the growth of the Alaskan economy during the period between 1965 and "1976. This section will examine the growth of the various industries which make up the Alaskan basic sector. By examining the growth in each industry, we can see the relative importance of the basic sector to Alaskan economic growth.

A major problem in examining the relation between the economy's basic sector and its growth is determining which industries in a region are basic industries. Traditional multiplier analysis is importantly dependent on this, since the size of the multiplier is determined by this disaggregation. The problem arises because every industry has both basic and nonbasic sectors. An Alaskan example is the construction industry which includes a basic component such as pipeline and federal government-sponsored construction, a nonbasic component such as housing construction, and an investment component which is exogenous in the short run while it is endogenous in the long run. Even an important support sector industry such as services has a relatively large basic component in hotel and motel service which serves the tourist industry.

Many methods exist for defining industries as either basic or nonbasic. Leven suggested that, other than conducting a survey, most traditional methods for separating these sectors incorrectly estimate the importance of the basic sector (Leven, 1964). In this section, we will determine the basic sector by definition. Those industries where the level of activity is affected most significantly by external factors will be considered basic industries. Mining, agriculture-forestry-fisheries, manufacturing. federal government, and construction are basic industries. The demand for the products of both mining and agriculture-forestry-fisheries is determined in national and international markets not within the Alaskan economy. Manufacturing is largely a part of these two industries since food processing and petrochemicals are its major components. The level of federal government activity in Alaska is determined by decisions made outside the

state. Construction has both basic and nonbasic components; however, major changes in construction activity are determined by outside agencies and firms. The most important recent example of this is the construction of the trans-Alaska pipeline.

Table 2 illustrates the growth of the Alaskan economy by sector. Industry growth is described by the growth of employment and wages and salaries. Growth of employment illustrates the direct effect of the industry on the growth in the number of jobs. Wages and salaries are an important component of both personal income and industrial output. This measure allows us to estimate the broader effect of the industry on the economy. The growth in wages and salaries can differ from employment growth for three reasons. First, the growth of wage rates can differ between industries. Wage rates are determined by the industrial productivity, as well as differential demand. Secondly, the hours worked in different industries could differ. During the construction of the TAPS, the hours worked increased considerably in construction, raising average wages because of overtime. Finally, wages and salaries can increase at a different rate than employment because the composition of industrial employment changes.

The distinction between employment and wage and salary growth is important when examining the relative growth of the basic sector. Overall employment in the basic sector grew much less rapidly than the remainder of the economy in all but the pipeline years, 1973-1975. Between 1965 and 1976, basic sector employment increased at an average annual rate of only 2.9 percent per year, compared to 6 percent for the entire economy and 10.2 percent

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TABLE 2.   ALASKA ECONOMIC GROWTH BY SECTOR
1965-1976

Average Annual Percent Increase

| | 1965 - 1976 | | 1970 - 1976 | | 1973 - 1975 | |
|---|---|---|---|---|---|---|
| | Employment | Wages & Salaries | Employment | Wages & Salaries | Employment | Wages & Salaries |
| Basic Sector[1] | 2.9 | 16.7 | 4.7 | 23.6 | 13.8 | 54.2 |
| Mining | 12.5 | 23.1 | 4*9 | 16.3 | 37.8 | 68.8 |
| Construction | 15.2 | 29.1 | 27.9 | 50.6 | 82.2 | 157.8 |
| Manufacturing | 4.6 | 11.1 | 4.7 | 13.0 | 1*1 | 15.5 |
| Federal Civilian | .3 | 7.6 | .8 | 8.0 | 3.5 | 12.7 |
| Federal Military | -2.7 | 5.7 | -4.1 | 4.3 | -4.1 | 2.5 |
| | | | | | | |
| Support Sector | 10.2 | 18.6 | 12.3 | 24.1 | 23.7 | 52.5 |
| Transportation-Comm.-Utilities | 7.4 | 16.9 | 9.6 | 22.8 | 26.0 | 58.7 |
| Trade | 9.7 | 16.4 | 10.2 | 19.3 | 19.7 | 38.9 |
| Finance-Insurance-Real Estate | 11.2 | 18.5 | 14.8 | 24.4 | 18.1 | 30.3 |
| Services | 12.6 | 24.3 | 16.0 | 30.9 | 28.5 | 68.1 |
| | | | | | | |
| Other | | | | | | |
| State Government | 6.6 | 15.7 | 5.4 | 15.8 | 6.0 | 23.0 |
| Local Government | 10.7 | 18.8 | 11.1 | 21.7 | 11.9 | 20.5 |
| | | | | | | |
| Total Nonagricultural Wages and Salaries[2] | 6.0 | 17.5 | 7.8 | 23.4 | 16.5 | 47.5 |

---

'Agriculture-forestry-fisheries is left out of this table.   During the period, changes in the coverage of fisheries employment distorts the real growth in this industry.

'Includes military wages and salaries from U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, July 1978 printout.

SOURCES:   Alaska Department of Labor, Alaska Labor Force Estimates, Estimates of Total Population, various years.

Alaska Department of Commerce and Economic Development, The Alaska Economy: Year End Performance Report 1977.

for the support sector.   After 1970 industrial growth rates were much closer; basic sector employment grew at a rate of 4.7 percent, compared to 7.8 percent for the entire economy.   The growth rates are much closer when wages and salaries are considered.   Between 1965 and 1976, the wages and salaries earned in the basic sector grew only .8 percent less than the economy-wide average of 17.5 percent.   After 1970 basic sector wages and salaries grew slightly faster than the economy as a whole.

The effect of pipeline construction on the growth of the economy can be seen in the period 1973 to 1975.   Employment in the basic sector grew at 13.8 percent annually, while the economy grew at 16.5 percent. Wages and salaries increased more rapidly, increasing at a rate of 54.2 percent annually in the basic sector, compared to 47.5 percent for the economy as a whole.

One of the major reasons for the overall character of the basic sector was the declining role of the federal government in the state economy. The federal government has played a major role in the economy of Alaska. Between 1965 and 1976, federal government civilian employment increased from 17,400 to 17,900.   Employment grew faster between 1973 and 1975 in response to TAPS construction's reaching a peak of 18,300 in 1975. The average growth rate of federal civilian employment was less than one percent per year over the entire period.   Military employment actually declined throughout the period with an average growth rate of -2.7 percent per year. Wages and salaries in this sector increased but at rates much less than

the growth of the economy in general. Federal government employment continued to supply a stable base for the economy but was not responsible for the tremendous growth in the economy throughout the period.

The most rapidly growing basic industry was construction. Employment grew at an average rate of more than 15 percent throughout the period; this was more than twice the growth rate of the economy. The obvious reason for this growth was the construction of the trans-Alaska pipeline beginning in 1974. The most rapid increase in construction employment came between the period 1973 and 1975 when construction employment increased at a rate of 82.2 percent per year. The state has estimated that in 1976 construction employment connected with the Alyeska project was approximately 15,000, or 50 percent of the total state construction employment (Alaska Department of Labor, 1977). Wages and salaries mirrored the growth in employment, increasing at an average annual rate of 50.6 percent after 1970.

Mining employment also increased at a rapid rate throughout. the period; its average annual rate was 12.5 percent, Unlike construction, mining experienced cyclical. growth during the period. Mining employment increased between 1965 and 1970 to 3,000, then fell to 2,000 in 1973 before increasing to 4,000 in 1976. The early growth in mining resulted from discovery, development, and production of oil and gas from the Kenai Peninsula and Cook Inlet fields.. Oil was discovered in 1957 at the Swanson River; production increased from one million barrels per month

in 1966 to a peak in 1970 of 7.5 million barrels per month.   Employment associated with these fields grew at an annual rate of approximately 40 percent in the late sixties, causing mining employment to triple between 1965 and 1969 in the Cook Inlet Region (Anchorage, Kenai, Matanuska-Susitna, Seward) (Scott, 1978). Employment associated with this development dropped after this peak production. During the 1970s, the development of the Prudhoe Bay fields resulted in the expansion of the mining industry.   This development led to growth in both exploration and production employment and headquarters employment in Anchorage. The most rapid expansion of the mining industry came between 1973 and 1975 when both employment and wages and salaries increased at rates more than three times as great as the economy.

Manufacturing in Alaska has traditionally been associated with the fish-ing industry because of the large component of food processing employment. The composition of manufacturing changed over the period with food proc-essing becoming less important; this change in composition accounts for the differential growth in employment and wages and salaries, since food processing is a traditionally low-paying sector. Between 1970 and 1976, employment in manufacturing grew at a rate of 4.6 percent annually, while wages and salaries grew at 11.1 percent.   Food manufacturing, because of its relation to the fishing industry, showed cyclical growth; employment fell between 1973 and 1974 and did not rise again until 1976. The fastest growing sector of food manufacturing was "other" manufacturing which con-sists principally of petroleum refining, petrochemical, and printing and

publishing.    Between 1965 and 1976, employment in "other" manufacturing increased at an average annual rate of 6.5 percent, which meant that this sector was increasing its share. of manufacturing employment.

Agriculture-fisheries-forestry depends on the development of the state's renewable natural resources.    The growth of these industries depends to some extent upon the natural resource cycles.    State Labor Department estimates do not include all of the employment in this industry, since a large proportion of the workers are self-employed.    Independent estimates of employment in these industries suggest little growth.    Forestry employs only about 22 people statewide; most of the logging employment is accounted. for in lumber and wood products manufacturing (Scott, 1979). One indicator of agricultural activity is employment reported in a yearly agricultural survey.    This survey reports a decline in total agricultural employment from 900 in 1965 to 750 in 1975 (USDA).    The fishing industry has tradi- tionally been important to Alaska.    Based on estimates from Fish and Game fish ticket data, employment was estimated to have increased from about 4,340 in 1970 to about 5,7'20 in 1976. This is an annual growth rate of 1.3 percent (Rogers and Listowski, 1978).    Table 3 shows some additional indicators of the growth of the fisheries industry.    The catch and value statistics shown in this table illustrate the cyclical nature of the fishing industry.    The real value of fisheries catch peaked in 1973 at $117,842 (in 1967 dollars).

TABLE 3.   ALASKA FISHERIES ACTIVITY, 1970-1975

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|
| Catch (million lbs) | 533.6 | 471.0 | 422.5 | 513.1 | 454.2 | 442.4 |
| Value ($.000) | 97,497 | 85,585 | 92,431 | 142,353 | "144,809 | 129,402 |
| Real Value ($.000) | 88,957 | 75,735 | 79,751 | 117,842 | 108,147 | 84,965 |

SOURCE: Alaska Department of Commerce and Economic Development, The Alaska
  Economy, 1977, 1978.

The major growth in the basic sector was in mining and construction.

The traditionally important fishing industry did not keep up with growth

in other basic sectors.   Federal government employment, while it provided

a stable base for the economy, actually declined.   Overall, employment

in the basic industries grew rapidly but not as rapidly as the total

economy.   The differential growth in average wages led to increases in

basic sector wages and salaries at rates close to state averages.


THE GROWTH OF STATE GOVERNMENT

The growth of nonexport sectors may also be responsible for the growth of

a regional economy.   An important sector contributing to the growth of

Alaska between 1965 and 1976 was the expansion of state government. There

are two reasons for selecting state government as a growth-initiating

sector.   First, state government experienced rapid growth in the early

1970s.   Secondly, this growth was funded by the growth in revenues which

were exogenous to the economy.   The lease bonus from the Prudhoe Bay

lease sale in 1969 resulted in the increased state revenues. This placed state government in a position equivalent to the basic sector. Growth in exogenous revenues led to increased expenditures which caused growth in the economy. Because of this, state and local government could be a possible source of economic growth. The growth of state government expenditures will influence the economy in two ways. First, increased state expenditures will lead to increased employment in state and local government. Secondly, state capital expenditures will increase employment in the construction industry. State expenditures on construction of highways and ports provide increased activity in the construction industry. Examining the growth of state expenditures during the period will provide an indication of the state government's contribution to growth.

Since statehood, total state expenditures have increased at an average annual rate of 21 percent (Goldsmith, 1977). Examination of expenditures shows there are three distinct periods of expenditure growth: prior to the 1969 Prudhoe Bay lease sale, between 1970 and 1972 when the initial adjustment to these revenues occurred, and after 1972. The primary interest is in the period after the state received the lease bonus in 1970. In examining expenditures in this period, Scott (1978) found:

1.  The constant dollar increase was 62 percent of the
    nominal dollar increase.

2.  The rate of increase was more rapid between 1970
    and 1972 than between 1972 and 1977.

3.  Operating expenditures have grown more rapidly over
    the whole period, while capital expenditures grew
    more rapidly between 1970 and 1972. These suggest
    that each type of expenditure may be sensitive to
    different factors, with operating expenditures respond-
    ing to increases in demand and capital expenditures
    responding more to available revenues.

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The question of whether state expenditures responded to growth or were growth inducing can be examined in Table 4 (from Scott, 1978), which shows the growth of real per capita state expenditures. If expenditures increased but real per capita expenditures remained constant, the growth of expenditures could be assumed to be simply keeping up with the growth in demand. If real expenditures grew faster than population, state government could be contributing to growth. Both real per capita operating and capital expenditures increased between 1970 and 1972. Real per capita operating expenses increased at an average rate of 19.9 percent in this period, while capital expenditures increased at a rate of 32.3 percent per year. After 1972 and the initial response to the expanded fund balance, operating expenditures increased at a rate of 3.4 percent and capital expenditures actually decreased at a rate of -6 percent.

Between 1970 and 1972, state government expenditures expanded much more rapidly than either population or prices. After 1972, expenditures have grown more in line with population and prices. The expansion of service levels between 1970 and 1972 is an indication that state government was a contributing factor to the growth during this period. The growth of the service levels reflected the initial response to the large increase in revenues from the Prudhoe Bay lease sale. State government contributed to growth since it distributed exogenous revenues to the economy. This extra demand resulted in economic growth. The long-term consequences result from the change in the relationship between state expenditures and economic growth as defined by real per capita expenditures.

TABLE 4.   STATE REAL PER CAPITA OPERATING AND
CAPITAL EXPENDITURES
1970-1977

(Constant 1967 Dollars)

| Fiscal Year | Resident Population[1] | Operating Expenditures Per Capita | Capital Expenditures Per Capita | Total Expenditures Per Capita |
|---|---|---|---|---|
| 1970 | 294,560 | $  722.20 | $317.02 | $1,039.22 |
| 1971 | 302,361 | 990.64 | 374.77 | 1,365,41 |
| 1972 | 312,930 | 1,038.74 | 555.11 | 1,593.85 |
| 1973 | 324,800 | 1,108.15 | 497.07 | 1,605.22 |
| 1974 | 330,600 | 1,168.14 | 475.66 | 1,643.80 |
| 1975 | 351,159 | 1,199.92 | 548.54 | 1,748.46 |
| 1976 | 404,635 | 1,156.97 | 486.57 | 1,634.54 |
| 1977 | 413,289 | 1,224.88 | 409.17 | 1,634.05 |

Average Annual Rate of Increase

| | | | | |
|---|---|---|---|---|
| 1970-1977 | 5.0% | 7.8% | 3.7% | 6.7% |
| 1972-1977 | 5.7% | 3.4% | - 6.0% | 0.5% |
| 1970-1972 | 3.1% | 19.9% | 32.3% | 23.8% |

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[1] State's estimate from Research and Analysis Section, Employment Security Division, Alaska Department. of Labor, State of Alaska Current Population Estimates by Census Divisions, July 1 (year). The population as of the beginning of the fiscal year was used.

This historical period illustrates the state's unique financial position. The revenues associated with Prudhoe Bay production will be available to the state to increase economic growth. However, Prudhoe revenues are a fixed flow of resources which will not be affected by economic growth. Since they are fixed, growth will reduce the share of these revenues available to existing residents.  This relation makes the ability of the economy to generate revenues to replace Prudhoe revenues an important future consideration.

SUMMARY

Two major factors have been responsible for the growth of the Alaskan economy since 1965.  The expansion of basic industries and the growth of state government were the most important growth-initiating factors. Unlike most states, the Alaskan government had an exogenous source of revenues in the early 1970s which it could use to expand government spending in more than a proportionate response to the growth of the economy.  The rapid increase in government spending was important as a source of growth in the early 1970s.  The most important basic sectors during this period were mining and construction.  These industries experienced particularly rapid growth after 1973 with the construction of TAPS and development of Prudhoe Bay. The traditionally important basic sectors of federal government and agriculture-forestry-fisheries expanded at a much less rapid pace.

The expansion of state government and the basic sector was important to growth of the economy, because this expansion led to an increase in incomes. Factors which cause incomes to increase independently of expansion of either the basic sector or state government. can also result in the expansion of the economy. Income can increase because of an increase in the productivity of labor or increased demand for labor not associated with an increase in the basic sector. One factor that is important for Alaska incomes is the influence of overall U.S. wage rates. Since Alaska is an open economy, Alaska is part of the U.S. labor market. The Alaska labor market will reflect changes in the U.S. wage rates. Alaska markets will adjust through migration. Higher relative wages outside will lead to out-migration and an increased wage until an equilibrium relationship is reached.

Growth is transmitted from its initiating source through the economy by increased demand for local goods and services. As incomes increase, a portion of this income is spent on goods and services in the local economy. This additional expenditure leads to increasing employment in the support sector. This growth in employment leads to increased incomes which generate new increases in demand. The simultaneous nature of this process can be seen as growth in income leads to increases in demand and further income growth; and the process begins again.

## Structural Change in the Alaskan Economy

The relation between the growth-initiating sectors and the remainder of the economy is an important part of the economic growth process. In our analysis of Alaskan growth, one thing was evident: the growth of employment in the basic sectors stimulated a greater-than-proportional response in the remainder of the economy. One measure of this response is the ratio of total-to-basic sector employment; the larger this ratio, the more important is the economy's response to basic sector growth. In 1965, the ratio of total-to-basic employment was 2.25; it had risen to 2.95 by 1973 prior to the trans-Alaska pipeline construction. Even in 1976 with the tremendous amount of basic construction employment, the ratio was 2.69. The change in this ratio shows that along with the rapid growth in the levels of economic activity, there has been a qualitative change in the relationships in the economy. This qualitative change is a change in the structure of the economy which will be described in this section.

## STRUCTURAL CHANGE

The economic relationships which determine the flow of income, goods, and services are determined by the structure of the economy. The structure of the economy's productive sector can be defined by the distribution of employment or gross product among industries. The economy's structure influences its overall level of activity, the level of prices, and seasonal and cyclical stability. The structure both affects and is affected by growth.

The growth of the economy leads to changes in its structure. Structural change can result from a change in the structure of demand as changes in incomes and prices affect the structure of consumption. However, changes in demand may only change the distribution of imports unless supply conditions lead to the production of goods locally. If economies of scale are obtained in production, regional growth will alter the production costs. As economies grow and achieve economies of scale, they will substitute local production for imports of goods or services.

The structure of the economy also affects growth. Chinitz suggested that the structure of the export sector influences important determinants of growth such as bank lending patterns and entrepreneurship (Chinitz, 1961). The structure of the export sector may also influence growth through its propensity for backward and forward linkages. The Alpetco project is a recent example of a forward linkage from the Alaska petroleum sector. The structure will influence the economy's response to major exogenous changes. The region's industrial structure will determine how much of the incomes generated by export activity will be spent locally. When the economic change is large relative to the local economy, structural change may result.

ALASKA STRUCTURAL CHANGE

The ratio of total-to-basic employment has steadily increased from the early fifties (Goldsmith and Huskey, 197813). This growth in the nonbasic or support sector of the Alaskan economy means that equivalent increases in basic employment will lead to greater growth. Table 5 illustrates the

## TABLE 5. THE EFFECT OF STRUCTURAL CHANGE, ALASKA, 1965-1976

| Year | Total Non- Agricultural Employment | Civilian Total Basic Employment | Ratio of Total / Basic | Total Employment. when using 1965 Ratio | Total Employment when using 1970 Ratio |
|------|------|------|------|------|------|
| 1965 | 70,530 | 31,393 | 2.25 | | 82,879 |
| 1970 | 92,476 | 35,028 | 2.64 | 78,697 | |
| 1971 | 97,584 | 35,447 | 2.75 | 79,638 | 93,582 |
| 1972 | 104,243 | 36,137 | 2.88 | 81,188 | 95,404 |
| 1973 | 109,851 | 35,849 | 3.06 | 80,541 | 94,643 |
| 1974 | 128,178 | 45,698 | 2.80 | 102,668 | 120,645 |
| 1975 | 161,313 | 58,592 | 2.75 | 131>637 | 154,686 |
| 1976 | 171,714 | 63,732 | 2.69 | 143,185 | 168,256 |

Basic Employment includes:   Mining, Contract Construction, Manufacturing, Agriculture-Forestry-Fisheries, Federal Government, and Military.

SOURCE :   Alaska Department of Labor, Statistical Quarterly, various quarters (primarily third), 1966-1977.

effect of structural change on growth.   The last two columns show what growth would have been with the given basic sector growth and the maintenance of 1965 and 1970 total-to-basic ratios. In all cases, these ratios underestimate the economy's real growth.

Table 6 provides a detailed description of the structure of Alaska industry in 1965, 1970, and two pipeline years--1975 and 1976. The support industries as a group expanded.   Trade and transportation-communication-utilities remained constant after 1970.  The service industry grew significantly in this period,  increasing from 10.7 percent to 16.1 percent of total employment.   Business services increased from 1.97 percent to 5.04 percent and were the major component of service sector change. Finance-insurance-real estate also increased as a proportion of total employment.  (The employment levels are found in Appendix A.)

The Extent of Future Structural Change

The Alaska support sector has increased its share of employment since 9965, which is part of a much longer trend. An important question when examining potential future growth is what the extent of future structural change will be.   If the support sector were to continue to expand its share of employment at its past rate of about 2.5 percent per year, the support sector would account for 85 percent of employment in 2000 and almost 100 percent six years later.   This, of course, cannot happen; however, there are reasons to expect future growth in the support sector. The most important reason is that economic growth will increase market size, which will allow more local production of goods and services.

| Industry | 1965 % of Total Employment | 1970 % of Total Employment | 1975 % of Total Employment | 1976 % of Total Employment |
|---|---|---|---|---|
| Total Wage and Salary Employment | 100.00 | 100.00 | 100.00 | 100.00 |
| Mining | 1.54 | 3.24 | 2.35 | 2.31 |
| Contract Construction | 9.15 | 7.45 | 16.04 | 17.61 |
| Manufacturing | 8.90 | 8.48 | 5.98 | 6.02 |
| Food | 4.26 | 4.04 | 2.68 | 2.98 |
| logging Lumber and Pulp | 3.27 | 2.98 | 2.09 | 1.89 |
| Other Manufacturing | 1.36 | 1.45 | 1.20 | 1.14 |
| Transportation, Communication, and Public Utilities | 10.30 | 9.85 | 10.21 | 9.18 |
| Trucking and Warehousing | 1.72 | 1.79 | 2.45 | 1.89 |
| Water Transportation | 1.47 | .90 | .86 | .78 |
| Air Transportation | 2.?2 | 3.32 | 2.96 | 2.70 |
| Other Transportation | .76 | .95 | 1.13 | 1.08 |
| Communications and Public Utilities | 3.63 | 2.89 | 2.69 | 2.73 |
| Trade | 14.11 | 16.61 | 16.25 | 16.05 |
| Wholesale | 2.63 | 3.51 | 3.66 | 3.55 |
| Retail | 11.48 | 13.10 | 12.58 | 12.50 |
| General Mdse. and Apparel | 2.69 | 3.63. | 2.55 | 2.48 |
| Food Stores | 1.65 | 1.85 | 1.62 | 1.74 |
| Automotive & Service Stations | NA | 1.81 | 1.77 | 1.68 |
| Eating/Drinking Establishments | 2.77 | 3.02 | 3.88 | 3.76 |
| Other Retail | 4.36 | 2.78 | 2.76 | 2.84 |
| Finance, Insurance, and Real Estate | 3.08 | 3.35 | 3.74 | 4.14 |
| Services | 10.65 | 12.37 | 15.58 | 16.11 |
| Hotels, Motels, and Lodges | 1.46 | 1.57 | 1.96 | 1.87 |
| Personal | .96 | .92 | .57 | .54 |
| Business | 1.97 | 2.16 | 4.54 | 5.04 |
| Medical | 2.03 | 2.35 | 2.68 | 2.92 |
| Other | 4.22 | 5.37 | 5.83 | 5.75 |
| Government | 42.06 | 38.45 | 29.22 | 27.89 |
| Federal | 24.72 | 18.50 | 11.34 | 10.45 |
| State | 9.87 | 11.21 | 9.59 | 8.22 |
| Local | 7.47 | 8.73 | 8.30 | 9.21 |
| Agriculture, Forestry, and Fisheries | .20 | .21 | .63 | .70 |

SOURCE: Statistical Quarterly, Alaska Department of Labor, various issues.

Tables 7 and 8 give some insight into the limits to the growth of the support sector. Table 7 compares the Alaskan distribution of employment to the United States and some other states. Only in finance-insurance-real estate and transportation does Alaska come close to the employment shares of other states. The shares of trade and services are well below those of other states. If the only thing determining industrial production were scale economies, the structure of a region could be assumed to grow toward similar averages. The average of other states is similar to the U.S. distribution and supports this hypothesis.

Examining Table 7 shows that the variation around the U.S. average cannot be explained simply by scale. Table 8 shows that real personal income may explain some of the differences; when personal income is adjusted to reflect regional cost differences, there is a similarity among states. The ratio of support employment to personal income is close to 30.00 for most states independent of their size, although the ratio is lower for some states larger than Alaska. Alaska's ratio is less than this. Both Tables 7 and 8 indicate that the support sector in Alaska has room for expansion.

What explains the support sector's relative underrepresentation in the Alaska economy? One explanation might be a certain threshold size which Alaska has not yet reached after which the support sectors grow somewhat proportionately. A second explanation could be the composition of the export sector. Large petroleum and mining operations and government provide much of the support activity internally leading to an underdeveloped

Table 7.   THE ECONOMIC STRUCTURE OF SMALL STATES

| | Total Employment (thousands) | Percent in Services | Percent in Trade | Percent in Finance-Insurance-Real Estate | Percent in Transportation-Communication-Public Utilities | Percent in Government |
|---|---|---|---|---|---|---|
| Alaska | 151.7 | 15.2 | 17*5 | 5 * 1 | 9.0 | 34.5 |
| Wyoming | 168,7 | 13,9 | 21.9 | 3,4 | 7.8 | 22.7 |
| Vermont | 179.5 | 23.4 | 20.7 | 4.0 | 4,7 | 18.2 |
| North Dakota | 227,8 | 1?,3 | 29.0 | 4,5 | 6,1 | 26,8 |
| South Dakota | 227,0 | 21.1 | 27.5 | 4*4 | 5*4 | 24,9 |
| Delaware | 234.3 | 16.9 | 22.0 | 4.8 | 5.2 | 17.8 |
| Montana | 263,7 | 18.4 | 25.2 | 4,4 | 7.8 | 27,8 |
| Idaho | 305,5 | 17,5 | 25,1 | 5*3 | 6,0 | 21.8 |
| Nevada | 323,7 | 40.8 | 13,8 | 4,2 | 6.0 | 16,1 |
| New Hampshire | 348,1 | 18.3 | 21.5 | 4.9 | 3.6 | 16..1 |
| Hawaii | 362,2 | 24,0 | 2 5 . 4 | 6.9 | 7.8 | 24,2 |
| Rhode Island | 383,0 | 18.8 | 29.9 | 5.0 | 3.5 | 15.7 |
| Maine | 384.3 | 17,0 | 21.1 | 3.9 | 4.5 | 21.3 |
| New Mexico | 430,9 | 19.5 | 22.9 | 4,4 | 6.0 | 26,9 |
| Utah | 500.2 | 17.4 | 24,0 | 4.6 | 6,1 | 23.8 |
| Nebraska | 583.6 | 17*4 | 26,5 | 6.6 | 7,2 | 22.2 |
| West Virginia | 549,2 | 15.8 | 22.1 | 3.6 | 6.6 | 20,9 |
| Arkansas | 714.5 | 14.0 | 21.3 | 4.2 | 5.4 | 19.0 |
| Mississippi | 778,1 | 14.3 | 19*7 | 3*9 | 4.7 | 21,2 |
| Arizona | 829.8 | 18.2 | 24,4 | 5,6 | 5,2 | 23,2 |
| Kansas | 878,5 | 17.5 | 23.8 | 4.9 | 6*6 | 20,9 |
| Oregon | 962.7 | 1.7,5 | 23.7 | 6.2 | 5.7 | 20.3 |
| Oklahoma | 1,001.6 | 16.6 | 23.4 | 5.0 | 6.0 | 22,4 |
| Colorado | 1,008.1 | 19.4 | 23.4 | 6.1 | 6.5 | 2 2.2 |
| Washington | 1,405.6 | 18.4 | 23,7 | 5.6 | 5.7 | 20,7 |
| Average (excluding Alaska) | | 19.0 | 23.3 | 4,8 | 5,8 | 21.5 |
| U.S. Average | | 18.8 | 22.1 | 5.1 | 5*5 | 15,9 |

Source:   U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, June 1978.

TABLE 8.    ECONOMIC STRUCTURE OF SMALL STATES
1977

| | Total Employment Support Industry[1] (Thousands) | Personal Income (Million . $) | Support/ Personal Income | Regional Index of costs (U. S.=1) | Support Employment/ Regionally Deflated Personal Income |
|---|---|---|---|---|---|
| Alaska | 71, 100 | 4, 311 | 16. 5 | 1.42 | 23. 4 |
| Wyoming | 79, 100 | 3, 073 | 25. 7 | .90 | 23.1 |
| Vermont | 94, 700 | 2, 814 | 33. 7 | 1. 02 | 34. 4 |
| North Dakota | 136, 600 | 4, 044 | 33. 8 | .92 | 31. 1 |
| South Dakota | 132, 700 | 4, 104 | 32. 3 | .92 | 29. 7 |
| Delaware | 114, 700 | 4, 477 | 25, 6 | 1. 02 | 26. 1 |
| Montana | 147, 300 | 4, 661 | 31.6 | .90 | 28. 4 |
| Idaho | 164, 600 | 5, 128 | 32. 1 | .90 | 28. 9 |
| Nevada | 228, 800 | 5, 059 | 45. 2 | .99 | 44. 7 |
| New Hampshire | 168, 400 | 5, 547 | 30. 4 | 1. 02 | 31. 0 |
| Hawaii | 234, 600 | 6, 773 | 34. 6 | 1. 21 | 41. 8 |
| Rhode Island | 181, 000 | 6, 332 | 28. 6 | 1. 02 | 29. 2 |
| Maine | 178, 300 | 6,221 | 28. 7 | 1.02 | 29. 3 |
| New Mexico | 227, 400 | 6, 970 | 32. 6 | .88 | 28. 7 |
| Utah | 256, 300 | 7, 510 | 34. 1 | .98 | 33. 4 |
| Nebraska | 336, 500 | 10,491 | 32. 1 | .93 | 29. 9 |
| West Virginia | 264, 000 | 11,129 | 23. 7 | .85 | 20.1 |
| Arkansas | 321, 100 | 11, 878 | 27. 0 | .89 | 24. 0 |
| Mississippi | 331, 800 | 12,019 | 27. 0 | .89 | 24. 0 |
| Arizona | 446, 600 | 14, 943 | 29. 9 | .99 | 29. 6 |
| Kansas | 464, 700 | 19,802 | 23. 5 | .93 | 21. 9 |
| Oregon | 511, 500 | 16,651 | 30. 7 | .998 | 30. 6 |
| Oklahoma | 510, 400 | 17, 839 | 28. 6 | .98 | 28. 0 |
| Colorada | 558, 900 | 18, 752 | 29. 8 | .98 | 29. 2 |
| Washington | 755, 900 | 27, 534 | 27. 5 | .998 | 27. 4 |

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[1]Support sector includes: Services, Trade, Finance-Insurance-Real Estate, and Transportation-Communication-Public Utilities.

SOURCES:    U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, June 1978.

U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, April 1978.

support sector.  A third reason could be the high cost of doing business in Alaska which dampens the effects of scale and reduces the competitiveness of Alaska production.  The extent of the state could be another reason for Alaska's underdevelopment of the support sector.  The distribution of population may make it snore profitable to serve some areas such as Southeastern and Western Alaska from outside the state.  The most optimistic reason would be that it is merely an information problem. If outside investors do not know the Alaska market, they will underinvest. That, coupled with the slow reaction of investment in the support sector to the recent rapid growth, would mean that Alaska could expect future growth in these sectors merely to catch up with the existing growth in the basic industry.

SUMMARY

This section has described the second part of the process of economic growth, the response of the economy to changes in those sectors which initiate growth.  This response has changed in the Alaska economy since 1965; an important indicator of this is the increased share of the support sector.  Relative to other states, Alaska is underserved by the support sector.  Because of this, there is some reason to believe the support sector will continue to expand as a portion of total employment. This understanding of structural change and its relation to economic growth increases our awareness of the effects of the scale and the timing of future economic activity.

## Population

Industrial growth and the change in the structure of the economy are not
the only aspects of economic growth. Population growth is another com-
ponent. The level of population is influenced by the level of economic
activity. Migration is a major component of population change, and the
relative economic opportunities within Alaska determine levels of in- and
out-migration. The population of a region also influences the economic
activity. The characteristics and size of the population determine the
region's local demand for goods and services and its labor force composi-
tion. This section will discuss the growth and composition of the Alaska
population.

Table 9 shows the growth in population between 1965 and 1976. As would
be expected, population increased most rapidly with the construction of
TAPS; between 1973 and 1974, population increased 6.29 percent, while
it increased by 15.23 percent between 1974 and 1975. Population increased
by 148,100, or 55.8 percent, between 1965 and 1976.

The age and sex distribution of the population determines the demand that
population places on both public and private services. A population with
a large school-age component will have a higher demand for schools than
the same population with a different distribution. The age-sex distribution
will also influence the size of the labor force produced by a given popula-
tion. Table 10 describes the age-sex distribution in 1970 and 1976.
Comparing the age-sex distribution between 1970 and 1976 shows two observ-
able trends. First, the proportion of males in the population has declined.

TABLE 9.   POPULATION GROWTH, ALASKA
1965,  1970-1976

| | Number of Births | Number of Deaths | Natural Increase | Estimated Net Migration[1] | Population as of July 1 | % Increase over Previous Year |
|---|---|---|---|---|---|---|
| 1965 | 7,063 | 1,400 | 5,663 | 4,538 | 265,192 | 3.84 |
| 1970 | 7,560 | 1,431 | 6,129 | 1,672 | 302,361[2] | 2.66[3] |
| 1971 | 7,312 | 1,455 | 5,857 | 4,712 | 312,930 | 3.50 |
| 1972 | 6,948 | 1,467 | 5,481 | 5,870 | 324,281 | 3.60 |
| 1973 | 6,611 | 1,464 | 5,147 | 937 | 330,365 | 1.88 |
| 1974 | 7,006 | 1,468 | 5,538 | 15,256 | 351,159 | 6.29 |
| 1975 | 7,470 | 1,522 | 5,948 | 47,527 | 404,634 | 15.23 |
| 1976 | 7,834 | 1,713 | 6,121 | 2,534 | 413,289 | 2.14 |

[1]Difference between change in population and natural increase.

[2]U.S. Department of Commerce, Bureau of Census, 1970 Census of Population.

[3]Average annual percent increase between 1965 and 1970

SOURCE :   Alaska Department of Labor and the Division of Economic Enterprise, Department of Commerce and Economic Development, as reported in The Alaskan Economy, Year-end Performance Report, 1977.

TABLE 10.   ALASKA POPULATION
AGE-SEX DISTRIBUTION
1970,  1976

| | 1970 | | | 1976 | | |
| Age | Males | Females | Total | Males | Females | Total |
|---|---|---|---|---|---|---|
| All ages | 54.2 | 45.7 | | 51.6 | 48.4 | |
| 0-13 | 16.5 | 15.7 | 32.2 | 14.1 | 13.2 | 27.3 |
| 14-19 | 5.7 | 5.2 | 10.9 | 6.6 | 6.0 | 12.6 |
| 20-29 | 12.4 | 8.7 | 21.1 | 11.2 | 10.4 | 21.6 |
| 30-39 | 7.7 | 6.5 | 14.2 | 7.8 | 7.8 | 15.6 |
| 40-54 | 8.1 | 6.6 | 14.7 | 7.7 | 7.2 | 14.9 |
| 55-64 | 2.5 | 2.0 | 4.5 | 3.1 | 2.6 | 5.7 |
| 64 + | 1.3 | 1.0 | 2.3 | 1.1 | 1.2 | 2.3 |

SOURCES:   U.S. Department of Commerce, Bureau of the Census, 1970 Census
of Population.

U.S. Department of Commerce, Bureau of the Census, 1976 Survey
of Income and Education Microdata Tape.

The second trend is the increase in working-age population relative to the remainder of the population. The surprising observation is that the age-sex distribution has maintained relative stability. The tremendous growth in the population between 1970 and 1976 seems to have affected the distribution only slightly.

Population has grown rapidly since 1965, although the growth has been less rapid than the growth in employment. This differential growth has resulted in a fall in the dependency ratio (population/employment). The ratio o-f population-to-employment has fallen from 3.76 in 1965 to 2.41 by 1976. TAPS construction may be largely responsible for the low ratio in 1975 and 1976, since the pipeline has attracted single workers. The dependency ratio had fallen substantially before construction on the pipeline began; in 1973 the ratio was 3.01. The dependency ratio has fallen as the proportion of the population which is working has increased. This increase results from a change in the proportion of the population which is of working age; the proportion of the population between 14 and 64 has increased from 65.4 percent in 1970 to 70.4 percent in 1976. The increased labor force participation of this population is also responsible.

Population growth results from the net effect of births, deaths, and in- and out-migration. As would be expected in a region with a small population which is experiencing rapid economic growth, migration was the most important component of population change throughout the period. Migration accounted for 69 percent of the total change in population between 1970 and 1976. In 1975, it accounted for 89 percent of the increase in population.

## Unemployment

Unemployment has always been an important problem for the Alaska economy. Table 11 shows the dimensions of the problem. Since 1970, the unemployment rate has remained close to 10 percent; only in 1975 did it fall below 10 percent. The unemployment rate remained constant even though employment was increasing throughout the period. This illustrates a particular Alaska dillema. Increases in employment lead to increases in migration, which increase the labor force and leave the unemployment rate high. This has important welfare effects when skill levels are considered. If migrants are more qualified and take the new jobs, employment growth may do little to increase the welfare of original residents. The other factor which maintained the high unemployment rate was the increase in labor force participation. The labor force participation rate responds, like migration, to economic opportunities. As the employment opportunities expand, more people enter the labor force. The labor force participation rate increased from about 40 percent in 1970 to 53 percent in 1976.

One factor influencing unemployment in Alaska is the seasonality of employment. Economies which are dependent on natural resource production often have seasonal cycles. This has been accentuated in Alaska by the severe winters which limit activity. Since the season decline occurs in the winter months, one measure of seasonality is defined by the ratio of the fourth-quarter employment to the third-quarter employment. The closer this index is to one, the less seasonal is the industry. Table 12 shows the seasonality of Alaska industries. Seasonality has decreased in importance throughout the historical period. In 1960 the overall seasonality

TABLE 11.   UNEMPLOYMENT, ALASKA
1965-1976

| Year | Total Unemployed | Unemployment Rate (%) | Labor Force Participation Rate (%) |
|------|------------------|-----------------------|-------------------------------------|
| 1965 | 7,700 | 8.6 | 38.16 |
| 1970 | 9,700 | 9.0 | 39.94 |
| 1971 | 12,100 | 10.4 | 40.97 |
| 1972 | 12,900 | 10.5 | 41.27 |
| 1973 | 13,900 | 10.8 | 42.78 |
| 1974 | 14,900 | 10.0 | 46.00 |
| 1975 | 14,900 | 8.3 | 47.40 |
| 1976 | 21,000 | 10.5 | 52.65 |

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SOURCE :   Alaska Department of Labor, Labor Force Estimates, various years.

Alaska Department of Labor, Estimates of Total Resident Population.

TABLE 12.   SEASONALITY OF EMPLOYMENT, ALASKA
1950, 1960, 1965, 1970, 1975, and 1976

|  | 1950 | 1960 | 1965 | 1970 | 1975 | 1976 |
|---|---|---|---|---|---|---|
| Mining | .6267 | .7143 | .7949 | .8556 | .9009 | .9690 |
| Construction | .7900 | .5862 | .6460 | .7279 | .8374 | .6906 |
| Manufacturing | .2440 | .5137 | .6531 | .5457 | .6886 | .6714 |
| Transportation, Communication, and Public Utilities | .8248 | .9683 | .9125 | .8851 | .9887 | .8871 |
| Trade | .9226 | .9718 | .9905 | .9733 | 1.0048 | .9120 |
| Finance, Insurance, and Real Estate | 1.0000 | 1.0000 | .9706 | .8942 | 1.0000 | .9270 |
| Services | .9583 | .9123 | .9664 | .9716 | .9812 | .9387 |
| Government | .9632 | .9815 | .9617 | .9810 | 1.0049 | .9689 |
| Total | .7505 | .8313 | .8718 | .8800 | .9402 | .8733 |

SOURCE:   State of Alaska, <u>Alaska Labor Force Estimates,</u> various years.

index was .8313. In 1975 the **seasonality** index for total employment was .9402; the increase in **seasonality** in 1976 was clue to the pipeline construction employment in the summer of 1976. The decrease in **seasonality** since 1960 has been a result of three factors. First, the increased importance of support sector industries with smaller seasonal components resulted in lowering the average **seasonality.** The **seasonality** index of services, trade, and **F.I.R.E.** has always been close to one. Secondly, the technology became available to work through the winter in construction. Finally, market forces made it profitable to employ these technologies in Alaska.

## Personal Income

Growth of personal income increases the demand for goods and services and is an important determinant of the growth of the Alaska economy. Growth in personal incomes is also a measure of the benefits received from economic growth. Personal income has grown at an average rate of more than 15 percent throughout the period. The best measure of the welfare effects of personal **income** is **real** per capita income. Increasing incomes **will** only increase welfare if it is increasing faster than prices and population. Real per capita personal income measures the command of the average individual over goods and services.

**Table 13** shows the effect of price increases in Alaska as measured by the Anchorage **CPI.** By comparing the growth in the Anchorage index to **the** United States, we can assess one impact of rapid development. Prior to 1974, the Anchorage **CPI was** increasing at a slower rate than the U.S. CPI,

TABLE 13.   ANCHORAGE CONSUMER PRICE INDEX
(1967 = 100)

| Year | Anchorage Index | % Change Over Previous Years | United States Index | % Change Over Previous Years. |
|------|------|------|------|------|
| 1965 | 94.2 | -- | 94.5 | -- |
| 1970 | 109.6 | 3.07' | 116.3 | 4.23[1] |
| 1971 | 112.9 | 3.01 | 121.3 | 4.30 |
| 1972 | 115.9 | 2.66 | 125.3 | 3.30 |
| 1973 | 120.8 | 4.23 | 133.1 | 6.23 |
| 1974 | 133.9 | 10.84 | 147.7 | 10.97 |
| 1975 | 152.3 | 13.74 | 161.2 | 9.14 |
| 1976 | 163.3 | 7.22 | 170.2 | 5.58 |

'Average annual rate of price increase 1965-1970.

SOURCE :   Alaska Department of Commerce and Economic Development,
The Alaska Economy Year End Performance Report, 1978.

which meant the price differential between Alaska and the United States was falling. With the TAPS boom, this trend was reversed. Prices rose relatively faster in Alaska after 1975 because of bottlenecks and the rapid increase in demand. Bottlenecks resulted when the rapid increase in demand was met by the relatively fixed supply system.

Table 14 shows the growth in real per capita personal income. The maximum increases came in 1973 and in 1975 when real per capita income increased by over 10 percent. In all but 1972, the growth of real per capita income was greater in Alaska than in the United States. This shows that an average Alaskan's command over goods and services has increased at a rate much greater than in the United States as a whole.

### Summary: The Effects of Economic Growth

During the period between 1965 and 1976, the Alaska economy experienced rapid growth. The expansion of the economy during this period is symbolized by the growth in three aggregate indicators of economic activity: personal income, employment, and population. Personal income, which measures the command of residents over goods and services, expanded by 382 percent during the period from $858 million to $4,133 million. Employment expanded by 144 percent from 70,530 to 171,714 between 1965 and 1976. Population grew from 265,192 in 1965 to 413,289 in 1976, an increase of 56 percent.

Growth did not occur evenly during the period; the most rapid growth occurred after 1970. For each of the aggregate indicators, the growth rate was more rapid after 1970. Population grew at an average annual rate

TABLE 14.  ALASKA GROWTH OF REAL PER CAPITA INCOME
1965, 1970-1976

| | Real Per Capita Income in Millions | | | |
| | Alaska | | United States | |
| Year | Total | % Increase Over Previous Year | Total | % Increase Over Previous Year |
|------|-------|------------------------------|-------|------------------------------|
| 1965 | 3,435 | -- | 2,895 | -- |
| 1970 | 4,260 | 4.40' | 3,348 | 2.95[1] |
| 1971 | 4,407 | 3.45 | 3,406 | 1.73 |
| 1972 | 4,5?8 | 2.52 | 3,585 | 5.26 |
| 1973 | 5,031 | 11.35 | 3,742 | 4.38 |
| 1974 | 5,180 | 2.96 | 3,675 | -1.79 |
| 1975 | 5,701 | 10.06 | 3,636 | -1.06 |
| 1976 | 6,124 | 7.24 | 3,755 | 3.27 |

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[1]Average annual percent increase between 1965 and 1970

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information Center, July 1977 printouts.

U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1966 and 1967.

U.S. Department of Labor, Handbook of Labor Statistics, 1972 and 1977.

of 5.4 percent after 1970 compared to 2.7 percent between 1965 and 1970. Employment grew at an average rate of 10.9 percent per year between 1970 and 1976, compared to 5.6 percent prior to 1970. Personal income grew at almost twice its pre-1970 rate between 1970 and 1976.

Economic growth during the period examined in this section resulted from expansion of the basic sector. The industries which were most important in the basic sector growth were mining and construction. The expansion of these sectors was directly related to petroleum development in the state. Prior to 1970, development of oil fields on the Kenai Peninsula and in Upper Cook Inlet were primarily responsible for growth. The development of the Prudhoe Bay fields after the lease sale in 1969 resulted in mining employment growth both at Prudhoe Bay and in Anchorage. The construction of the trans-Alaska pipeline to transport the oil from Prudhoe Bay was responsible for a 158 percent increase in construction employment between 1973 and 1975. This major petroleum-related growth occurred after 1970, contributing to the more rapid growth in the latter part of the study period.

Two other factors contributed to state economic growth. First, the additional state revenues available after the Prudhoe lease sale in 1969 allowed the state to increase expenditures. The increase in state government employment and capital improvement expenditures were partially responsible for state growth in the early 1970s. Secondly, as the scale of the economy increased, the relation between the support sector and basic sector growth changed. Increased scale allowed more local production of goods and services, which meant that increased basic sector activity resulted in greater growth in the support sector.

## Existing Economic Conditions

The existing economic conditions in Alaska reflect the end of work on the TAPS project. The project was completed in 1977, but the peak employment on the pipeline project occurred in 1976. The fall in construction employment between 1976 and 1977 illustrates the significance of this to the economy. Construction employment fell by 35.4 percent from 30,200 to 19,500 in 1977 (Alaska Department of Labor, 1978).

Although the economy experienced a fall in total employment, the drop was not so great as would have been expected given the response the economy experienced during the pipeline buildup. Nonconstruction employment actually rose between 1976 and 1977. Total nonagricultural wage and salary employment fell by only 7,000, or only 65 percent of the fall in construction employment; nonconstruction employment increased by 3,700. This increase was a result of the expansion of both the basic sector and the support sector. The major basic sector to increase was mining, which increased by 1,000 employees. This increase was a result of the continued development of the Prudhoe Bay fields and the preparation for further exploration activity. This included substantial expansion of headquarters employment in Anchorage. Trade and finance-insurance-real estate accounted for 1,500 of the increased employment. This was an unexpected response from the support sector, given decreasing basic sector employment. Local government added significantly to this growth, expanding employment by about 2,000.

Two delayed adjustments took place in the post-pipeline period. The first was a response by the support sector to the larger economy. The full expansion of this sector may have been prevented during the pipeline period because of the high demand for labor.   Another factor which may have been responsible for the delayed response was the rapid growth of the "economy; the 1977 response was the delayed investment response. The second delayed adjustment which prevented the proportional drop in the economy in the post-pipeline period was the spending of accumulated savings and capital gains.   This dissaving lengthened impact of the pipeline beyond the period of direct employment impact.

The economy has adjusted to the end of the pipeline. Future growth can be expected to be at much lower rates than in the past. Future growth will depend on the expansion of the basic sector and whatever structural change may occur.   One of the most important basic industries for the future will be mining.   With the beginning of production at Prudhoe Bay, Alaska became the third largest oil producing state. Continued development at Prudhoe Bay and exploration in NPRA, as well as the OCS areas, will be responsible for the continued future growth of this industry. The 200 mile fisheries limit will increase the importance of the fishing industry.   Alaska's current domestic catch accounts for only 7 percent of the fishery resource (Alaska Pacific Bank, 1979).  The near-future growth may be limited because of the investment required to move into bottomfishery.  In the near future, construction will be dependent on government projects.   The next major project planned is the construction of the ALCAN natural gas pipeline in the early 1980s. If constructed, this project should have impacts similar to the TAPS project.

The Economies of the Gulf of Alaska Region, 1965-1976

OVERVIEW

The major impacts from OCS development in the Northern Gulf of Alaska are projected to occur in the Gulf of Alaska region of the state. The Gulf of Alaska region contains two major subregions, Anchorage and Southcentral. The Anchorage region consists of the Anchorage Census Division. Southcentral includes six census divisions: Kenai, Seward, Matanuska-Susitna, Valdez-Chitina-Whittier, and Cordova-McCarthy. It also includes the Yakutat portion of the Skagway-Yakutat Division. (Figure 3 shows the Alaska Census Divisions.) The character of each of these subregions differs. Anchorage is the urban center of the state. The Southcentral region consists of a series of small, rural economies.

The Gulf of Alaska region is the most populous region of the state. It contains almost 60 percent of the state's population. Many of the events which have influenced the growth of the state occurred in the Gulf of Alaska region. The Cook Inlet oil and gas fields are located in that region, and the terminus of the trans-Alaska pipeline is also in the Gulf of Alaska region at Valdez. This region also contains one of the major fishing ports in the state at Kodiak. Anchorage, the state's major metropolitan center is in the region. The region and its subregional economies experienced rapid growth between 1965 and 1970. The Gulf of Alaska region grew faster than the state and increased its share of state employment from 53.6 percent to 56.5 percent. This section will examine the growth of the Gulf of Alaska's two subregions during the 1965-1976 period.
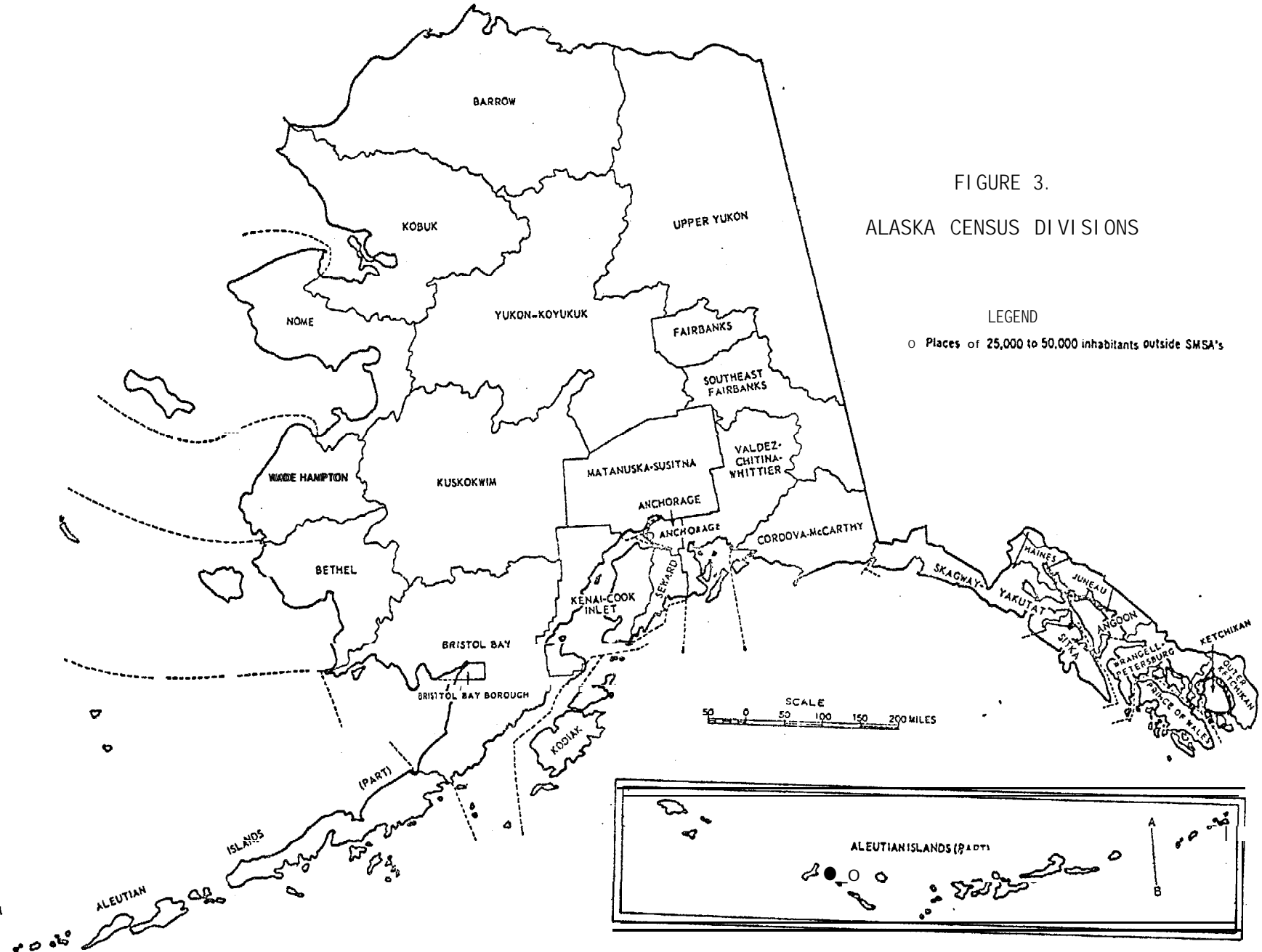
FIGURE 3.

ALASKA CENSUS DIVISIONS

LEGEND

o  Places of 25,000 to 50,000 inhabitants outside SMSA's

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ANCHORAGE

The position of Anchorage as the major metropolitan center of Alaska and the administration and distribution center for much of the state means that growth in Anchorage reflects the growth in the rest of the state. This factor explains why Anchorage, while having no actual pipeline construction, experienced rapid growth during the pipeline period. As an urban area, the past and future expected growth in Anchorage differs importantly in its causes and effects from the state as a whole. This section will describe the historical growth of Anchorage as well as try to isolate the important causes of growth which are unique to Anchorage.

Growth of Aggregate Indicators

Table 15 shows the growth of three indicators of aggregate economic activity: employment, population, and personal income. Total employment increased by about 42,440 during the period; over 73 percent of this increase occurred after 1970. After 1970 the average growth rate of employment was 9.7 percent compared to the overall 8.2 percent rate. Between 1973 and 1975, the period of the most rapid TAPS growth, total employment increased by 38 percent.

Population followed the same path as employment, increasing more rapidly in the last six years of the period. Population grew at an average rate of 5.54 percent per year between 1965 and 1970; for the period after 1970, the rate was 6.58 percent. Unlike employment, population grew faster in Anchorage than in the state, which grew at 5.3 percent. This meant

### TABLE 15. GROWTH OF EMPLOYMENT, POPULATION, AND PERSONAL INCOME: ANCHORAGE 1965-1976

|  | Population | Employment | Personal Income ($ Million) |
|---|---|---|---|
| 1965 | 102,337 | 30,678 | 371.0 |
| 1970 | 126,333 | 41,995 | 634.9 |
| 1971 | 135,777 | 45,452 | 732.9 |
| 1972 | 144,215 | 48,252 | 800.2 |
| 1973 | 149,440 | 50,627 | 883.1 |
| 1974 | 153,112 | 58,713 | 1111.6 |
| 1975 | 177,817 | 69,645 | 1577.6 |
| 1976 | 185,179 | 73,113 | 1799.1 |
| **Average Annual Percent Change** | | | |
| 1965-1976 | 5.54 | 8.22 | 15.43 |
| 1970-1976 | 6.58 | 9.68 | 18.96 |

SOURCES: All estimates State of Alaska Department of Labor, Research and Analysis Section, Population Estimates by Census Division, except 1970 which is Census of Population.

Alaska Department of Labor, Statistical Quarterly, various years.

U.S. Department of Commerce, Bureau of Economic Analysis, July 1978.

that population was concentrating in Anchorage even though the pipeline construction had slowed the trend toward employment concentration.

Personal income experienced growth similar to state growth; personal income increased at close to 15 percent annually in Anchorage and the state. For the entire period, the annual rate of growth was slightly higher for Anchorage. After 1970 the higher incomes associated with the pipeline construction led to a slightly faster rate of growth in the state.

### The Causes of Growth

The Anchorage economy expands for reasons similar to those causing expansion in the state economy. One cause of growth is the expansion of the basic industries of agricul ture-forestry-fisheries, mining, manufacturing, construction, and federal government. For the local economy, state government growth can also be seen as a basic sector, since the factors determining its growth are political decisions external to the region. The growth of the basic industries is shown in Table 16 which describes the growth of all industrial sectors in Anchorage.

Over the period 1965-1976, the fastest growing basic sector was mining. Mining grew at an average annual rate of 12.91 percent over the period. Between 1965 and 1970, mining employment increased by an average rate of 20.9 percent per year. The growth of mining was the result of the development of regional headquarters and administrative staffs to support the

## TABLE 16. CIVILIAN EMPLOYMENT GROWTH
## ANCHORAGE, 1965-1976

| Industry | Average Annual Percent Increase 1965-1976 | Average Annual Percent Increase 1970-1976 | Average Annual Percent Increase 1973-?975 |
|---|---|---|---|
| Total | 8.22 | 9.68 | 17.29 |
| Agriculture, Forestry, and Fisheries | 10.48 | 11.33 | 15.82 |
| Mining | 12.91 | 6.63 | 30.09 |
| Contract Construction | 8.39 | 13.69 | 29.94 |
| Manufacturing | 6.78 | 8.14 | 10.58 |
| Transportation, Communication, and Public Utilities | 9.92 | 11.26 | 26.01 |
|     Transportation | 10.68 | 10.77 | 31.60 |
|     Air | 11.93 | 10.29 | 19.28 |
|     Other | 9.52 | 11.29 | 47.32 |
|     Communication | 8.60 | 13.92 | 16.74 |
|     Public Utilities | 7.75 | 8.77 | 5.22 |
| Trade | 10.58 | 10.82 | 18.32 |
|     Wholesale | 11.94 | 11.39 | 28.33 |
|     Retail | 10.13 | 10.61 | 15.12 |
| Finance, Insurance, and Real Estate | 11.42 | 13.61 | 13.56 |
| Services | 13.69 | 15.81 | 27.23 |
|     Hotels | 10.96 | 11.41 | 28.77 |
|     Personal | 3.81 | 2.12 | 4.97 |
|     Business | 18.09 | 26.71 | 78.67 |
|     Medical | 13.17 | 14.17 | 7.08 |
|     Other | 13.53 | 13.51 | 19.99 |
| Federal Government | .40 | .53 | 3.41 |
| State Government | 8.38 | 8.97 | 5.61 |
| Local Government | 7.97 | 6.96 | 13.06 |

SOURCE: Department of Labor, <u>Statistical Quarterly,</u> various issues.

development of the Cook Inlet and Prudhoe Bay fields. The growth of mining employment in Anchorage, as in the state, was cyclical, falling after 1970 when peak development of Upper Cook Inlet was reached. After 1973 mining employment grew at an average rate of 22.3 percent per year. The growth during this period included headquarters growth necessary for the development of the Prudhoe Bay fields. Over the period, Anchorage averaged more than one-third of the statewide mining employment.

Construction was the second fastest growing major component of the basic sector.[1] Construction grew at an average annual rate of 8.39 percent between 1965 and 1976. Between 1973 and 1975 when the most rapid buildup resulting from the pipeline occurred, the growth rate averaged 29.94 percent. In Anchorage, the construction industry did not include major projects connected with resource development such as TAPS. Construction in Anchorage was largely an investment response to expected future growth and an expansion of the capacity of Anchorage housing and private sectors to meet the rapid growth in population.

The government component of the basic sector experienced minimal growth between 1965 and 1976. Federal government remained almost constant throughout the period, growing at an overall rate of less than one percent per year. State government employment grew at a rate slightly greater than growth in total employment, an annual average rate of

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[1]Agriculture-forestry-fisheries, while experiencing a very rapid rate of growth, had little impact on the Anchorage economy. In 1976, employment in this industry was only 100 people.

8.38 percent between 1965 and 1974. As on the state level, state government is partially responsive to local demands. However, since the determinants of its growth are outside the region and a large component of state government is administrative for programs outside of Anchorage, state government can be considered basic. The most rapid period of growth of state government in Anchorage was in the beginning of the 1970s. Between 1970 and 1972, state government employment grew at a rate of 20.2 percent per year. This reflects the rapid growth of total state government at the time.

The final basic sector is manufacturing which grew at an average annual rate of 6.78 percent between 1965 and 1976. When the period after 1970 is considered, the growth rate increases but it is still less than the growth rate of total employment. Manufacturing experiences a steady increase throughout the period, not a cyclical increase as at the state level. This is because the manufacturing in Anchorage has only a small component of food manufacturing which reflects cycles of the fishing industry.

Anchorage: The Administration and
Distribution Center for Alaska

Anchorage serves as the administration and distribution center for Alaska. Because of this, traditional service functions such as trade, services, transportation-communication-utilities, and finance-insurance-real estate have important basic components. These sectors are support sectors at the state levels since they respond primarily to growth in

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state incomes.   The distinction arises because the location of support

activities is not spread uniformly with basic activities; economies of

scale are one primary reason activities would concentrate in one place.

Because a portion of these sectors in Anchorage responds to demands

from outside the region,  they can be considered part of the Anchorage

basic sector.   This response of the Anchorage support sector provides

a major link between the economies of Anchorage and the state.


There are many ways of distinguishing the basic and nonbasic components

of an industry.   The most accurate would be by survey. In a survey, a

sample of firms in each industry would be asked the portion of their

output sold inside and outside the region.   A less costly method involves

the use of location  quotients.   A location quotient for industry i is

defined as the ratio of the percent of total  employment in Anchorage in

industry i  to the percent of total  employment in the state in industry i.

The use of location quotients to measure the basic components of support

industries  requires the assumption that consumption in all  parts of the

state is similar and that this average consumption "is reflected in the

proportion  of employment in these industries at the state level.   Table 17

shows the Anchorage location quotients for the four support  industries:

transportation-communication-utilities, trade, finance-insurance-real

estate,  and  services.


Table 18 shows the Anchorage basic sector as estimated using location

quotients.   The portion of support industry employment which is basic

TABLE 17.    LOCATION QUOTIENTS, ANCHORAGE
1965, 1970, 1975, 1976

|  | 1965 | 1970 | 1975 | 1976 |
|---|---|---|---|---|
| Transportation, Communication, and Public Utilities | .8284 | .9485 | 1.0323 | 1.1039 |
| Trade | 1.2927 | 1.2354 | 1.3191 | 1.3548 |
| Finance, Insurance, and Real Estate | 1.3706 | 1.4074 | 1.3877 | 1.4058 |
| Services | 1.1531 | 1.2326 | 1.2407 | 1.3117 |

$$\text{Location Quotient} = \frac{\dfrac{\text{Total Anchorage Employment in Industry } i}{\text{Total Anchorage Employment}}}{\dfrac{\text{Total State Employment in Industry } i}{\text{Total State Employment}}}$$

SOURCE :    Alaska Department of Labor, Statistical Quarterly, various issues.

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TABLE 18.  ANCHORAGE BASIC SECTOR GROWTH
1965, 1970, 1973, 1975, and 1976

| Industry | 1965 | 1970 | 1973 | 1975 | 1976 |
|---|---|---|---|---|---|
| Agriculture, Forestry, and Fisheries | 33 | 52 | 82 | 110 | 100 |
| Mining | 371 | 958 | 769 | 1,301 | 1,409 |
| Contract Construction | 3,127 | 3,514 | 4,178 | 7,054 | 7,587 |
| Manufacturing | 791 | 1,018 | 1,286 | 1,573 | 1,629 |
| Transportation, Communication, and Public Utilities | - o - | - o - | - o - | 230 | 697 |
| Trade | 1,195 | 1,642 | 2,239 | 3,611 | 4,195 |
| Finance, Insurance, and Real Estate | 350 | 573 | 825 | 1,010 | 1,229 |
| Services | 500 | 1,208 | 1,323 | 2,612 | 3,510 |
| Federal Government | 9,395 | 9,509 | 9,558 | 10,222 | 9,813 |
| Total Civilian Basic Employment | 15,762 | 18,474 | 20,260 | 27,723 | 30,169 |
| Total Military Employment | 15,190 | 12,884 | 14,049 | 12,642 | 12,179 |
| Total Basic Employment | 30,952 | 31,358 | 34,309 | 40,365 | 42,348 |
| Total Basic/ Total Employment | .6748 | .5714 | .5305 | .4905 | .4965 |
| Civilian Basic/Total Civilian Employment | .5138 | .4399 | .4002 | .3981 | .4126 |

SOURCE: Alaska Department of Labor, statistical Quarterly, various issues.

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is equal to $\dfrac{LQ-1}{LQ}$. The location quotient methodology does not provide

an exact description of the basic component of these industries. This

method may overestimate the basic component if the assumption of similar

consumption is not true. The location quotient may underestimate the true

amount of export component, since it considers only the net difference in

regional consumption and does not allow for interregional trade (Hoover,

1970). For example, the location quotient method estimates no basic

component of transportation prior to 1975. This is surely an under-

estimate, since the Port of Anchorage serves as the entrance source of

supply for approximately 80 percent of the state's population (Munici-

pality of Anchorage, 1978). This analysis is useful in pointing out the

relationship of the Anchorage support sector to the state economy.

Table 18 shows the trends in this component of the Anchorage basic sector.

The component of the basic sector made up of transportation-communication-

utilities, trade, finance-insurance-real estate, and services has been

increasing. In 1965 this component accounted for 13 percent of the

civilian basic sector; and by 1976, it accounted for 31.9 percent.

Overall, the importance of the basic sector to the Anchorage economy

decreased as it did at the state level. The civilian basic sector

decreased from 51 percent of total employment in 1965 to 41 percent in

1976.


The Economic Structure

The growth of the Anchorage economy has resulted not only in a change

in the levels of economic indicators but also in a change in the process

by which growth is transmitted. This change is similar to that experienced

in the state economy.   The decreasing proportion of basic employment is one result of this change.   The increase in the support sector means the economy will have a greater response to growth in the basic sector. Table 19 details the change in the economy's structure as measured by employment distribution.

The growth of the support sector in Anchorage can easily be observed from this table.   The support sector industries increased their share of total employment from 42.2 percent in 1965 to 58.9 percent in 1976. This is a result of the increased importance of the support sector in both the state and Anchorage economies.   The share of government has decreased. This is primarily because of the limited growth of federal government.   The share of federal government fell from 30.6 percent in 1965 to 13.4 percent in 1976.   Total government's share fell from 43.7 percent in 1965 to 26.4 percent in 1976. The share of employment in construction increased between 1970 and 1976, reversing the trend between 1965 and 1970. This reversal may be a short-run phenomenon reflecting only the increased activity connected with TAPS construction.

Anchorage, like the state, has been experiencing and should continue to experience an increased importance of the support sector.   This structural change is a result of the increased size of the economy which allows the production of more goods and services for local consumption. This process affects Anchorage in a twofold manner, since it provides support sector goods and services for the state as well as the region.

TABLE 19.   ANCHORAGE DISTRIBUTION OF EMPLOYMENT
1965, 1970, AND 1976

| Industry | % of Total Non-Agricultural Wage & Salary Employment | | |
|---|---|---|---|
| | 1965 | 1970 | 1976 |
| Agriculture, Forestry, and Fisheries | .11 | .12 | .14 |
| Mining | 1.21 | 2.28 | 1.93 |
| Contract Construction | 10.19 | 8.37 | 10.38 |
| Manufacturing | 2.58 | 2.42 | 2.23 |
| Food | .59 | .47 | .46 |
| Lumber | .06 | .11 | .19 |
| Paper | .01 | .01 | .03 |
| Other | 1.92 | 1.83 | 1.56 |
| Transportation, Communication, and Public Utilities | 8.53 | 9.30 | 10.13 |
| Transportation | 5.52 | 6.67 | 7.07 |
| Communication | 2.20 | 1.82 | 2.28 |
| Public Utilities | .81 | .82 | .78 |
| Trade | 17.21 | 20.52 | 21.83 |
| Wholesale | 4.00 | 5.29 | 5.80 |
| Retail | 13.21 | 15.23 | 16.03 |
| Finance, Insurance, and Real Estate | 4.22 | 4.71 | 5.82 |
| Services | 12.28 | 15.25 | 21.13 |
| Hotels | 1.50 | 1.80 | 1.97 |
| Personal | 1.31 | 1.27 | .83 |
| Business | 2.57 | 2.83 | 6.72 |
| Medical | 2.22 | 2.85 | 3.63 |
| Other | 4.71 | 6.49 | 7.97 |
| Federal Government | 30.62 | 22.64 | 13.42 |
| State Government | 5.45 | 5.77 | 5.54 |
| Local Government | 7.59 | 8.61 | 7.40 |

SOURCE :   Alaska Department of Labor, Statistical Quarterly, various issues.

Population

Table 20 shows the growth of population in the Anchorage region. Anchorage experienced major population growth since 1965. Of the 82,842 population increase since 1965, 71 percent occurred after 1970. Migration accounted for 70.6 percent of the increase between 1970 and 1976. The major migration increase occurred in 1975 at the height of pipeline activity when the state estimated migration of 22,222 to Anchorage. As in the state, migration was the most important component of population growth.

The dependency ratio in Anchorage fell during this period, although the fall was not so great as at the state level. The dependency ratio in Anchorage fell from 3.01 in 1970 to 2.53 in 1976, a drop of 16 percent, compared to a 36 percent drop at the state level. The reason for the fall was the same as at the state level, an increased proportion of the population in the labor force. Since Anchorage serves as home to many workers in other areas of the state, the ratio will be higher.

Anchorage does have comparative age distributions of the population in 1970 and 1975. These illustrate the reasons the population-to-employment ratio has fallen.

Comparing these figures shows a relatively stable age distribution when the major growth which took place is considered. However, the proportion of nonworking-age population has fallen. The population under fifteen accounted for 33.9 percent of the population in 1970 and for 29.3 percent in 1975. This reflects a relative decrease in family size and a decreased

TABLE 20.   ANCHORAGE POPULATION GROWTH
1965, '1970-1976

| | Number of Births | Number of Deaths | Natural Increase | Estimated Net Migration | Population as of July 1 | % Increase over Previous Year |
|------|------|------|------|------|------|------|
| 1965 | | | | | 102,337 | |
| 1970 | 3,285 | 489 | 2,796 | | 126,333[1] | 4.30[2] |
| 1971 | 3,192 | 473 | 2,719 | 6,725 | 135,777 | 7.48 |
| 1972 | 3,119 | 490 | 2,629 | 5,809 | 144,215 | 6.21 |
| 1973 | 4,247 | 424 | 3,823 | 1,402 | 149,440 | 3.62 |
| 1974 | 3,123 | 481 | 2,642 | 1,030 | 153,112 | 2.46 |
| 1975 | 2,990 | 507 | 2,483 | 22,222 | 177,817 | 16.14 |
| 1976 | 3,472 | 519 | 2,953 | 4,409 | 185,179 | 4.14 |

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[1]U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population.

[2]Percent average annual increase.

SOURCE : Alaska Department of Labor, Estimates of Total Resident Population and Estimates of Civilian Population, various years.

Alaska Department of Health and Social Statistics, in communication with the Municipality of Anchorage.

demand for services such as schools.  The percentage of the population available for the labor force, ages 15-64, increased from 64.6 percent in 1970 to 68.6 percent in 1975.  This is one reason for the decreased dependency ratio.  Table 21 compares the age distribution in the two periods.

Unemployment

Anchorage, like the state, has a serious unemployment problem, although the unemployment rate is less than the state. 'The unemployment rate has remained less than 10 percent through the period. The unemployment rate rose to a high of 9.7 percent in 1973 prior to the construction of the pipeline; the rate then fell to a low of 6.7 percent in 1975 and rose again in 1976 as pipeline construction came to an end.  Except for 1975, the total number of unemployed increased throughout the period. Increases in employment opportunities encourage increases in the labor force in a corresponding manner.  The increased labor force results from two forces.: increases in the population from migration and increases in the proportion of the population in the labor force.  Table 22 shows the increased labor force participation throughout the period, This increased labor force participation rate is partially an effect of the increase in the age group available for work.

Seasonality has not been a major factor in the Anchorage economy. Anchorage is less dependent on traditionally seasonal industries and has a larger proportion of the less seasonal support sector employment.

TABLE 21.   ANCHORAGE AGE DISTRIBUTION OF
NONMILITARY BASE POPULATION

| Age | % of 1970 Population | % of 1975 Population |
|---|---|---|
| 0 - 4 | 10.40 | 9.50 |
| 5 - 14 | 23.50 | 19.80 |
| 15 - 30 | 28.10 | 34.10 |
| 30 - 40 | 15.50 | 15.30 |
| 40 - 50 | 12.40 | 11.90 |
| 50 - 64 | 8.60 | 7.30 |
| 65 + | 1.50 | 2.10 |

SOURCE:   Patricia L. Dolezal and Richard L. Ender, 1976 Population
Profile, Municipality of Anchorage, September 1976. 1970
Census of the Population PC(1)-B3 Table 35.

## TABLE 22.  ANCHORAGE UNEMPLOYMENT AND SEASONALITY
### 1965,  1970-1976

| Year | Total Unemployment | Unemployment Rate (%) | Labor Force Participation Rate (%) | Seasonality Index |
|------|--------------------|-----------------------|-------------------------------------|-------------------|
| 1965 | 2,249 | 6.2 | 41.44 | .9406 |
| 1970 | 3,267 | 6.7 | 43.21 | .9526 |
| 1971 | 4,418 | 8.2 | 44.43 | .9680 |
| 1972 | 5,140 | 8.9 | 44.68 | .9738 |
| 1973 | 5,818 | 9.7 | 44.40 | .9281 |
| 1974 | 5,980 | 8.6 | 49.66 | .9914 |
| 1975 | 5,279 | 6.7 | 47.85 | .9818 |
| 1976 | 7,372 | 8.4 | 50.56 | .9920 |

SOURCE:  Alaska Department of Labor, Alaska, Labor Force Estimates.

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Only in 1973 is the seasonality index less than .95, which may reflect more cyclical than seasonal problems. Since the beginning of pipeline construction, the seasonality index has remained above .98 which reflects the technology and profit factors on Anchorage's most highly seasonal industry, construction.

Personal Income

Personal income increased at an average annual rate of approximately 15.4 percent between 1965 and 1976. The growth of personal income is only one determinant of the command over goods and services. In order to increase the command over goods and services, personal income must increase faster than both population and prices. Real per capita income reflects the effects of population and prices on incomes.

Table 23 shows the growth of real per capita income over time. The growth has been about 4 percent per year over the entire period. At the height of pipeline activity between 1973 and 1975, real per capita personal income increased at a rate of 9.12 percent per year.

Summary

Anchorage experienced rapid growth between 1965 and 1976. During this period, the proportion of state population in Anchorage increased. Employment grew more rapidly outside of Anchorage. The differential growth was a result of the rapid employment growth associated with TAPS construction outside of Anchorage. Expansion of the traditional basic sector was an important cause of the growth of the Anchorage economy.

## TABLE 23. ANCHORAGE GROWTH OF REAL PER CAPITA INCOME
## 1965, 1970-1976

| Year | Personal Income Thousands | Real Personal Income Thousands | Real Per Capita Personal Income |
|------|---------------------------|--------------------------------|---------------------------------|
| 1965 | 371,037 | 393,882 | 3,849 |
| 1970 | 634,884 | 579,274 | 4,585 |
| 1971 | 732,881 | 649,142 | 4,781 |
| 1972 | 800,201 | 690,424 | 4,788 |
| 1973 | 883,144 | 731,079 | 4,892 |
| 1974 | 1,111,635 | 830,197 | 5,422 |
| 1975 | 1,577,614 | 1,035,859 | 5,825 |
| 1976 | 1,799,125 | 1,110,173 | 5,950 |

| % Annual Average Increase | | | |
|------|---------------------------|--------------------------------|---------------------------------|
| 1965 - 1976 | 15.43 | 9.88 | 4.04 |
| 1970 - 1976 | 18.96 | 11.45 | 4.44 |
| 1973 - 1975 | 33.65 | 19.03 | 9.12 |

However, the support sector in Anchorage also has an important basic component. The support sector industries in Anchorage have a basic component responding to growth outside of Anchorage. This relationship, along with the increased scale of the economy, was responsible for the **change in** the structure of the economy which took place.

The population of Anchorage expanded rapidly during this period. The major component **of** growth was migration which was induced by increased economic opportunities. As at the state level, the increased economic activity had **little** effect **on** the Anchorage unemployment problem; only in the peak TAPS year did the unemployment rate fall below 8 percent. Real per capita did expand during this period as a result of the increased activity.

SOUTHCENTRAL

Anchorage, because of its **link** to the rest of the state through the support function, is indirectly affected by resource development; the remainder of the Gulf of Alaska region is directly affected by resource development. The **Southcentral** region contains both the historically important natural resource industries and the new natural resource industries. Fisheries of **Southcentral** are some of the most important in the state, accounting for close **to half** the catch of the state's fishing industry. The Upper Cook **Inlet** region was the state's first major **oil** producing region and con- tributed to the development of the petrochemical industry in **Kenai.** The oil port built as the terminus 'of the **trans-Alaska** pipeline at **Valdez** contributed to the economic growth of the **Southcentral** region during

construction and will contribute to its growth in the future.   This
section will examine the historical growth of the region.


Growth of the Aggregate Indicators

The aggregate indicators of economic growth illustrate the importance of
TAPS construction to the economy of this region.   (See Table 24.) Between
1973 and 1976, the population of the region increased by almost 20,000;
employment, by more than 10,000;  and personal income, by $330 million.


Population grew at an overall average rate of 6.34 percent per year during
this period.   Population in the region grew by almost 29,196 between 1965
and 1976.   Over 67.5 percent of this growth occurred after the beginning
of the pipeline construction in 1974.


Population growth followed a pattern established by employment growth.
Employment grew at an annual average rate of 11.26 percent during the
period; in the post-1970 period, the rate increased to 15.7 percent.
The employment growth rates are greater than the population growth rates.
This reflects the type of employment growth in the region at this time.
Employment connected with mining and construction is more transient than
employment in other sectors and does not bring dependents to the area.
This pattern also results from shift schedules which allow workers,
particularly in mining, to live in other regions. The short-term enclave
nature of the employment, such as construction of the TAPS line, was .
another reason for the decreased dependency ratio in the region.


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TABLE 24. GROWTH OF EMPLOYMENT, POPULATION, AND
PERSONAL INCOME, SOUTHCENTRAL REGION
1965-1976

|  | Population | Employment | Personal Income ($ Million) |
|---|---|---|---|
| 1965 | 30,235 | 7,124 | 90.1 |
| 1970 | 37,809 | 9,582 | 157.3 |
| 1971 | 39,227 | 10,127 | 165.1 |
| 1972 | 39,148 | 10,735 | 172.9 |
| 1973 | 39,716 | 12,131 | 210.2 |
| 1974 | 41,986 | 13,645 | 264.4 |
| 1975 | 51,923 | 18,300 | 414.0 |
| 1976 | 59,431 | 23,030 | 548.7 |
| **Annual Average Percent Change** | | | |
| 1965-1976 | 6.34 | 11.26 | 17.85 |
| 1970-1976 | 7.83 | 15.74 | 23.15 |

SOURCES:   All estimates State of Alaska Department of Labor, Research and
           Analysis Section, Population Estimates by Census Division, except
           1970 which is Census of Population.

           Alaska Department of Labor, Statistical Quarterly, various years.

           U.S. Department of Commerce, Bureau of Economic Analysis, July 1978.

Personal income grew at an average annual rate of 17.9 percent between 1965 and 1976. Most of this growth came after 1973 with pipeline construction. Personal income increased at an annual rate of 37.7 percent after 1973. There are two reasons the economies of Southcentral did not feel the full impact of this growth in income. First, the transient and enclave nature of pipeline construction and mining employment means that less of the income is spent in the region. Secondly, because they are smaller economies, the leakages from the economy are greater and there is less induced response to growth in incomes.

Causes of Growth

The major cause of growth in the Southcentral region was the expansion of the traditional basic industries. Table 25 provides information on employment growth by industry and on the basic sector.

The three major industries affecting the growth of Southcentral Alaska are mining, construction, and fisheries. The fisheries industry includes both actual harvesting and food processing. The growth rate of mining averaged 8.27 percent over the entire period. Mining experienced cyclical growth, declining after 1970 and rising again after 1973. The recent growth of the industry is a result of exploratory activity and increased petrochemical activity (Kenai Borough, 1977).

The major mining development occurred early in the period with the development of the Kenai-Upper Cook Inlet fields. Petroleum activity in the Kenai fields can be described in two periods: Field development occurred

## TABLE 25. EMPLOYMENT BY INDUSTRY
## SOUTHCENTRAL ALASKA

| Industry | Annual Average Percent Increase | | |
|---|---|---|---|
| | 1965 - 1976 | 1970 - 1976 | 1973 - 1975 |
| Agriculture, Forestry, and Fisheries | 38.44 | 37.87 | 5.16 |
| Mining | 8.27 | 1.37 | 18.59 |
| Contract Construction | 20.71 | 85.19 | 131.70 |
| Manufacturing | 9.53 | 11.90 | .55 |
|     Food | 6.30 | 8.65 | .20 |
| Transportation, Communication, and Public Utilities | 9.51 | 2.09 | 32.62 |
|     Transportation | 9.15 | 34.50 | 49.33 |
|     Communications | 22.71 | 19.69 | 2.86 |
|     Public Utilities | 5.90 | 8.38 | 12.66 |
| Trade | 10.88 | 11.22 | 31.72 |
|     Wholesale | 11.95 | 10.59 | 60.82 |
|     Retail | 10.47 | 11.46 | 23.95 |
| Finance, Insurance, and Real Estate | 10.57 | 14.68 | 25.86 |
| Services | 12.12 | 16.72 | 21.56 |
|     Hotel | 11.61 | 20.09 | 24.77 |
|     Personal | 3.37 | 4.28 | -1.01 |
|     Business | 18.49 | 37.07 | 78.12 |
|     Medical | 11.60 | 9.15 | -6.89 |
|     Other | 9.64 | 11.54 | 24.90 |
| Government | | | |
|     Federal | -3.80 | -4.28 | 5.65 |
|     State and Local | 8.49 | 7.50 | 6.33 |
| Total | 11.26 | 15.74 | 22.82 |

SOURCE : Estimated from Alaska Department of Labor, Research and Analysis
Section worksheets.
Alaska State Housing Authority, Alaska, Yakutat, Comprehensive
Development Plan, Anchorage 1971.
Alaska Consultants, Inc., Anchorage, Alaska, Yakutat, Comprehensive
Development Plan, December 1976.

between 1961 and 1968; this phase included the development of both onshore and offshore fields. During this phase, mining employment increased by over 600 percent. Major construction of petrochemical facilities also took place during this period. Three petrochemical plants and seven pipelines were completed between 1961 and 1968. The second major phase was production. By 1970, all the major components of the petroleum industry had begun production (Math Sciences, 1976).

Construction employment increased at an annual average rate of 20.7 percent throughout the period. The major increase occurred between 1973 and 1975 when construction employment increased at an annual rate of 131.7 percent. This increase was a result of the construction of the trans-Alaska pipeline and the Valdez Port facility. Construction activity in Valdez accounted for almost 70 percent of total regional employment in 1975 and 78 percent in 1976. Although this is not all TAPS-connected employment, it shows the magnitude of the effect of this project on the region. Regional construction employment prior to 1970 was influenced importantly by petrochemical development in Kenai. Construction of five petrochemical facilities and seven pipelines increased Kenai's construction employment to a peak of 1,209 in 1968 (Math Sciences, 1976). By 1970 construction employment had decreased until its regional total was 583.

The final basic industry in the Southcentral region is the fisheries industry. This industry consists of fish harvesting employment and fish processing employment. Fish processing is a major component of manufacturing. The full impact of fisheries cannot be observed from employment

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data.   Employment reported in nonagricultural wage and salary employment excludes self-employed which is a major component of fishery employment. (The rapid growth in agriculture-forestry-fisheries employment is primarily a result of a redefinition of the employment category in 1972.) Employment itself may not be a good indicator of the industry's health; in most industries, employment may be a good indicator of income, but fisheries' incomes depend upon the catch and its market value.

Independent estimates of fishery employment have been made based on catch and gear statistics.   The totals for three regions--Prince William Sound, Cook Inlet, and Southwest--are  hewn in Table 26.

TABLE 26.  ESTIMATED FISH  ARVESTING EMPLOYMENT

|  | 1970 | 1   9 7 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|---|
| Employment | 2,193 | 2,052 | 1,853 | 2,235 | 1,998 | 2,031 | 2,388 |
| Catch* (million lbs.) | 269.3 | 256.6 | 233.8 | 362.6 | 254.5 | 256.8 | 245.4 |
| Value* (thousand $) | 40,681 | 36,658 | 44,773 | 73,496 | 65,912 | 60,971 | 93,668 |
| Real Value (thousand $) | 37,117 | 32,469 | 38,631 | 60,841 | 49,225 | 40,033 | 57,080 |

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[1]Rogers and Listowski, 1978.

[2]Alaska Department of Commerce and Economic Development,  1977.
Value is deflated by the Anchorage CPI.

These regions include more than Southcentral; however, the figures provide an indication of the probable pattern of industry growth in the South-central region. Employment in 1976 was only 9 percent higher than in 1970. These figures show the cyclical behavior of fishery employment. Employment fell until 1972. After that, it peaked at 2,235 in 1973. After falling slightly, employment then rose to its present level of 2,388. Information on the value and catch show a similar cyclical growth. Since 1970, catch in the Central region peaked at 362.6 million pounds in 1973 and fell to 256.8 million pounds in 1975. Except for the bonanza year in 1973, catch has varied relatively little from an average of 253 million pounds. The real value of this catch was only 7.8 percent higher in 1975 than in 1970; its peak was $60.8 million in 1973. The catch statistics provide an indication of the importance of the region to Alaska fisheries. In 1975, the Central region accounted for 47.1 percent of the total value of fish caught in the state.

The manufacturing sector, because of the large fish processing component, was affected by the fish harvesting activity in the region. Manufacturing increased at an average annual rate of 9.5 percent per year. This was well over the average rate of increase in the state. Manufacturing has experienced cycles similar to fisheries, but they have not been as pro-nounced. The main reason for this is that manufacturing includes compo-nents of the petrochemical industry in Kenai. The petrochemical industry is not cyclical, so it stabilizes the Southcentral manufacturing industry.

The **final** basic sector **is** federal government employment. Federal government employment actually fell during the period from 975 in 1965 to 637 in **1976.** The **lowest** point was in 1974 when employment was 595. Military employment in the region also followed the same pattern. Military employment in 1976 was 1,660 less than in 1965. The primary reason for this was the closure of the Kodiak Naval Station.

Table 27 summarizes the basic sector in the **Southcentral** region. The basic sector more than doubled between 1965 and 1976. (The year 1973 has been included in order to observe the non-TAPS trend.) While the total basic sector (including the military) remained constant between 1965 and 1973, the civilian basic sector grew by approximately 1,600 employees. The growth of the civilian basic sector replaced the lost military and federal government employment.

The Economic Structure

**Table** 27 shows the basic-to-total employment ratios; between 1965 and 1973, this ratio **fell.** During this period, the support **sector** increased its importance relative to the basic sector. **With** the construction of TAPS, the support sector did not expand as rapidly as the basic sector. The enclave nature of pipeline employment meant that the **suport** services were mostly provided by the enclave sector. This limited the necessary expansion of the support sector to accommodate pipeline employment and reversed the trend of decreased basic sector importance.

TABLE 27.    BASIC SECTOR GROWTH, SOUTHCENTRAL ALASKA
1965, 1970, 1973, 1975, and 1976

| Industry | 1965 | 1970 | 1973 | 1975 | 1976 |
|---|---|---|---|---|---|
| Agriculture, Forestry, and Fisheries | 19 | 99 | 491 | 543 | 680 |
| Mining | 345 | 762 | 640 | 900 | 827 |
| Contract Construction | 880 | 583 | 681 | 3,656 | 6,978 |
| Manufacturing | 1,188 | 1,647 | 2,627 | 2,656 | 3,234 |
| Federal Government | 975 | 828 | 602 | 672 | 637 |
| Total Civilian Basic Employment | 3,407 | 3,919 | 5,041 | 8,427 | 12,356 |
| Total Military Employment | 2,651 | 2,110 | 1,039 | 747 | 991 |
| Total Basic Employment | 6,058 | 6,029 | 6,080 | 9,174 | 13,347 |
| Total Basic/ Total Employment | .6197 | .5157 | .4617 | .4817 | .5556 |
| Civilian Basic/Total Civilian Employment | .4782 | .4090 | .4155 | .4605 | .5365 |

SOURCES:  Estimated from Alaska Department of Labor, Research and Analysis Section worksheets.

Alaska Department of Labor, Estimates of the Population.

Alaska State Housing Authority, Alaska, Yakutat, Comprehensive Development Plan, Anchorage, 1971.

Alaska Consultants, Inc., Yakutat, Comprehensive Development Plan, Anchorage, Alaska, 1971.

Table 28 illustrates the structure of the Southcentral economy as defined
by its employment distribution.   The non-TAPS trend can be seen by examin-
ing the change between 1965 and 1970.   Between these periods, the support
sectors either increased their share of employment or remained constant;
the overall change was not so great as in the state or Anchorage. Only
trade expanded its share significantly from 11.4 percent to 14 percent.
One interesting trend is the reduction of importance of food manufacturing.
The 1976 figures are skewed because of the pipeline construction; in
1976, construction accounts for over 30 percent of the total civilian
employment.

Population

Population in the Southcentral region increased by over 28,000 between
1965 and 1976; over half of this increase came after 1973. The major
growth in the Southcentral region was a direct result of the construction
of the trans-Alaska pipeline beginning in 1974. Such rapid growth in the
relatively small region meant that migration was the most important
component of growth. Between 1973 and 1974, migration accounted for
90 percent of the increase in population.   Table 29 shows the employment
growth in Southcentral.

The dependency ratio in Southcentral fell dramatically from 1965 to 1976.
The ratio dropped from 4.24 in 1965 to 2.58 in 1976, a 40 percent decrease.
The enclave nature of the TAPS construction affected this significantly;
the ratio fell 22 percent after 1973. The trend had been established prior
to this.   Increased labor force participation is primarily responsible for

TABLE 28.   EMPLOYMENT DISTRIBUTION BY INDUSTRY
SOUTHCENTRAL ALASKA
1965, 1970, AND 1976

Percent of Total Employment

| Industry | 1965 | 1970 | 1976 |
|----------|------|------|------|
| Agriculture, Forestry, and Fisheries | .27 | 1.03 | 2.95 |
| Mining | 4.84 | 7.95 | 3.59 |
| Contract Construction | 12.35 | 6.08 | 30.30 |
| Manufacturing | 16.68 | 17.19 | 14.04 |
|     Food | 15.24 | 13.49 | 9.24 |
| Transportation, Communication, and Public Utilities | 7.61 | 7.93 | 6.39 |
|     Transportation | 5.24 | 5.44 | 4.24 |
|     Communication | .36 | .89 | 1.07 |
|     Public Utilities | 1.85 | 1.61 | 1.08 |
| Trade | 11.41 | 13.96 | 11.00 |
|     Wholesale | 1.43 | 2.01 | 1.53 |
|     Retail | 9.99 | 11.95 | 9.47 |
| Finance, Insurance, and Real Estate | 2.23 | 2.20 | 2.08 |
| Services | 10.36 | 10.72 | 11.28 |
|     Hotel | 1.94 | 1.61 | 2.01 |
|     Personal | .35 | .29 | .16 |
|     Business | 1.64 | 1.19 | 3.28 |
|     Medical | 1.95 | 2.87 | 2.02 |
|     Other | 4.48 | 4.76 | 3.81 |
| Federal Government | 13.69 | 8.64 | 2.77 |
| State and Local Government | 20.56 | 24.29 | 15.60 |

SOURCE :   Estimated from Alaska Department of Labor, Research and Analysis
Section worksheets.
Alaska State Housing Authority, Yakutat Alaska, Comprehensive
Development Plan, Anchorage 1971.
Alaska Consultants Inc., Anchorage, Alaska, Yakutat Comprehensive
Development Plan, December 1976.

TABLE 29.   POPULATION GROWTH, SOUTHCENTRAL
ALASKA, 1965, 1970-1976

|      | Number of Births | Number of Deaths | Natural Increase | Estimated Net Migration | Population as of July 1 | % Increase over Previous Year |
|------|------------------|------------------|------------------|-------------------------|-------------------------|-------------------------------|
| 1965 |                  |                  |                  |                         | 30,235                  |                               |
| 1970 | 863              | 215              | 648              |                         | 37,540[1]               | 4.4[2]                        |
| 1971 | 505              | 139              | 366              | 926                     | 38,832                  | 3.4                           |
| 1972 | 505              | 138              | 367              | -406                    | 38,739                  | -0.2                          |
| 1973 | 718              | 173              | 545              | - 31                    | 39,253                  | 1.3                           |
| 1974 | 768              | 231              | 537              | 1,667                   | 41,457                  | 5.6                           |
| 1975 | 634              | 244              | 390              | 9,828                   | 51,675                  | 24.6                          |
| 1976 | 993              | 227              | 766              | 6,436                   | 58,877                  | 13.9                          |

_____

[1] Data is from April Census.

[2] Annual average increase from 1965 to 1970.

SOURCE :   State of Alaska, Department of Health and Social Services,
Health Information System Section.

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this change.   An increase in the proportion of employment covered in these
employment statistics was also responsible for the decrease in this ratio
as fishing became less important.

## Unemployment

The unemployment rates were high even during the period of rapid employment
growth in connection with TAPS.   Unemployment was highest in 1972 when the
unemployment rate reached 15.0 percent.   With the beginning of pipeline
construction, the unemployment rate began to fall, reaching its lowest
point in 1975 at 12.4 percent. Even though the percentage of unemployed
fell throughout the period, the number of unemployed grew.

As in the state, the seemingly contradictory growth in employment and
unemployment is a result of two factors.   First, the increased employment
opportunities led to increased migration.   Secondly, the increased employ-
ment opportunities were responsible for increased labor force participation.
As can be seen from Table 30, the labor force participation rate increased
from 38.2 percent in 1970 to 54.8 percent in 1976. This increase resulted
from an increased participation among existing population and a high rate
of participation among migrants.

The seasonality index remained close to .80 throughout the period.   Only
during 1974 and 1975, did the index rise, indicating a fall in seasonality.
The fall in the seasonality index in 1976 is a result of peak employment
on the pipeline being reached in the summer of 1976.

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TABLE 30.    UNEMPLOYMENT AND SEASONALITY
SOUTHCENTRAL ALASKA
1965, 1970-1976

| Year | Total Unemployment | Unemployment Rate (%) | Labor Force Participation Rate (%) | Seasonality Index |
|------|------|------|------|------|
| 1965 | 1,172 | 10.30 | 41.38 | .8322 |
| 1970 | 1,835 | 13.44 | 38.24 | .7959 |
| 1971 | 2,135 | 14.66 | 38.90 | .8375 |
| 1972 | 2,257 | 15.03 | 39.17 | .7815 |
| 1973 | 2,336 | 14.07 | 42.94 | .8242 |
| 1974 | 2,744 | 14.80 | 45.09 | .9481 |
| 1975 | 3,094 | 12.42 | 48.68 | .9971 |
| 1976 | 4,502 | 13.83 | 54.78 | .7722 |

SOURCES:    Alaska Department of Labor, Labor Force Estimates, various years.

Alaska Department of Labor, Estimates of the Population.

Alaska State Housing Authority, Yakutat, Alaska Comprehensive Development Plan, Anchorage 1971.

Alaska Consultants Inc., Anchorage, Alaska, Yakutat Comprehensive Development Plan, December 1976.

## Personal Income

Personal income is an important economic indicator since it influences demand and growth of the support sector. It is also a measure of the growth of residents' economic welfare. The effect of price increases (measured by the Anchorage CPI) and population increases on the real per capita income of residents is shown in Table 31. The real per capita incomes of the Southcentral region increased at an overall average yearly rate of 5.42 percent; this is less than one-third the rate of increase of personal income. The most rapid growth occurred between 1973 and 1975, the period of peak TAPS construction.

## Summary

The construction of the trans-Alaska pipeline was the most important factor determining the economic growth of the Southcentral region. The majority of the growth in employment, population, and personal income occurred after 1973. Prior to the construction of the pipeline, South-central was experiencing a structural change similar to the state. The basic sector was playing a less important role in the Southcentral economy. The magnitude of pipeline employment and its enclave nature reversed this trend. The growth of employment was much greater than population, indicating an increased labor force participation of the population. Per capita incomes rose with growth. Growth in employment did not dramatically affect the Southcentral unemployment rate.

TABLE 31.   GROWTH OF REAL PER CAPITA INCOME
SOUTHCENTRAL ALASKA
1965, 1970-1976

| Year | Personal Income (Thousands $) | Real Personal Income (Thousands $) | Real Per Capita Personal Income ($) |
|------|------|------|------|
| 1965 | 90, 128 | 95, 677 | 3, 164 |
| 1970 | 157,316 | 146, 234 | 3, 796 |
| 1971 | 165, 099 | 143, 536 | 3, 728 |
| 1972 | 172, 916 | 149, 194 | 3, 811 |
| 1973 | 210, 235 | 174, 036 | 4, 382 |
| 1974 | 264, 428 | 197, 482 | 4, 704 |
| 1975 | 414, 045 | 271, 861 | 5, 236 |
| 1976 | 548, 661 | 335, 983 | 5>653 |
| **Annual Average Percent Increase** | | | |
| 1965 - 1976 | 17. 85 | 12. 10 | 5. 42 |
| 1970 - 1976 | 23.15 | 14. 87 | 6. 86 |
| 1973 - 1975 | 40. 34 | 24. 98 | 9. 31 |

SOURCES:  U.S. Department of Commerce, Bureau of Economic Analysis,
          Regional Economic Information System, July 1978 printouts.

          Alaska Department of Labor, Labor Force Estimates, various years.

          Alaska Consultants, Inc., City of Yakutat, Comprehensive
          Development Plan, December 1976,

          U.S. Department of Labor, Bureau of Labor Statistics.

          Alaska State Housing Authority, Alaska, Yakutat, Comprehensive
          Development Plan, Anchorage, 1971.

The Regional Economy in the Southcentral Alaska Region

Southcentral Alaska is made up of a number of local economies. These economies differ in their size and economic structure. The economies range from the largest, Valdez with a 1976 employment of 7,8'18, to the smallest, Yakutat with employment in 1976 equaling 241. The economies not only differ in size but also in the factors determining their growth. A question of some interest is whether the region can be treated as a single economy. This is important because in our projections Southcentral is treated as a single economy. In this section, we will examine the small economies which make up Southcentral and show why Southcentral can appropriately be treated as a single region.

In Alaska, the spatial order of the economy is that all local economies have a position in a regional structure. The link through transportation and support services in Anchorage makes a large portion of Alaska a region centered on Anchorage. Our aim in defining economic regions is to provide some spatial disaggregation of this major region. There are two approaches which have been taken to define regions. The first approach is based on the principle of functional integration. This notion would group economies which are interrelated and integrated. The second approach is based on the principle of homogeneity. This approach forms regions which are as much alike as possible and different from other regions (Nourse, 1968). This section will investigate the Southcentral subregions in terms of these principles.

The Local Economies

This section will describe the local economies in terms of their size and growth since 1970. Although each census division is not an individual economy, the analysis must concentrate on census divisions because of data limitations. Table 32 shows the employment, population, and personal income of each subregion in 1965, 1970, and 1976.

Table 32 shows that the growth in the region has been concentrated in three areas: the Kenai Census Division, the Matanuska-Susitna Census Division, and Valdez. Between 1965 and 1970, the major growth in the region was centered in Kenai with the petroleum development in Cook Inlet. Between 1965 and 1970, employment in Kenai grew at an annual average rate of 15.3 percent per year. Kenai increased its share of regional employment from 31.9 percent in 1965 to 36.6 percent in 1970.

After 1970, Valdez was the fastest growing region. Between 1970 and 1976, employment in Valdez increased by over eight times. The construction of TAPS was responsible for this growth. The fastest growing economy after Valdez was Matanuska-Susitna which increased employment at a 12.1 percent rate. Kenai grew at an average annual rate of 10.4 percent after 1970. During this period, Kodiak and Seward also experienced rapid average annual growth rates of close to 9.0 percent.

One noticeable trend was nonproportionate growth in population in Matanuska-Susitna and Kodiak. In Matanuska-Susitna, population was determining the growth of employment. Matanuska-Susitna experienced suburbanization from

TABLE 32.    GROWTH OF AGGREGATE INDICATORS
SMALL ECONOMIES
1965, 1970. ₃ AND 1976

|  | Population | Employment | Personal Income (Million $) |
|---|---|---|---|
| **Cordova-McCarthy** | | | |
| 1965 | 1,991 | 604 | 7.5 |
| 1970 | 1,857 | 702 | 9.8 |
| 1976 | 2,353 | 1,041 | 17.7 |
| **Valdez-Chitina-Whittier** | | | |
| 1965 | 2,396 | 452 | 6.1 |
| 1970 | 3,098 | 831 | 9.7 |
| 1976 | 13,000 | 7,818 | 163.0 |
| **Matanuska-Susitna** | | | |
| 1965 | 6,125 | 1,083 | 13.4 |
| 1970 | 6,509 | 1,145 | 24.3 |
| 1976 | 14,010 | 2,269 | 108.9 |
| **Seward** | | | |
| 1965 | 2,213 | 620 | 5.7 |
| 1970 | 2,336 | 692 | 8.4 |
| 1976 | 3,395 | 1,136 | 25.9 |
| **Kenai** | | | |
| 1965 | 8,446 | 1,753 | 26.7 |
| 1970 | 14,250 | 3,576 | 57.2 |
| 1976 | 16,753 | 6,465 | 156.0 |
| **Kodiak** | | | |
| 1965 | 9,064 | 2,310 | 30.6 |
| 1970 | 9,409 | 2,469 | 45.0 |
| 1976 | 9,366 | 4,153 | 72.9 |
| **Yakutat** | | | |
| 1965 | -- | -- | -- |
| 1970 | 350 | 193 | 3.0 |
| 1976 | 550 | 241 | 4.2 |

—————————————

'Civilian nonagricultural wage and salary employment.

SOURCES:    Alaska Department of Labor.    Population Estimates by Census Divisions,  various years.

Alaska Department of Labor, Statistical Quarterly,  various years.

U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System Printouts, July 1978.

Anchorage which actually encouraged growth of employment to serve the suburban population. The population of Kodiak fell slightly between 1965 and 1976; this was a result of the closure of the Kodiak Naval Station during the period. Civilian employment growth actually replaced the decline in military employment. The three major economies in terms of personal income were Valdez, Kenai, and Matanuska-Susitna, all with more than $100 million in personal income in 1976.

Functional Integration

Economies can be functionally integrated even though they are physically separate if they interact in the production and distribution process. Any set of economies which are open, allowing the exchange of goods and the flow of productive factors, are functionally integrated. The extent of this integration depends on the importance of these flows to the individual economies. The Southcentral Alaskan economy will not have perfect functional integration, the smallness of these economies and their separation in distance will assure this. In this section, we will attempt to determine the degree of integration of these economies.

Transportation links and trade flows are measures of the degree of ex-change between economies. The Southcentral region, relative to the rest of the state, has highly developed transportation links. Most larger communities in the region are linked by roads and/or ferry and by a highly developed communications system. There are numerous deepwater ports and commercial marine freight service. The communities of the Kenai, Seward, Matanuska-Susitna Census Divisions, and Anchorage are

linked by the Seward, Sterling, and Glenn Highways. Valdez is linked
through the Richardson Highway.  Ferry service connects Cordova, Valdez,
Kodiak, Seward, Whittier, Homer, and Seldovia. Van container service is
available in Cordova, Valdez, Kodiak, and Seward (ISER, 1978).

The trade flows between these areas were described in a census of trans-
portation conducted by the Institute of Social and Economic Research
(ISER, 1976).  Table 33 shows the distribution of intrastate freight
from Southcentral points of origin.  This is not a pure measure of
trade flows since it includes transshipment of goods, but it does
provide an indication of the trade links between the economies of the
region.  Of all the census divisions, Skagway-Yakutat is the least tied
to the Southcentral region; only 30 percent of the freight leaving Skagway
is shipped to other areas of Southcentral Alaska.  For a number of the
divisions (Valdez, Kodiak, Kenai, and Cordova), Anchorage is the destina-
tion for major portions of their flows; while, as an illustration of the
role of Anchorage in the statewide transportation system, less than
30 percent of Anchorage goods flows to other regions of Southcentral.
The existing transportation links and the flows of freight show that the
economies of Southcentral Alaska, when Anchorage is included, do exhibit
a degree of functional integration.  The integration described by the
trade flows means that changes affecting one area will have corresponding
effects in the other economies of the region.

TABLE 33.    DISTRIBUTION OF INTRASTATE FLOWS OF FREIGHT
AND MAIL FROM SOUTHCENTRAL ORIGINS, 1973

(Percent of flows from Southcentral origins)

| DESTINATION ORIGIN | Anchorage | Cordova | Kenai | Kodiak | Matanuska-Susitna | Seward | Skagway-Yakutat | Valdez-Chitina-Whittier |
|---|---|---|---|---|---|---|---|---|
| Anchorage | 5.84 | .86 | 6.04 | 4.14 | 1.32 | 1.03 | .07 | 2.63 |
| Cordova | 63.88 | 13.54 | .38 | 7.17 | .48 | 0 | .65 | 1.17 |
| Kenai | 39.90 | .62 | 15.50 | 2.64 | .17 | .15 | .15 | 23.20 |
| Kodiak | 76.96 | .02 | 11.87 | 6,73 | 0 | .01 | 0 | .26 |
| Matanuska-Susitna | 10.59 | 0 | 32.46 | 0 | .50 | 25.91 | 0 | 5.71 |
| Seward | 12.36 | .08 | 5.53 | 0 | 0 | 0 | 0 | 68.60 |
| Skagway-Yakutat | .14 | .02 | 28.80 | 0 | 0 | 0 | .67 | 0 |
| Valdez-Chitina-Whittier | 41.14 | 7.77 | 15.05 | 5.46 | .73 | 7.97 | 2.93 | .60 |

SOURCE:  ISER., Census of Alaska Transportation,  September 1976.

<u>Homogeneity</u>

The economies of the Southcentral region vary in two ways which significantly affect their structure--size and basic sectors. Size will determine the economies of scale which can be reached in a region and the structure of the support sector. Larger economies can support larger, more diverse support sectors. The basic sectors also provide an influence on the support sectors and the economic structure. The economies of the Southcentral region can be separated into groups based on size and the basic sector. Kenai, Matanuska-Susitna, and Valdez are relatively large economies with nonfishing basic sectors. Mining and manufacturing are important for Kenai; construction and transportation, for Valdez; and the suburban phenomenon, for Matanuska-Susitna. The growth of these economies will not be affected by natural resource cycles. The remaining economies are significantly influenced by fisheries, and their attendant cyclical behavior. These classifications are not distinct. Kodiak and Yakutat may experience significant petroleum development in the future which will change their economic base.

Table 34 describes a measure of the structure of these local economies. The per capita employment in the support sector measures the relative size of the support sector (transportation-communicate on-utilities, trade, finance-insurance-real estate, services, and state and local government). This ratio provides an indication of how the economy would respond to exogenous changes in its population caused by expansion of the basic sector. The similarity among the structures of the local economies can be seen. Except for Valdez and Matanuska-Susitna, the

TABLE 34.   THE STRUCTURE OF LOCAL ECONOMIES

(The per capita level of support sector employment, 1976)

| Census Division | Population | Support Sector Employment | Per Capita Support Employment |
|---|---|---|---|
| Kenai | 16,753 | 3,521 | .21 |
| Seward | 3,395 | 681 | .20 |
| Cordova-McCarthy | 2,353 | 522 | .22 |
| Valdez-Chitina-Whittier | 13,000 | 2,327 | .18 |
| Matanuska-Susitna | 14,010 | 1,888 | .13 |
| Kodiak | 9,366 | 1,870 | .20 |
| Yakutat | 550 | 122 | .22 |
| Anchorage | 185,179 | 52,540 | .28 |

SOURCES:  Alaska Department of Labor, worksheets, except for Yakutat which
          is from Alaska Consultants, Yakutat, Comprehensive Plan, 1976.

ratio is close to .2. Valdez has a lower value because a large propor-
tion of the population was enclave construction employment associated
with TAPS which did not make full demand on the support sector. The
low level of the ratio in Matansuka-Susitna results because of its sub-
urban link to Anchorage. Comparison of the per capita support sector
levels to the Anchorage level of .28 shows that the support sector, at
least by this measure, is relatively undeveloped. The similarity of
per capita support sector levels means that these economies may respond
to future expansion of their populations in a similar manner.

The above analysis provides the evidence to support treating Southcentral
as a regional economy. Although the area is not fully integrated, there
is a similarity of structure and existence of trade links between the
local economies. The importance of Anchorage as a regional center should
not be understated; Anchorage serves the region as a center for adminis-
trative, distributive, and financial services which ties the region to-
gether, as well as limits the growth of local support sectors. The trade
links and structural similarity mean that the region will experience
similar response to a given exogenous change irregardless of where the
change takes place. By making the additional assumption that these
changes will follow patterns similar to historical changes, Southcentral
can be used as a region for projection.

## Summary

The economy of Alaska expanded rapidly during the period 1965 to 1976. The major industries responsible for this growth were construction and mining. Development of the Cook Inlet fields was important to growth in the early part of the period, while the development of Prudhoe Bay influenced economic growth significantly during the latter part of the period. The expansion of state government between 1970 and 1972 was also responsible for a portion of the economy's growth. The construction of the trans-Alaska pipeline was the most important factor influencing growth during the period. The economy experienced its fastest growth during the period of peak pipeline employment.

The Alaska growth process consists of growth-initiating factors and the response of the economy to these factors. The major cause of growth was expansion of the basic sector industries--mining, construction, manufacturing, agricul ture-forestry-fisheries, and federal government. The response to change in these sectors occurs with the expansion of activity in the support sectors. Over the historical period, the response of the support sector has been nonproportional to the growth in the basic sector. The support sector has expanded its share of the economy as a result of the increased scale of the economy which allows a more local production of the goods and services consumed. This type of structural change can be expected to continue in the future.

The growth associated with this period affected population, unemployment, and personal income. Population increased primarily because of in-migration

in response to the increased economic opportunities.  Population did not respond as rapidly as employment growth; this was a result of a change in the character of the population.  The increase in the population occurred mostly in the working ages.  Unemployment was only minimally affected during the period, and the unemployment rate fell only during the period of most rapid growth in 1975.  The seasonality component of unemployment fell throughout the period primarily as a result of the increased importance of the less seasonal support industries. Growth increased real personal incomes; so that for most of the period, it increased faster that-t the U.S. average.  Finally, prices exhibited a trend toward the U.S. level as the scale of the economy expanded.  The rapid expansion with the TAPS caused this trend to be reversed.

# III. THE ALASKAN ECONOMY IN THE BASE CASE

This chapter will describe the projected growth of the Alaskan economy without the development of the Northern Gulf of Alaska Outer Continental Shelf (sale no. 55). In order to examine the effect of previous OCS activity on the impacts of Northern Gulf development, three alternative base cases will be examined. Each of these cases will have similar assumptions concerning future non-OCS developments, but they will have different assumptions about the development of OCS activity in Lower Cook Inlet and the Beaufort Sea.

## The Purpose of the Base Case

Petroleum development in the Northern Gulf of Alaska may affect both the structure and the size of the Alaska economy. Changes in the economy which result from the development of OCS resources can be defined as the impact of this development. The impact can only be described as changes from a certain pattern of economic growth which would have occurred without OCS development. The base case describes the projected growth of the economy without the development for which the impact is to be measured. Comparing two projections of the economy, the base case and the OCS case will define the impact of OCS development.

The base case scenarios described below are consistent, plausible patterns of development; however, they should not be mistaken for best-guess patterns of development in any sense. The actual pattern likely to occur is subject to an enormous amount of uncertainty determined by technology,

market prices, federal policies, and other uncertain events. To project any one economic future would be little more than idle speculation, since at this point many major events and decisions affecting Alaska are uncertain. The MAP model is designed to permit the formulation of ranges of scenarios which reflect these uncertainties in order to trace out the range of possible outcomes. This study does this in respect to various alternative OCS scenarios. The same approach could be used to determine the range of alternative non-OCS assumptions. To estimate the impacts of OCS development, a single base case is needed. This must be selected on the basis of the consistency and plausibility of the assumptions, consistency with historical growth, and consistency with assumed future patterns of economic relations. The effect of this base case choice will be measured by testing the sensitivity of the results to certain of the more important assumptions.

The purpose of establishing a base case must be kept in mind when examining the results. The base case is run in order to isolate the changes resulting from OCS development; this should influence the variables we examine. Rapid growth associated with OCS development will affect most economic variables. Although many variables will be affected, a much smaller number is important, and information on these dimensions of impact will describe the effect of rapid growth on state and regional economies. The base case will be analyzed to provide a point of reference for these dimensions.

## Base Case Assumptions

The base case is defined by assumptions about the future levels of certain exogenous variables; this set of assumptions describes the base case scenario. The set of assumptions necessary for a base case scenario includes three important components. The first involves assumptions about the level of employment in those industries whose level is assumed to be influenced by factors outside the economy, the exogenous industries. Those industries include manufacturing, agriculture-forestry-fisheries, federal government, mining, and a portion of the construction industry. The second set of assumptions involves the level of certain exogenously determined revenues which result from the production of the petroleum industry. These include royalties, production taxes, property taxes, and corporate income tax. The final assumption concerns the rule which defines an assumed spending pattern for the state.

The uncertainty surrounding the future petroleum and world energy markets, as well as state economic decisions which influence economic growth, means that any assumption about the appropriate base case scenarios is subject to criticism. An extensive development of a base case scenario which required considerable time and research would, because of the uncertainty, be subject to the same type of criticism. The uncertainty involves such major factors as the construction and timing of the ALCAN gas line and future state spending policy. Because of this, an extensive development of the base case scenario was not undertaken in this study; instead, a reasonable set of assumptions was developed which placed emphasis on

consistency of assumptions and reasonableness of approach.  This section describes the set of assumptions used in the base case.

NON-OCS ASSUMPTIONS

Industry Assumptions

There are two special groups of industry assumptions which are required. First, assumptions about employment connected with special projects, mainly resource development projects, are needed.  Secondly, assumptions about the growth of the major exogenous industries--manufacturing, agriculture-forestry-fi sheries, and federal government--are required.

Special projects include petroleum projects, major construction projects, and the operations of these projects.  Petroleum activity is assumed to continue at Prudhoe Bay with further exploration and development of the Kuparak and Lisburne formations.  Mining employment peaks in this area at 1,783 in 1980.  The Upper Cook Inlet fields are the other major area of petroleum activity.  Employment is assumed to increase from its present level between 1985 and 1990 as the oil fields are shut down. Gas production continues after 1990 but with a reduced work force. There is little other new mining activity in the state with other mining maintaining current levels throughout the projection period.

Major construction projects in the state during the projection period include the Trans-Alaska Pipeline Service (TAPS) and the ALCAN gasline. TAPS is completed in 1977, after which the line's capacity is assumed to

be increased by the addition of four pump stations between 1979 and 1982.
The ALCAN gasline is assumed to be built between 1981 and 1984 with peak
employment of 4,800 in 1,982.    The only other special construction project
in the state during the projection period is the construction of the
Pacific LNG plant between 1980 and 1983; this project employment peaks in
1982 with 1,300 employees.

TAPS is assumed to require 850 workers per year for its long-term operations.
ALCAN operations employment is assumed to be 96 beginning in 1985. TAPS'
higher operations employment can be accounted for since TAPS has more
pipeline in Alaska, Valdez port employment is part of TAPS employment,
and TAPS has substantial Alaska headquarters employment.    Operations
employment for the Pacific LNG plant is 60 beginning in 1984.

The level of employment in federal government and agriculture-forestry-
fisheries and output in manufacturing is set exogenously. Federal govern-
ment employment is assumed to follow its general historical trend and
remain constant at the 1976 level throughout the forecast period.  The
trend in the historical period reflected increases in civilian employment,
offsetting decreasing military employment.    Employment in agriculture-
forestry-fisheries is assumed to be dominated by increases in fisheries.
Given favorable conditions, employment in Alaska fisheries has been pro-
jected to increase by almost four times between 1975 and 2000.  This will
result with the establishment of an American trawl fishery which com-
pletely replaces foreign fishing off Alaska (ISER, 1979). The opposite
extreme would be an assumption of no employment growth without bottomfish

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development.    In this study, we assume an average rate of growth of
3 percent per year.    This is consistent with moderate replacement of
the foreign fishery by Alaskans (Scott, 1979).

Output in manufacturing is assumed to increase at an average annual rate
of 4 percent, which is consistent with both the historical trend and the
assumed growth in the fisheries industry.

## National Variables

Alaska is part of the larger U.S. economy, and it is affected by changes
in the national economy.    Three assumptions about the future growth of
the U.S. economy are needed.    These assumptions are based upon the long-
term projections of the consumer price index by Data Resources, Inc.
Assumed U.S. rates were those from DRI's TRENDCONG0678 forecast (DRI,
1978).    This assumption assumes the continuation of long-term trends in
important exogenous variables.    The average annual rate over the period
of the forecast was used as our assumption.    The consumer price index
was assumed to grow at 5.5 percent per year.    The U.S. real per capita
disposable income, adjusted to reflect consistent tax assumptions, was
assumed to grow at 2.2 percent per year.    Finally, DRI does not provide
a projection of U.S. weekly compensation.    U.S. weekly compensation was
assumed to increase at a rate of 6.8 percent per year.

## Petroleum Revenues

The petroleum revenues received by the state consist of royalties, pro-
duction taxes, property taxes, and the corporate income tax.    The major

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source of these revenues in the projection period is the Prudhoe fields. The revenues are determined by the assumed rate of production of oil and gas and its wellhead value. Prudhoe oil production is assumed to peak in 1985 at 641.5 million barrels, while gas production is assumed to maintain its peak production of 912 billion cubic feet per year once this is reached in 1987. The wellhead value of Prudhoe oil is determined by the following assumptions: constant real West Coast market price of $12 per barrel, constant real vessel and processing costs of $1.75 per barrel, and a TAPS tariff of $5.25 in 1978. The nominal TAPS tariff is assumed to remain constant until 1990 when increasing operating costs are assumed to dominate decreasing capital costs; after 1990, the real tariff is assumed to remain constant. The wellhead value of gas was assumed to equal $1.00 per MCF in 1978; this assumes the producers pay a $.45 per MCF processing cost.[1] These wellhead values are only part of an array of many possible wellhead values. The range of wellhead values is a function of the uncertainty about the future levels of those factors influencing these values. Revenues are determined by existing state laws describing royalties, production taxes, property taxes, and corporate income taxes.

THE STATE EXPENDITURE RULE

Because of the central role of state and local government in the Alaska economy and because the behavior of these governmental units depends largely on policy choices to be made over the next several years within

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[1] These base case assumptions were selected prior to the passage of the 1978 Energy Bill which sets a ceiling of $1.68 per MCF on Prudhoe gas.

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a framework far different from the past, the treatment of expenditures by state and local governments is a central feature of any development scenario.

Over the projection period, the state government is assumed to receive revenues from oil development which far exceed current levels of expenditures. The rate at which state government chooses to spend these revenues and the composition of these expenditures will serve to determine not only direct employment in the government. sector but will also impact all endogenous sectors.

Two factors determine the current framework in which state expenditure policy will be determined. First, revenues to the state will increase tremendously with the completion of the trans-Alaska oil pipeline. These revenues will follow closely the pattern of production from Prudhoe Bay. Secondly, the establishment of the Permanent Fund will place new constraints on the use of certain petroleum revenues. The Permanent Fund was adopted in 1976 as a constitutional amendment. It established that a minimum of 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue sharing payments, and bonuses received by the state would be placed in the fund. This forced savings is only a portion of the revenues available to the state  Revenues accumulating in the General Fund will be greater than in the Permanent Fund for most of the period.

These changes in the structure of state spending limit the usefulness of past spending policies in determining the spending rules to be used. The rate of state expenditures, because it is a matter of policy choice to be made within a framework far different from past experience, cannot be modeled simply from past experience. However, past experience can provide a guide for developing the hypothetical spending rule used in the simulation. Scott, in his paper "Behavioral Aspects of the State of Alaska's Operating Budget FY 1970 - FY 1977," found two major factors responsible for the growth of state expenditures. First, real per capita state expenditures increased in response to real per capita income growth, a demand effect. Secondly, expenditures increased in relation to the available funds for state expenditures. The pattern between capital and operating expenditures differed. Capital expenditures increased strongly in response to available fund growth but the higher levels were not maintained. The higher levels of operating expenditures were maintained. Adjustments to available funds seemed to provide a new base for the growth of these expenditures.

Based on this analysis, the following pattern of state expenditures was assumed. Expenditures were assumed to increase in response to increases in personal income. The income elasticity of both capital and operating expenditures was less than one to reflect assumed increases in scale economies associated with the production of state services. The major difference was that the real level of state operating expenditures was assumed to be maintained while the level of capital expenditures could fall.

The response to fund availability was composed of two parts. Expenditures responded to changes in the general fund balance. The response was weighted depending on the existing surplus; the weight equalled the previous-year fund balance divided by general fund expenditures. In other words, the response to a change in the general fund was weighted by the number of years of existing expenditures which could be taken out of the general fund. The response of capital expenditures was greater than the operating expenditure response.

Most relationships in the model are derived from historical relations. The elasticities in the operating and capital expenditure equations cannot be derived in this manner since the structure will be uniquely different in the future. Assumptions about these elasticities must be made. The elasticities in both sets of equations are chosen so that the elasticity of real per capita income equals .5. Real per capita expenditures increase at half the rate that real per capita incomes increase. This rate was chosen both to reflect economies of scale in production of government services and to reflect a decreased importance of state government in the Alaskan economy. Alaska has a much higher ratio of state expenditures to personal income than other states, and it was assumed that this ratio should fall toward the other states. The elasticities for the supply-affected portion of growth were determined by examining the changes in the period 1970 to 1971, which was the last period of rising general fund balance. Based on examining changes in this period, elasticities on the weighted increase in the general fund of 2 percent for the operating budget and 10 percent for the capital budget were used.

Admittedly, these expenditure rules are highly speculative, but they seem to reflect the wide range of policy choices open to state government as a consequence of new oil revenues. It is impossible to predict the specific expenditure path. Because of this, we assume a hypothetical rule which is reasonable. The sensitivity of the impacts measured with this rule will be tested.

## ALTERNATIVE OCS SCENARIOS

Three alternative scenarios describing OCS activity prior to the Northern Gulf lease sale will be described in this section. Two lease sale areas, the Lower Cook Inlet arid Beaufort Sea, are involved. The first Lower Cook lease sale took place in 1977, and the Beaufort sale is scheduled for 1979. The three alternative scenarios describe low, moderate, and high levels of activity in each area. The employment levels in each of these scenarios are described in Tables 35 and 36.

These scenarios differ in timing as well as magnitude. The Lower Cook scenarios range from an exploration-only case to a high case with peak employment of almost 2,500. The timing differs significantly between the moderate and high scenarios, with the moderate scenario reaching peak employment three years prior to the high scenario. The high Lower Cook scenario also contains the development of an LNG plant with 60 employees during its operation.

TABLE 35. LOWER COOK INLET EMPLOYMENT SCENARIOS

| | Low[1] | Moderate[2] | | High[3] | | |
|---|---|---|---|---|---|---|
| | Mining | Mining | Construction | Mining | Construction | Manufacturing |
| 1978 | | 70 | 0 | 84 | 0 | 0 |
| 1979 | 1:: | 321 | 88 | 1 26 | 0 | 0 |
| 1980 | 252 | 664 | 162 | 252 | 0 | 0 |
| 1981 | 210 | 804 | 108 | 486 | 213 | 0 |
| 1982 | 126 | 572 | 38 | 776 | 213 | 0 |
| 1983 | 84 | 523 | 0 | 1,285 | 543 | 0 |
| 1984 | 42 | 622 | 0 | 1,590 | 858 | 0 |
| 1985 | 42 | 604 | 0 | 1,548 | 317 | 0 |
| 1986 | 0 | 545 | 0 | 1,347 | 0 | 60 |
| 1987 | 0 | 411 | 0 | 1,139 | 0 | 60 |
| 1988 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1989 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1990 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1991 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1992 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1993 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1994 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1995 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1996 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1997 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1998 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 1999 | 0 | 417 | 0 | 1,139 | 0 | 60 |
| 2000 | 0 | 417 | 0 | 1,139 | 0 | 60 |

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[1] Based on scenarios in Lower Cook Inlet, Final Environmental Impact Statement, 1976.

[2] Based on Lower Cook Inlet scenario in Beaufort Sea Petroleum Development Scenarios. Economic and Demographic Impacts, Technical Report No. 18, Alaska OCS Socioeconomic Studies Program, 1978. Distribution between offshore/onshore and industry was based on the distribution in the Lower Cook EIS.

TABLE 36.   BEAUFORT SEA OCS EMPLOYMENT SCENARIOS

| | Low | | Moderate | | High | |
|---|---|---|---|---|---|---|
| | Mining | Construction | Mining | Construction | Mining | Construction |
| 1981 | 67 | | 67 | 49 | 67 | |
| 1982 | 198 | 1;; | 198 | 198 | 198 | 1:: |
| 1983 | 198 | 247 | 198 | 247 | 198 | 247 |
| 1984 | 232 | 247 | 232 | 247 | 232 | 247 |
| 1985 | 67 | 99 | 67 | 99 | 67 | 99 |
| 1986 | 70 | 281 | 112 | 304 | 70 | 403 |
| 1987 | 123 | 331 | 276 | 333 | 148 | 642 |
| 1988 | 228 | 395 | 479 | 466 | 321 | 810 |
| 1989 | 345 | 395 | 616 | 466 | 583 | 761 |
| 1990 | 387 | 132 | 595 | 155 | 710 | 254 |
| 1991 | 434 | 132 | 524 | 155 | 758 | 254 |
| 1992 | 388 | 66 | 503 | 77 | 748 | 127 |
| 1993 | 355 | 132 | 432 | 155 | 681 | 254 |
| 1994 | 333 | 132 | 535 | 155 | 647 | 254 |
| 1995 | 334 | 59 | 438 | 77 | 616 | 127 |
| 1996 | 333 | 18 | 440 | 22 | 572 | 36 |
| 1997 | 332 | 0 | 417 | 0 | 551 | 0 |
| 1998 | 330 | 0 | 393 | 0 | 547 | 0 |
| 1999 | 327 | 0 | 393 | 0 | 548 | 0 |
| 2000 | 325 | 0 | 394 | 0 | 542 | 0 |

SOURCE :   BLM-Alaska OCS Office.

All three Beaufort scenarios contain production of oil and gas. There is less variation in the Beaufort scenarios than in Lower Cook. In all cases, peak employment occurs in 1989; it ranges from 740 in the low scenario to 1,344 in the high scenario. Since the Beaufort is a joint state-federal lease sale, it also provides increased revenues to the state. These include bonus, royalty, severance tax, property tax, and corporate income tax revenues. They are described in Appendix B.

Developing these alternative base case scenarios allows us to assess the effects of the level of previous OCS activity on the impacts of the sale under consideration. The uncertainty of the level of OCS activity makes this necessary. By comparing the impact of a Northern Gulf scenario with different base case scenarios, we can assess the sensitivity of development to previous OCS activity.

The Causes of Economic Growth

The growth of the Alaskan economy is determined by three separate but interrelated factors: changes in the level of employment in the exogenous sectors of the economy, changes in the level of personal income, and changes in state expenditures. If we define economic growth as the expansion of employment, the effect of these factors can be seen.

Growth of the exogenous sector directly affects economic growth by the employment it creates. The growth of this sector is determined by external demand for Alaskan products. The most obvious example of this type of

growth is the employment associated with the construction of the trans-Alaska pipeline.  The employment generated by this project was determined by demand for Alaska's petroleum resources.

The growth of state expenditures is another source of economic growth. State expenditures are a source of growth, since they translate revenues raised outside of the Alaskan economy, such as petroleum-related revenues, into demand for Alaskan products.  State expenditures influence employment growth in two ways.  First, state capital expenditures on projects such as ports and highways increase the output of the construction industry. This increases the demand for construction employment. Secondly, state operating expenditures are partially spent on personnel expenditures. This determines the level of state government employment.

State spending will be determined by two influences which are proxies for demand and supply effects.  The demand for state government services, as measured by expenditures, has been shown to be income elastic. Growth of income will generate demand for increased government services. The second influence on expenditures is a supply influence. With the flow of revenues from Prudhoe Bay oil and gas, Alaska will begin to accumulate a surplus in its General Fund.  This surplus, unlike the surplus in the Permanent Fund, can be used for state government expenditures. This fund balance is assumed to have a supply effect on expenditures, causing them to be increased as funds accumulate in the balance.  This is an assumption which is required about future state spending patterns.

The effect of state expenditures on employment is determined by the wage rate of state employees.  Once state personnel expenditures are determined, the wage rate determines the number of state employees.

Employment in each of these sectors influences the growth of the economy through the increased demand for goods and services produced in Alaska. For endogenous sectors, employment is determined by the demand for labor needed to produce a desired level of output. The demand for output is a function of real disposable income.  Demand is income elastic, so that increases in personal income lead to increased demand.  This effect is simultaneous; increased incomes lead to increased demand which increases employment.  This increased employment generates its own demand, and the process continues.  The process stops when leakages outside the economy dominate the flow of income.

Income increases with increases in the average income per worker and with increases in the number of workers in the economy.  The average income is substantially determined by wages and salaries, so it reflects changes in the wage rate.  The real wage rate is determined by changes in prices, bottlenecks in the economy associated with rapid growth, and changes in outside wages.  The U.S. labor market affects the Alaskan real wage rate because of the small size of the Alaskan labor market and the mobility of Alaskan workers.  Because of these factors, migration becomes the equilibrating factor maintaining the relation between Alaska and U.S. wages.  Slow growth leads to out-migration and a reduction in the supply of labor, not a reduction in the relative wage differential.

Changes in the sectoral composition of employment will also affect the average wage. As high wage sectors such as construction and mining increase in importance, wages and salaries will increase more than proportionally to employment growth.

The response of the economy to increases in income will be determined by the structure of the economy. Larger economies provide more of their own goods and services, there are fewer leakages, and the multiplier is larger. This results because economies of scale allow lowered production costs and import substitution. Growth by affecting the structure of the economy will influence the response of the economy to increases in income.

The effect of an increase in personal income on growth will also depend on the increase in prices resulting from growth. Real income determines the demand for goods and services. The price level of the Alaskan economy is determined by U.S. prices, since Alaska imports most of its goods. The size of the economy also affects the price level; larger economies provide economies of scale which reduce the cost of production and reduce prices. The rate of growth also affects prices. Rapidly growing regions are more subject to bottlenecks and supply constraints which lead to price increases.

Employment and income growth influence the growth of population in the state. Population grows as a result of natural increase and migration. Natural increase (the excess of births over deaths) is a function of the

age distribution of the population. Migration is determined by the relative economic opportunities available in Alaska. Changes in employment opportunities and the relative per capita income between Alaska and the rest of the United States will determine migration. Migration has a considerable effect on the age-sex distribution of the population. Migration, which is determined by economic opportunities, primarily affects the age group under forty. Migration after forty years of age is a response to other factors such as retirement and the high cost of living (Seiver, 1975). Because of this, migration is a response to changing economic opportunities and will affect the proportion of the population under forty.

State economic growth does not occur uniformly throughout the state but varies by region. Regional growth depends on the factors causing growth. Factors which have a similar influence on state growth may affect the growth in each region differently. For example, equal growth in state government employment and exogenous employment, although they may affect state growth the same, will differ in their regional impacts, depending on the concentration of exogenous employment and the dispersion of state government expenditures.

The causes of regional growth are the same as those at the state level: increases in exogenous employment, increases in personal income, and increases in state expenditures, Growth of any of these factors within the region will lead to growth in the region. The economies of Alaskan regions are not independent; they are interdependent. Because of this, growth in

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one region will affect growth in other regions.   Four processes reflect this interaction; the strength of the interdependence of the Alaskan regional economies depends on the strength of these processes.   First, government spending works to distribute growth between the regions. Increases in state revenues which result from growth in one region will be translated into growth in other regions through the distribution of state expenditures.   State expenditures are distributed to a region in relation to its population.   However, government centers such as Anchorage and Juneau receive a greater-than-proportionate share of state expenditures because of the administrative and headquarters functions they serve. Second, changes in state wage rates will affect growth in the regions. Increases in wage rates increase personal incomes in each region and the demand for goods and services in each region. Wage rate increases throughout the state can result from increases in construction employment in one region.   Third, regions which serve as regional centers will reflect growth in other regions,  since they provide goods and services to other regions.   The growth of Anchorage which serves as the financial, distributional,  and adminstrative center of the state is the most obvious example of this,  although smaller centers such as Fairbanks also experience this type of relation.   Finally,  migration between regions illustrates interaction of the regional economies.   Residents of one region respond to employment opportunities in another region by migrating to it, so that employment growth in one region determines the population of other regions.

The Alaskan Economy
Moderate Base Case Growth

The base case describes the general pattern of Alaska economic growth
without development in the Northern Gulf of Alaska OCS. The impact of
Northern Gulf development will be measured as changes from this base case
pattern of growth. In analyzing the projected base case growth, we will
examine the change in the magnitudes of the important economic variables,
as well as changes in the economic structure or process of growth.

The historical economic growth serves as a reference for describing future
projected growth. Between 1965 and 1976, the Alaska economy experienced
rapid growth. Employment grew at an annual average rate of 8.4 percent
throughout the period. Expansion of the mining and construction was largely
responsible for this growth. Economic growth also produced some structural
changes. The most significant of these were the increased importance of
the support sector and the aging of the population. Population grew at an
annual rate of 4.1 percent over the period; migration was responsible for
the large proportion of this growth. Growth had little effect on unemploy-
ment but did improve real per capita incomes of Alaskans relative to the
U.S. average. Historical growth had opposite effects on prices, As the
scale of the economy grew, the price level relative to the United States
fell; however, the rapid growth connected with the impact of TAPS reversed
this trend.

The overall growth of the state economy in the future will be affected by growth in its basic sector. Rapid increases or declines in this sector provide interesting periods for our analysis. The early 1980s are important for basic sector growth. Two special construction projects, the ALCAN gas line and the Pacific LNG plant, have peak construction years between 1981 and 1983. Mining activity is also important. Prudhoe employment is assumed to fall from about 1,800 in 1980 to about 900 in 1983 and then begin to rise; Lower Cook OCS activity peaks in 1981; and Beaufort OCS development begins in 1981. Another event of importance is the shutdown of the Upper Cook Inlet oil production in 1990. This reduces mining employment by 450, an 11 percent fall. Peak Prudhoe oil production occurs in 1985; the effect of this on revenues to the state government makes this an important point in time to consider.

THE STATE

The General Pattern of Development

Economic growth is a multidimensional process which no one indicator can describe. While population, employment, and personal income do not describe the full range of growth, they can be used to describe the general pattern of growth. Employment measures the ability of the economy to create jobs; personal income measures the effect of the economy on residents' command over goods and services; and population growth describes the response of people to these changing economic opportunities. Table 37 shows the projected levels of population, employment, and personal income. Overall, there is substantial growth, although it is not so rapid as in the period between 1965 and 1976.

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TABLE 37.   AGGREGATE INDICATORS OF ECONOMIC GROWTH
MODERATE BASE CASE, ALASKA
1977-2000

|  | Population | Employment | Personal Income (Millions of Nominal $) |
|---|---|---|---|
| 1977 | 410,660 | 185,508 | 4,072 |
| 1978 | 406,667 | 178,526 | 4,236 |
| 1979 | 418,656 | 185,225 | 4,743 |
| 1980 | 434,173 | 194,054 | 5,395 |
| 1981 | 455,563 | 206,479 | 6,401 |
| 1982 | 486,359 | 224,637 | 7,916 |
| 1983 | 502,802 | 230,228 | 8,571 |
| 1984 | 501,479 | 223,159 | 8,276 |
| 1985 | 509,057 | 224,931 | 8,810 |
| 1986 | 523,083 | 231,906 | 9,763 |
| 1987 | 539,029 | 240,132 | 10,854 |
| 1988 | 55.6,942 | 249,550 | 12,146 |
| 1989 | 575,352 | 259,033 | 13,531 |
| 1990 | 591,580 | 266,632 | 14,836 |
| 1991 | 606,771 | 273,502 | 16,226 |
| 1992 | 622,686 | 280,902 | 17,781 |
| 1993 | 640,335 | 289,580 | 19,613 |
| 1994 | 658,298 | 298,329 | 21,602 |
| 1995 | 677,649 | 308,016 | 23,829 |
| 1996 | 698,466 | 318,616 | 26,434 |
| 1997 | 719,126 | 328,881 | 29,095 |
| 1998 | 740,455 | 339,495 | 32,116 |
| 199!3 | 764,593 | 352,046 | 35,661 |
| 2000 | 789,287 | 364,721 | 39,559 |

SOURCE :   MAP Model

Population is projected to be approximately 789,000 by 2000. Between 1978 and 2000, the population grows at an annual rate of almost 3.1 percent. This rate is approximately 25 percent less than the average annual growth rate experienced between 1965 and 1976 but faster than the average rate of 2.8 percent experienced prior to the construction of TAPS. Population falls after the completion of both TAPS in 1977 and ALCAN in 1983. In each case, population declines by less than one percent, and the peak population is exceeded the following year. The most rapid period of population growth occurs between 1978, the year TAPS is completed, and 1982, the peak year of ALCAN construction. During this period, population increases at a rate of 4.6 percent per year.

Employment is projected to grow at an average annual rate of 3.3 percent, reaching approximately 365,000 by 2000. Like population, employment experiences its greatest growth between 1978 and 1982 when it grows at a rate of 5.9 percent per year. These projected growth rates are not so great as the 8.4 percent rate of growth experienced between 1965 and 1976. Employment is projected to decline after completion of both the TAPS and ALCAN projects. The decline is more substantial than the decline in population, being approximately 4 percent in each case. The 1983 employment level is not reached until 1986. Employment is projected to grow faster than population throughout the forecast period; this supports the trend observed in the historical period. By 2000 the dependency ratio has fallen to 2.2.

The growth in personal income is related to the growth in employment, since wages and salaries are a major component of personal income. Changes in the composition of employment, changes in the productivity of labor, and changes in the level of prices will result in differential rates of growth between personal income and employment. Personal income is in nominal dollars, so it reflects both the real growth of the economy and increases in prices. Personal income grows at an annual average rate of 10.6 percent. Personal income grows faster in the period prior to the 1983 ALCAN peak construction. Between 1978 and 1983, personal income grows at a rate of 15.1 percent per year; this is 4.8 percent greater than the average yearly rate between 1984 and 2000. This illustrates the importance of the high-wage pipeline construction employment to growth in personal income. Between 1978 and 2000, personal income grows at an annual average rate of 10.7 percent, which is less than the 15.4 percent rate experienced between 1965 and 1976.

Although population, employment, and personal income do not experience growth at so rapid a rate as they experienced between 1965 and 2000, economic growth is projected to be substantial. Employment is projected to increase by 104 percent, population by 94 percent, and personal income by 834 percent between 1978 and 2000. The difference between the projection and the historical period is caused by the major role pipeline construction played in the historical period.

Employment and the Structure of the Economy

The increased demand for industrial output will result in growth of Alaska
employment.  Total Alaska employment is projected to more than double by
the end of the projection period.  We saw in the historical period that
growth does not occur in all industrial sectors evenly. Between 1965 and
1976, we observed structural change which increased the importance of the
support sector in the economy.  The projected economic growth continues
the structural  change observed in the historical period.

Table 38 illustrates the changing structure of the Alaska economy. This
table shows the growth of three sectors of the Alaska economy--the support
sector which includes transportation-communication-utilities, trade, finance,
and service employment;  the government sector which includes state, local,
federal  civilian, and federal  military employment;  and the basic sector
which includes mining, manufacturing, agricul ture-forestry-fisheries, and
construction.

The sector which is projected to grow most rapidly is the support sector.
This sector grows at an annual  average rate of approximately 5 percent
between 1978 and 2000;  this is 1.7 percent faster than the growth of total
employment.  The support sector expands more rapidly in all parts of the
period.  This sector expands its share from approximately 37 percent of
total employment in 1978 to 53 percent by 2000. Expansion of this sector
is consistent with past trends in the Alaska economy. This projected
expansion of this sector does not exceed the limits suggested by national
comparisons.  The projected share is close to the average share of this

TABLE 38.   THE STRUCTURE OF EMPLOYMENT
MODERATE BASE CASE, ALASKA
1978,  1980, 1985, 1990, 2000

| | Support Sector | | Government. | | Basic Sector | |
|------|------------|-------------|------------|-------------|------------|-------------|
| | Employment | % of Total | Employment | % of Total | Employment | % of Total |
| 1978 | 66,504 | 37.3 | 68,862 | 38.6 | 43,159 | 24.2 |
| 1980 | 76,658 | 39.5 | 69,783 | 36.0 | 47,612 | 24.5 |
| 1985 | 95,975 | 42.7 | 74,472 | 33.1 | 54,484 | 24.2 |
| 1990 | 123,176 | 46.2 | 78,919 | 29.6 | 64,536 | 24.2 |
| 1995 | 152,850 | 49.6 | 81,743 | 26.5 | 73,424 | 23.8 |
| 2000 | 193,506 | 53.1 | 84,417 | 23.1 | 86,798 | 23.8 |

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Support Sector includes transportation-communication-public utilities,
    trade, finance, and service employment.

Government includes state, local, and federal employment.

Basic Sector includes mining, manufacturing, agriculture-forestry-fisheries,
    and construction employment.

SOURCE :   MAP Model

sector in the U.S. economy and several small states described in Table 7. The support sector expands because of increased demand for goods and services. Demand increases as incomes increase. The nonproportional response of this sector occurs as the scale of the economy expands and allows more local production of these goods and services.

The nongovernment basic sector maintains a relatively constant share of total employment throughout the projection period. Its share is close to 24 percent in all years except those connected with large special projects. The share of total employment is between 25 and 26 percent in the period with ALCAN construction. Employment in the nongovernment basic sector expands at an average annual rate of 3.2 percent between 1978 and 2000. Employment in this sector reaches a peak of approximately 58,000 in 1982 and 1983 when both the ALCAN and Pacific LNG projects are at their peak. After completion of these projects in 1983, basic sector employment falls by almost 8 percent. The peak level is not reached again until 1987. Growth in this sector after the ALCAN project averages an annual rate of 3.0 percent. Growth is primarily a result of the expansion of manu-facturing and construction since there is only limited expansion of special project construction and mining.

The growth of the government sector is a result of the expansion of state and local government since federal employment is assumed to follow its historic trend and remain constant. State and local government employment increases by almost 16,000 between 1978 and 2000. The growth of state and local government is not strong enough to maintain the share of the

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government sector.    The share of government employment falls from almost 39 percent in 1978 to 23 percent in 2000.

## Population

Population grows through natural increase and net in-migration. Natural increase occurs when there is an excess of births over deaths.    Migration results in population increases when in-migrants outnumber out-migrants, and population decreases when the opposite 'is true.    Each of these factors affects not only the size of the population but the age and sex distribution as well.    The projected population increase of 382,620 between 1578 and 2000 is significantly affected by migration.    Population growth in the base case also continues the aging of the population. Table 39 shows the components of population change.

As in most small regions experiencing rapid growth, migration is the most important component of population change.    Table 39 shows net migration from the previous year.    Between 1978 and 2000, almost half of the population growth is net in-migration.    Net in-migration occurs in all but four years of the projection period; net out-migration occurs in 1978, 1984, and 1985--years following the completion of major TAPS and ALCAN construction.    The economic opportunities associated with ALCAN and Pacific LNG construction are also responsible for major in-migration in 1981 when migration is responsible for 67 percent of the population growth, and in 1982 when migration accounts for 75 percent of the population growth. In other years, population increase is divided almost evenly between net in-migration and natural increase.

TABLE 39.   THE COMPONENTS OF POPULATION CHANGE
MODERATE BASE CASE, ALASKA
1977-2000

| | Net Migration | Natural Increase |
|---|---|---|
| 1977 | -24,935 | 6,383 |
| 1978 | -11,241 | 7,202 |
| 1979 | 5,268 | 6,697 |
| 1980 | 8,650 | 6,870 |
| 1981 | 14,253 | 7,144 |
| 1982 | 23,180 | 7,633 |
| 1983 | 8,014 | 8,460 |
| 1984 | -9,943 | 8,626 |
| 1985 | -0,528 | 8,082 |
| 1986 | 6,046 | 7,971 |
| 1987 | 7,828 | 8,120 |
| 1988 | 9,585 | 8,332 |
| 1989 | 9,802 | 8,614 |
| 1990 | 7,336 | 8,900 |
| 1991 | 6,111 | 9,082 |
| 1992 | 6,694 | 9,220 |
| 1993 | 8,264 | 9,386 |
| 1994 | 8,349 | 9,616 |
| 1995 | 9,508 | 9,845 |
| 1996 | 10,701 | 10,120 |
| 1997 | 10,228 | 10,438 |
| 1998 | 10,603 | 10,729 |
| 1999 | 13,110 | 11,031 |
| 2000 | 13,274 | 11,429 |

SOURCE :    MAP Model

Population growth results in changes to the age-sex distribution of the population. Table 40 compares the age-sex distribution of the population in 1980 and 2000. The aging of the population is projected to continue with the cohorts over 30 gaining as a proportion of the population. The proportion of the population over 30 increases from 37.6 percent in 1980 to 43 percent in 2000. One reason for the fall in the dependency ratio can be easily seen; between 1980 and 2000, the proportion of children (0-14) falls from 29.6 percent to 28.0 percent.

Personal Income

Personal income is projected to increase at an average rate of 10.6 percent per year. Increase in personal income is one of the benefits of growth; it measures the command of residents over goods and services. The full effect of increases in personal income is diminished by increases in prices; as prices of goods and services increase, a dollar can buy less. Economies which increase real personal income may not be increasing bene- fits if it does not increase as fast as population. Increases in real per capita income measure real increases in the command of the average resident over goods and services. Table 41 shows the projected change in the price level (RPI) and real per capita income.

The Alaska relative price index measures the increase in Alaska prices relative to a 1957 U.S. average. RPI increases at an average annual rate of 4.7 percent. Over the period, RPI moves toward the U.S. average since U.S. CPI is assumed to increase faster, at a rate of 5.5 percent per year. This supports the pre-pipeline trend; as the scale of the

TABLE 40.   AGE-SEX STRUCTURE OF THE POPULATION
MODERATE BASE CASE, ALASKA
1980 and 2000

| Age Cohorts | 1980 | | 2000 | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| 0 - 1 4 | 15.08 | 14. 56 | 14. 25 | 13. 79 |
| 15 - 29 | 18. 47 | 14. 33 | 15. 92 | 13. 14 |
| 30 - 49 | 13. 35 | 12. 12 | 14.67 | 13. 27 |
| 50 - 59 | 3.31 | 2. 92 | 3. 84 | 3. 72 |
| 60 i - | 3. 06 | 2. 81 | 3. 43 | 3. 97 |

SOURCE:  MAP Model.

TABLE 41.   REAL PER CAPITA INCOME
MODERATE BASE CASE, ALASKA
1977-2000

|  | Real Per Capita Income | Alaska Relative Price Index |
|---|---|---|
| 1977 | 3,924 | 252.71 |
| 1978 | 3,724 | 279.75 |
| 1979 | 3,862 | 293.36 |
| 1980 | 4,029 | 308.40 |
| 1981 | 4,317 | 325.47 |
| 1982 | 4,711 | 345.51 |
| 1983 | 4,720 | 361.12 |
| 1984 | 4,431 | 372.44 |
| 1985 | 4,463 | 387.79 |
| 1986 | 4,598 | 405.92 |
| 1987 | 4,732 | 425.53 |
| 1988 | 4,886 | 446.35 |
| 1989 | 5,024 | 468.12 |
| 1990 | 5,119 | 489.91 |
| 1991 | 5,221 | 512.19 |
| 1992 | 5,330 | 535.75 |
| 1993 | 5,462 | 560.82 |
| 1994 | 5,590 | 587.03 |
| 1995 | 5,720 | 614.78 |
| 1996 | 5,875 | 644.16 |
| 1997 | 5,997 | 674.62 |
| 1998 | 6,139 | 706.48 |
| 1999 | 6,297 | 740.64 |
| 2000 | 6,456 | 776.37 |

SOURCE:   MAP Model

economy increases and more goods and services are produced locally, the price level falls relative to the U.S. average. During the buildup of the ALCAN and Pacific LNG, RPI increases faster than the U.S. CPI. This diverging price level is a result of the rapid growth connected with development. Overall, the price level follows trends similar to the historical growth.

Real per capita income expands by 73 percent between 1978 and 2000. The average rate of growth is 2.5 percent per year. This is less than the 5.4 percent growth in real per capita income between 1965 and 1976 and the 3.5 percent annual growth rate prior to TAPS construction between 1965 and 1973. This rate is slightly greater than the 2.2 percent increase assumed for the United States in general. The high wage of special project construction workers affects real per capita incomes--real per capita income peaks in 1982 and 1983 and falls by 6 percent after the peak ALCAN year. The rise in real per capita incomes shows an increase in benefits of growth; however, this does not address distributional questions concerning personal income.

The State Fiscal Position-

Over the projection period, state government will receive revenues from petroleum development which exceed current levels of expenditure. State government's decision on the expenditure of these revenues will influence the growth of the Alaska economy. In the historical period, we observed state government's role in the growth process. State government contributes

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to growth by the expenditure of revenues directly through state government employment and indirectly through capital expenditures, which influences the level of activity in the construction sector. When revenues from outside the economy such as exogenous petroleum revenues are spent, this extra demand causes growth. This section describes the projected revenues to the state, the state's projected expenditures, and the overall fiscal position of the state in the projection period.

State Revenues. The State of Alaska has two major sources of revenue, exogenous petroleum revenues which are determined by the flow of oil and gas on state lands and endogenous tax revenues which are determined by the state's economic activity. Endogenous tax revenues include income tax, business taxes, and other revenues determined by the growth of the economy.[1] Table 42 shows the growth of state government revenues between 1977 and 2000. Total revenues are almost $6.9 billion larger in 2000 than in 1977. Overall, these revenues increase at a rate of 10.3 percent per year. Prudhoe oil revenues peak in 1985. Prior to 1985, the rate of increase in revenues averages 20.9 percent per year, while this slows to 5.1 percent following 1985. The pattern of revenues follows the pattern of petroleum revenues received by the state.

The most important source of revenues to the state during the period between 1977 and 2000 are petroleum revenues. Petroleum revenues include royalties, production taxes, property taxes, and petroleum corporate

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[1] Other tax revenues include revenues from the personal income tax, nonpetroleum corporate income tax, business license tax, motor fuels tax, alcohol tax, cigarette tax, school tax, ad valorem tax, and other miscellaneous taxes.

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TABLE 42.   STATE REVENUES
MODERATE BASE CASE, ALASKA
1977-2000

(Millions of Nominal Dollars)

| | General Fund Revenues | Petroleum Revenues | Other Tax Revenues |
|---|---|---|---|
| 1977 | 796 | 197 | 214 |
| 1978 | 1,054 | 471 | 207 |
| 1979 | 1,441 | 861 | 274 |
| 1980 | 1,625 | 996 | 313 |
| 1981 | 1,988 | 1,278 | 355 |
| 1982 | 2,329 | 1,476 | 437 |
| 1983 | 2,651 | 1,643 | 552 |
| 1984 | 3,224 | 2,122 | 650 |
| 1985 | 3,629 | 2,422 | 682 |
| 1986 | 3,811 | 2,431 | 737 |
| 1987 | 4,058 | 2,480 | 793 |
| 1988 | 4,312 | 2,521 | 872 |
| 1989 | 4,583 | 2,563 | 955 |
| 1990 | 4,712 | 2,459 | 1,035 |
| 1991 | 4,880 | 2,406 | 1,108 |
| 1992 | 5,129 | 2,430 | 1,208 |
| 1993 | 5,402 | 2,459 | 1,324 |
| 1994 | 5,637 | 2,427 | 1,445 |
| 1995 | 5,864 | 2,374 | 1,578 |
| 1996 | 6,162 | 2,366 | 1,750 |
| 1997 | 6,494 | 2,367 | 1,944 |
| 1998 | 6,840 | 2,365 | 2,159 |
| 1999 | 7,234 | 2,371 | 2,415 |
| 2000 | 7,678 | 2,372 | 2,718 |

SOURCE :   MAP Model

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income taxes from petroleum production.  Petroleum revenues are earned
from production on state lands in Upper Cook Inlet, Prudhoe Bay, and
the Beaufort Sea.  Because of their importance, Prudhoe Bay production
dominates these revenue flows.  Petroleum revenues increase until 1989,
after which their general pattern is declining revenues.  The decrease
in revenues reflects declining production at Prudhoe Bay. Between 1977
and 1989, yearly petroleum revenues increase at an average rate of over
23.8 percent a year.  After 1989 petroleum revenues fall, falling 7.5 per-
cent by 2000.  Other tax revenues, which include personal and business
taxes, increase throughout the projection period. The increase in these
revenues results from the growth of the economy. These revenues grow at
an average rate of 11.6 percent between 1977 and 2000. Other tax revenues
fall after completion of TAPS in 1977.  The increase in these revenues
after 1990 counteracts the decline in petroleum revenues.

State Expenditures.  State government expenditures increase during the
projection period; they are shown in Table 43. The increase in state
expenditures is a result of two forces.  First, expenditures grow as a
response to the general growth of the economy.  Increased population and
prices result in increasing expenditures to provide the same level of
services as measured by real per capita expenditures.  The growth of
income is assumed to increase the demand for the level of services pro-
vided.  The second force operating on state expenditures is the accumulation
of unspent revenues.  These revenues will place pressure on the government
to increase expenditures.

TABLE 43.   STATE EXPENDITURES
MODERATE BASE CASE, ALASKA
1977-2000

| | Total Expenditures (Millions of Nominal Dollars) | Real Per Capita Expenditures |
|---|---|---|
| 1977 | 1,161 | 1,119 |
| 1978 | 1,311 | 1,152 |
| 1979 | 1,415 | 1,152 |
| 1980 | 1,567 | 1,170 |
| 1981 | 1,744 | 1,176 |
| 1982 | 2,015 | 1,199 |
| 1983 | 2,371 | 1,306 |
| 1984 | 2,580 | 1,381 |
| 1985 | 2,748 | 1,392 |
| 1986 | 3,062 | 1,442 |
| 1987 | 3,382 | 1,475 |
| 1988 | 3,750 | 1,509 |
| 1989 | 4,145 | 1,539 |
| 1990 | 4,557 | 1,572 |
| 1991 | 4,904 | 1,578 |
| 1992 | 5,284 | 1,584 |
| 1993 | 5,705 | 1,589 |
| 1994 | 6,179 | 1,599 |
| 1995 | 6,667 | 1,600 |
| 1996 | 7,201 | 1,601 |
| 1997 | 7,809 | 1,610 |
| 1998 | 8,473 | 1,620 |
| 1999 | 9,198 | 1,624 |
| 2000 | 10,029 | 1,637 |

SOURCE:    MAP Model

State expenditures increase more than eight times between 1977 and 2000. The average annual growth rate during this period is 9.8 percent per year. After 1989 when petroleum revenues peak, the growth of expenditures is at a rate of only 8.4 percent per year. The projected growth in state expenditures repeats the experience of the state after the Prudhoe lease sale over a much longer period. The Prudhoe Bay experience may provide an indication of how the state will expand services in the future. Despite the rapid growth of expenditures during the historical period, the functional distribution of expenditures remained fairly stable. From this, we may be able to infer that the state will continue to distribute expenditures, as in the past, between the nine functional categories (education, social services, health, natural resources, public protection, justice development, transportation, and general government) (Goldsmith, 1977).

Real per capita expenditures can be considered a measure of the level of state services received by an individual. Increases in state expenditures are of two types: providing additional services and providing the same level of services to an increased population. Increases in services occur throughout the period. Real per capita expenditures increase by 46.3 percent between 1977 and 2000. This is a modest expansion when it is compared to the rise in real per capita expenditures of 118 percent between 1969 and 1973 (Goldsmith, 1977}. The growth in real per capita expenditures is not even throughout the period; almost 81 percent of the increase occurs between 1977 and 1989 when oil revenues peak.

Balances.   The huge increases in revenues which result from the production of oil and gas place the State of Alaska in a unique position. The excess revenues available allow the state to build up its fund balance.   These funds not only provide a source of future revenues; they also generate interest earnings which increase yearly revenues.   There are two types of fund balances:  the permanent fund and the general fund. (See Table 44. )

The permanent fund is a legislated savings account for the state. In 1976, Alaska adopted a constitutional amendment which established the permanent fund.   The relevant section of the constitution is Article IX, Section 15, which reads:

> ALASKA PERMANENT FUND. At least twenty-five percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue sharing payments, and bonuses received by the State shall be placed in a permanent fund, the principal of which shall be used only for those income producing investments specifically designated by law as eligible for permanent fund investments. All income from the permanent fund shall be deposited in the general fund unless otherwise provided by law.

This establishes the permanent fund as a minimum amount of petroleum revenues which cannot be spent.   The permanent fund grows continually throughout the projection period.   By 2000, there are $4.9 billion in the permanent fund.   The general fund includes the remainder of the state's unspent revenues.   For most of the period, the general fund is more important than the permanent fund. At its peak in 1996, the general fund has $12 billion, which is greater than three times the amount in the permanent fund.   The decline in petroleum revenues after 1989 reduces the rate of increase in the general fund. Beginning in

TABLE 44.   STATE FUND BALANCES
MODERATE BASE CASE, ALASKA
1977-2000

(Millions of Nominal Dollars)

| | General Fund Balance | Permanent Fund Balance | Fund Balance Interest |
|---|---|---|---|
| 1977 | 668 | 2 | 35 |
| 1978 | 617 | | 47 |
| 1979 | 815 | 1:; | 47 |
| 1980 | 1,054 | 275 | 69 |
| | | | |
| 1981 | 1,500 | 411 | |
| 1982 | 2,056 | 563 | 1;: |
| 1983 | 2,630 | 732 | 186 |
| 1984 | 3,558 | 949 | 239 |
| 1985 | 4,748 | 1,188 | 320 |
| | | | |
| 1986 | 5,872 | 1,437 | 421 |
| 1987 | 6,983 | 1,684 | 519 |
| 1988 | 8,044 | 1,936 | 615 |
| 1989 | 9,044 | 2,193 | 708 |
| 1990 | 9,837 | 2,445 | 798 |
| | | | |
| 1991 | 10,504 | 2,689 | 872 |
| 1992 | 11,096 | 2,937 | 937 |
| 1993 | 11,604 | 3>188 | 997 |
| 1994 | 11,956 | 3,437 | 1,051 |
| 1995 | 12,128 | 3,681 | 1,095 |
| | | | |
| 1996 | 12,150 | 3,924 | 1,125 |
| 1997 | 11,996 | 4,168 | 1,145 |
| 1998 | 11,642 | 4,413 | 1,152 |
| 1999 | 11,086 | 4,660 | 1,146 |
| 2000 | 10,293 | 4,907 | 1,126 |

SOURCE :   MAP Model

1997, the general fund is drawn down to make expenditures. Between 1997 and 2000, the general fund is reduced by almost $2 billion. The cyclical nature of petroleum revenues and their importance as a part of state revenues mean that when expenditure policies are tied to revenues, they will eventually lead to expenditures in excess of revenues. Since the increase in services cannot be supported by normal revenues, the fund balance must be drawn on. Changes in the rate of spending out of revenues will only affect the timing of this, not its eventuality (Goldsmith, 1977). These fund balances provide an additional source of revenue to the state; the general fund is assumed to earn interest at a rate of 7 percent per year, while the permanent fund earns a slightly higher rate of 7.5 percent. These rates reflect the diverse portfolio held by the state which includes both long- and short-term bonds as well as in-state loans. At their peak in 1997, these revenues are about 18 percent of the state's general fund revenues. The interest revenues fall as the general fund is decreased.

State Fiscal Position. The state's fiscal position is determined by two factors. First, the Prudhoe Bay petroleum revenues are the major portion of state revenues, which are a fixed flow through time. Growth in the economy will not affect the level of these revenues. Secondly, economic growth increases expenditures without the same response in nonpetroleum revenues. These factors lead to the pattern of the fund balances shown in the previous section.

Table 45 contains two indicators which illustrate the state's fiscal position. The first is the excess of general fund revenues over general

TABLE 45.   STATE FISCAL POSITION
MODERATE BASE CASE, ALASKA
1977-2000

|      | General Fund Revenues Minus General Fund Expenditures (Millions of Nominal Dollars) | Fund Balance (Millions of 1977 Constant Dollars) |
|------|------|------|
| 1977 | -137 | 671 |
| 1978 | - 4 | 602 |
| 1979 | 302 | 835 |
| 1980 | 361 | 1,090 |
| 1981 | 583 | 1,486 |
| 1982 | 708 | 1,918 |
| 7983 | 742 | 2,355 |
| 1984 | 1,145 | 3,062 |
| 1985 | 1,429 | 3,873 |
| 1986 | 1,373 | 4,556 |
| 1987 | 1,358 | 5,153 |
| 1988 | 1,313 | 5,657 |
| 1989 | 1,257 | 6,073 |
| 1990 | 1,044 | 6,342 |
| 1991 | 912 | 6,517 |
| 1992 | 840 | 6,627 |
| ?993 | 760 | 6,673 |
| 1994 | 600 | 6,634 |
| 1995 | 416 | 6,506 |
| 1996 | 264 | 6,313 |
| 1997 | 91 | 6,062 |
| 1998 | -109 | 5,750 |
| 1999 | -309 | 5,379 |
| 2000 | -546 | 4,953 |

SOURCE:   MAP Model

fund expenditures. As long as this is positive, the general fund balance will increase; when it is negative, the fund balances must be drawn down to meet expenditures. The excess of revenues over expenditures increases until 1985, after which it falls. After 1985, expenditures are increasing faster than revenues. After 1998, expenditures are greater than revenues; and the fund balance must be drawn down. This pattern has long-range effects since it affects not only the level of the general fund but also the interest earned on the fund balances. This interest is an important part of revenues to the state.

The other factor affecting the value of the fund balances to the state is prices. As prices increase, the purchasing power of the fund will decrease. Table 45 shows the value of the fund balances in constant 1977 dollars. The effect of prices is to reduce the real value of the fund earlier. The real value of the fund peaks in 1993 at $6.7 billion; this is four years before the nominal fund balance peaks. By 2000, the real fund balance has fallen 26 percent from its peak; this compares to the 6 percent fall the nominal fund balance experiences by 2000. The real fund balance illustrates the effect of price increases on the fixed flow of revenue which is included in the fund.

GROWTH OF THE REGIONAL ECONOMIES

The regions of Alaska do not uniformly reflect state growth. Differences reflect the location of exogenous employment growth as well as the size and structure of the regional economy. This section will describe the distribution of state growth in the base case between

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two of the state's regions--Anchorage and Southcentral. As we have

seen in the historical analysis, Anchorage and Southcentral, while

closely related, are different types of economies.   Anchorage is the

state's major region.   Its growth is largely affected by its role as

the administration and distribution center for the state.   This provides

an indirect link between the Anchorage economy and the state's resource

industries.   Because of this role, growth in other parts of the state

is reflected by growth in Anchorage.   Southcentral is a combination of

many small, local economies which are significantly dependent on the

resource industries; both petroleum development and fisheries are impor-

tant to these economies.   These small economies, while physically sepa-

rated, form a regional economy with similar structure and important

trade and transportation links.


## Anchorage

Aggregate Indicators.   Table 46 shows three indicators of the growth of

the Anchorage economy during the projection period.   Employment, popula-

tion, and real disposable income show that the state growth is reflected

in Anchorage even though there is no major exogenous resource development.

Population grows at an annual average rate of 3.5 percent during the period.

Anchorage grows faster than the state, and the concentration of popula-

tion in Anchorage continues throughout the projection period.  In 1977,

46.3 percent of the state's population is in Anchorage; by 2000, that

has increased to 52.5 percent.   Population does not fall after completion

of TAPS but experiences a slight decrease in 1984 after the peak ALCAN

TABLE 46.   AGGREGATE INDICATORS OF ECONOMIC GROWTH
MODERATE BASE CASE,  ANCHORAGE
1977-2000

|  | Population | Employment | Real Disposable Personal Income (Millions of Constant $) |
|---|---|---|---|
| 1977 | 190,188 | 85,523 | 573 |
| 1978 | 197,348 | 84,128 | 586 |
| 1979 | 201,235 | 87,606 | 626 |
| 1980 | 207,323 | 91,938 | 677 |
| 1981 | 218,413 | 98,363 | 741 |
| 1982 | 235,032 | 107,329 | 825 |
| 1983 | 244,804 | 111,220 | 870 |
| 1984 | 243,808 | 108,713 | 862 |
| 1985 | 248,194 | 110,055 | 887 |
| 1986 | 256,190 | 114,113 | 935 |
| 1987 | 265,322 | 118,863 | 992 |
| 1988 | 275,583 | 124,228 | 1,054 |
| 1989 | 286,278 | 129,727 | 1,120 |
| 1990 | 295,590 | 134,221 | 1,177 |
| 1991 | 305,641 | 138,703 | 1,238 |
| 1992 | 315,565 | 143,318 | 1,298 |
| 1993 | 326,780 | 148,754 | 1,371 |
| 1994 | 338,200 | 154,245 | 1,442 |
| 1995 | 350,467 | 160,260 | 1,524 |
| 1996 | 363,718 | 166,870 | 1,614 |
| 1997 | 377,150 | 173,444 | 1,702 |
| 1998 | 391,303 | 180,343 | 1,796 |
| 1999 | 407,125 | 188,369 | 1,907 |
| 2000 | 422,609 | 196,092 | 2,015 |

SOURCE:   MAP Model

year.   Between 1984 after the ALCAN is completed and 2000, the population grows at an average annual rate of 3.5 percent.

Population follows the pattern of employment growth. Employment grows at an average annual rate of 3.7 percent during the projection period. As with population, employment experiences a slight decrease in 1984 when the ALCAN construction is in its final year.   After 1984 employment grows at an average of 3.8 percent per year. Throughout the projection period, the dependency ratio (the ratio of population to employment) falls; this ratio is 2.22 in 1977 and 2.16 by 2000. This small decline results from the aging of the population and the increased participation in the labor force of the working-age population.

The final indicator of regional economic growth in the projection period is the total regional real disposable income.   This accounts for the effect of prices and taxes on incomes.   Total real disposable income increases at an average of 5.6 percent per year over the projection period. It experiences a slight peak in 1983, the final peak ALCAN year.

The Economic Structure.   Table 47 shows the changes in structure of the Anchorage economy as measured by the distribution of employment. The major exogenous industries of mining and exogenous construction grow only slightly after completion of TAPS; this employment is made up of headquarters mining employment.   Growth over this sector occurs with the expansion of headquarters employment for the development of Lower Cook

TABLE 47.    ECONOMIC  STRUCTURE
MODERATE BASE CASE
ANCHORAGE

| | Support Sector I | | Support Sector II | | Government | | Basic Sector | |
|---|---|---|---|---|---|---|---|---|
| | Employment | % of Total | Employment | % of Total | Employment | % of Total | Employment | % of Total |
| 1978 | 36, 835 | 43. 9 | 12, 153 | 14. 5 | 31, 427 | 37. 4 | 3, 439 | 4. 1 |
| 1980 | 42, 516 | 46. 4 | 13, 652 | 14. 9 | 31, 763 | 34. 6 | 3, 746 | 4. 1 |
| 1985 | 54, 003 | 49. 4 | 17, 245 | 15.8 | 33, 500 | 30. 6 | 4, 581 | 4. 2 |
| 1990 | 70, 106 | 52. 8 | 21, 890 | 16. 5 | 35, 166 | 26. 5 | 5, 548 | 4. 2 |
| 1995 | 87, 903 | 55. 8 | 26, 785 | 17. 0 | 36, 273 | 23. 0 | 6, 625 | 4. 2 |
| 2000 | 112, 644 | 58. 7 | 33, 924 | 17. 7 | 37, 334 | 19. 5 | 7, 952 | 4. 1 |

Support Sector I includes trade, services, and finance-insurance-real estate employment.

Support Sector II includes transportation-communication-public utilities and other construction employment.

Government includes state, local, and federal employment.

Basic Sector includes manufacturing, agriculture-forestry-fisheries, mining, and exogenous construction employment.

SOURCE: MAP Model

and Beaufort OCS.   The major growth occurs in the local support sector. This sector is composed of two components:  1) local construction and transportation-communication-utilities and 2) trade, services, and finance-insurance-real estate.   Each component of the support sector increases its share of total employment during the projection period. Local construction and transportation-communication-utilities increases from 14.5 percent in 1978 to 17.7 percent by 2000; while trade, services, finance-insurance-real estate increases from 43.9 percent to 58.7 percent. These changes are a continuation of historical changes in the structure of the Anchorage economy.  These shares are greater than the shares of similar industries on the state level because of the important administrative and distributive role of Anchorage.


## Southcentral

Aggregate Indicators.   Unlike Anchorage, the growth of Southcentral depends largely upon the growth of the regional exogenous sector. The exogenous sector is influenced significantly by three events:  the construction of the Pacific LNG plant between 1980 and 1983, the development of the Lower Cook OCS, and the shutdown of the Upper Cook oil fields in 1990.   Three aggregate indicators--population, employment, and disposable real income--are shown in Table 48.   Population falls after the completion of the trans-Alaska pipeline in 1977. Between 1978 and 2000, population is projected to grow at an average annual rate of 1.9 percent. Population falls slightly (less than one percent) in 1991 when the Upper Cook Inlet oil fields are closed.

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TABLE 48.   AGGREGATE INDICATORS OF ECONOMIC GROWTH
MODERATE BASE CASE. SOUTHCENTRAL
1977-2000

| | Population | Employment | Real Disposable Personal Income (Millions of Constant $) |
|---|---|---|---|
| 1977 | 58,958 | 23,117 | 180 |
| 1978 | 53,826 | 20,898 | 145 |
| 1979 | 55,799 | 21,946 | 159 |
| 1980 | 59,054 | 23,745 | 184 |
| 1981 | 61,533 | 25,452 | 212 |
| 1982 | 62,582 | 26,520 | 232 |
| 1983 | 6?,933 | 25,863 | 216 |
| 1984 | 63,292 | 26,030 | 213 |
| 1985 | 63,915 | 26,323 | 219 |
| 1986 | 64,866 | 26,923 | 229 |
| 1987 | 65,675 | 27,500 | 238 |
| 1988 | 67,012 | 28,318 | 250 |
| 1989 | 68,418 | 29,173 | 264 |
| 1990 | 70,015 | 30,054 | 277 |
| 1991 | 69,574 | 30,002 | 279 |
| 1992 | 70,713 | 30,647 | 290 |
| 1993 | 71,825 | 31,316 | 303 |
| 1994 | 73,076 | 32,029 | 315 |
| 1995 | 74,402 | 32,810 | 330 |
| 1996 | 75,849 | 33,657 | 345 |
| 1997 | 77,095 | 34,375 | 359 |
| 1998 | 78,319 | 35,084 | 373 |
| 1999 | 79,791 | 35,958 | 390 |
| 2000 | 81,385 | 36,886 | 407 |

SOURCE:  MAP Model

Employment grows faster than population in Southcentral during the pro-
jection periods.   Employment falls after TAPS is completed in 1977.
After this, it grows at an average rate of 2.6 percent per year. The
ratio of population-to-employment was much higher in 1978 in Southcentral
(2.58) than in the state (2.27).   The Southcentral ratio falls toward
the state ratio by 2000 (2.21 for Southcentral and 2.16 for the state).
This trend was experienced in the historical period; the population-to.
employment ratio fell from 4.24 in 1965 to 3.07 prior to the TAPS con-
struction in 1974.   The declining dependency ratio results from a change
in the character of the population.   As at the state level, the population
is aging and the labor force participation is increasing. These factors
account for the greater proportion of employed in the population.

Disposable real income grows throughout the period after falling with
the completion of the trans-Alaska pipeline; in 1978 it is almost 20 per-
cent lower than in 1977.   Between 1978 and 2000, disposable real income
increases at an annual average rate of 4.8 percent.

The Economic Structure.   Table 49 shows the changes in the structure
of the Southcentral economy during the projection period as described
by changes in the distribution of employment. Two important trends can
be observed from this table.   First, those exogenous sectors which have
recently been important to the region's growth, construction and mining,
decrease their importance throughout the projection period. After com-
pletion of TAPS, this exogenous construction decreases, then increases

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## TABLE 49.   ECONOMIC STRUCTURE
## MODERATE BASE CASE
## SOUTHCENTRAL

| | Support Sector I | | Support Sector II | | Government | | Basic Sector | |
|---|---|---|---|---|---|---|---|---|
| | Employment | % of Total | Employment | % of Total | Employment | % of Total | Employment | % of Total |
| 1978 | 8,134 | 38.6 | 3,101 | 14.7 | 4,717 | 22.4 | 5,146 | 24.4 |
| 1980 | 9,173 | 38.2 | 3,515 | 14.7 | 4,837 | 20.2 | 6,462 | 26.9 |
| 1985 | 10,452 | 39.2 | 3,997 | 15.0 | 5,402 | 20.2 | 6,799 | 25.5 |
| 1990 | 12,293 | 40.3 | 4,583 | 15.0 | 5,923 | 19.4 | 7,729 | 25.3 |
| 1995 | 14,046 | 41.9 | 4,991 | 14.9 | 6,234 | 18.6 | 8,258 | 24.6 |
| 2000 | 16,440 | 43.2 | 5,663 | 14.9 | 6,517 | 17.1 | 9,438 | 24.8 |

Support Sector I includes trade, services, and finance-insurance-real estate employment.

Support Sector II includes transportation-communication-public utilities and other construction employment.

Government includes state, local, and federal employment.

Basic Sector includes manufacturing, agricul ture-forestry-fisheries, mining, and exogenous construction employment.

SOURCE:   MAP Model

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to a peak of 2,578 in 1982 with construction of the Pacific LNG plant and development of the Lower Cook OCS. After the Cook Inlet oil fields are shut down in 1980, this mining includes only 780 employees. The second trend is the increasing importance of the support sector in the region. Trade, services, and finance-insurance-real estate increase their share of total employment from 38.6 percent in 1978 to 43.2 percent in 2000. This follows a historical trend. The increased scale of the Southcentral economy during the projection period leads to a greater-than-proportional increase in support sector employment.

## Alternative Base Cases

Two additional base case projections were made. These base cases differ in the assumed level of OCS activity in the Lower Cook Inlet and Beaufort Sea. The major difference between these base cases is one of magnitude; the high base case assumes a higher level of Beaufort and Lower Cook OCS activity than the moderate base case. The low base case assumes only exploration activity in the Lower Cook and lower development activity in the Beaufort. The major difference between the projected growth of the base cases in these three scenarios will also be in magnitude. Each alternative base case will be described by four major variables: employment, population, total state expenditures, and the fund balance. These cases affect the structure of the economy in a manner similar to the moderate case. (The detailed scenarios are shown in Appendix D.)

LOW BASE CASE SCENARIO

The minimum base case scenario includes the same non-OCS assumptions as the moderate Scenario. The difference between these cases involves the assumptions about OCS activity in the Lower Cook Inlet and Beaufort. The minimum development scenario assumes only exploration activity in the Lower Cook. Lower Cook OCS employment occurs between 1978 and 1985 with a peak of 252 in 1980. In contrast, the moderate case has a Lower Cook OCS employment peak of 912 in 1981 and operations employment of 417 remains throughout the period. The level of activity assumed in the low Beaufort scenario is much closer to the moderate scenario. The low Beaufort scenario contains production and has employment through the entire projection period. Peak employment of 740 occurs in 1989; this is 68 percent of the peak in the moderate Beaufort scenario. Operations employment is approximately 82 percent of the moderate case by the end of the period. Since Beaufort OCS production occurs in state waters, Beaufort will also generate tax, bonus, and royalty revenues to the state.

General Pattern of Growth

Table 50 describes four indicators of the magnitude of economic growth projected for the low base case. Population is projected to increase at an annual average rate of growth of 3.0 percent between 1978, the year after the TAPS project is complete, and 2000. The most rapid period of growth is between 1978 and 1982, the peak ALCAN year; growth averages 4.4 percent per year during this period. Population falls after completion of TAPS in 1977 and the last peak ALCAN year in 1983; in both cases,

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TABLE 50.    AGGREGATE INDICATORS OF ECONOMIC GROWTH
LOW BASE CASE, ALASKA
1977-2000

|      | Population | Employment | State Expenditures (Millions of Nominal Dollars) | Fund Balance (Millions of Nominal Dollars) |
|------|------------|------------|--------------------------------------------------|--------------------------------------------|
| 1977 | 410,660    | 185,508    | 1,161                                            | 671                                        |
| 1978 | 406,709    | 178,557    | 1,311                                            | 666                                        |
| 1979 | 417,661    | 184,486    | 1,415                                            | 967                                        |
| 980  | 431,495    | 192,187    | 1,559                                            | 1,330                                      |
| 981  | 451,557    | 203,886    | 1,723                                            | 1,921                                      |
| 982  | 482,344    | 222,330    | 1,988                                            | 2,640                                      |
| 983  | 498,942    | 228,242    | 2,348                                            | 3,393                                      |
| 984  | 497,291    | 221,077    | 2,559                                            | 4,548                                      |
| 985  | 504,710    | 222,880    | 2,727                                            | 5,986                                      |
| 1986 | 518,422    | 229,756    | 3,044                                            | 7,366                                      |
| 1987 | 534,266    | 238,040    | 3,362                                            | 8,732                                      |
| 1988 | 551,407    | 246,998    | 3,731                                            | 10,049                                     |
| 1989 | 569,207    | 256,188    | 4,115                                            | 11,306                                     |
| 1990 | 585,921    | 264,313    | 4,520                                            | 12,336                                     |
| 1991 | 601,605    | 271,644    | 4,871                                            | 13,216                                     |
| 1992 | 617,354    | 278,970    | 5,252                                            | 14,033                                     |
| 1993 | 635,153    | 287,806    | 5,671                                            | 14,769                                     |
| 1994 | 653,018    | 296,515    | 5,145                                            | 15,339                                     |
| 1995 | 671,975    | 305,943    | 6,628                                            | 15,725                                     |
| 1996 | 691,018    | 315,281    | 7,154                                            | 15,948                                     |
| 1997 | 712,023    | 325,984    | 7,722                                            | 16,008                                     |
| 1998 | 733,658    | 336,919    | 8,404                                            | 15,857                                     |
| 1999 | 757,817    | 349,551    | 9,134                                            | 15,500                                     |
| 2000 | 782,438    | 362,225    | 9,965                                            | 14,900                                     |

SOURCE:    MAP Model

the decrease is less than one percent. The **rate of** population growth is slightly less than the 3.1 percent rate in the moderate base.  By the peak ALCAN construction year, 1983, population is almost 4,000 greater in the moderate base case.  This is mainly a response to the more rapid Lower Cook development in the moderate case.  By 2000 population is 7,000 less in the low base case.

Employment is projected to be 362,225 by 2000 in the low base case. This is 2,500 less than in the moderate base case. Employment falls from 185,500 in 1977 to 178,560 in 1978 with the completion of TAPS in the low base case.  After 1978 employment grows at an annual rate of 3.27 percent. Like population, employment is projected to grow most rapidly with the buildup before the ALCAN.  Between 1978 and 1982, employment increases at the average rate of 5.6 percent per year.  The overall growth is only slightly less than the growth in the moderate base case.  The difference in employment is almost 2,600 in 1981 when Lower Cook development is at its peak in the moderate scenario.  As in the moderate base case, population is projected to increase less rapidly than employment.

Throughout the projection period, state expenditures in the low base case are only slightly less than in the moderate base case.  By 2000 expenditures in the low base case are $9,965 million, which is less than one percent lower than in the moderate base case. In 1981 at the peak of Lower Cook moderate development, moderate case expenditures are only slightly more than one percent higher.  The lower base case also has a similar effect on the fund balances.  The fund balance in the low base

case is $300 million less than the fund balance in the moderate case. This is a difference of only 2 percent. The moderate base case has a larger fund balance even though it has larger expenditures because of the greater revenues received from the Beaufort OCS. The pattern of the fund balance is similar in both cases. In the low base case, the fund balance increases at an annual average rate of 17.2 percent until 1997, when it peaks. Between 1997 and 2000, the fund falls by 7 percent in the low case because fund balances are drawn down to meet state expenditures. This is similar to the pattern found in the moderate base case.

The growth projected for the low base case is similar in magnitude to that projected in the moderate base case. The difference in the major variables is small. By the end of the period, the difference varies from the fund which is 2 percent smaller to state expenditures which is only .63 percent smaller. The major differences occur early in the projection period because the major difference in the scenarios is in the Lower Cook OCS assumption which peaks by 1981.

Structural Differences and Similarities. The main difference between the low and moderate base cases involves the magnitude of the variables. The effect of economic growth on the process of change is similar in both base cases. Four major structural changes were observed in the moderate base case. These were measured by changes in the employment distribution, the dependency ratio, the regional distribution of the population, and the fund balance. The change in the employment distribution measures the increased importance of the support sector in the Alaska economy. As the

economy grows larger, the support sector experiences a greater-than-proportional growth because more goods and services are produced locally. The dependency ratio decreases as a greater proportion of the population is employed. This results from increases in the proportion of the population of labor-force age and increased labor-force participation of this population. The concentration of population in Anchorage was also observed in the moderate base case. Anchorage's role as the administrative and distribution center for Alaska assures the continuing growth of Anchorage even if the major cause of growth continues to be resource development outside the region. The final structural characteristic observed in the moderate base case concerns the state fiscal sector. The influence of petroleum revenues on state expenditures leads to expenditures which increase faster than revenues. Eventually, the fund balances must be drawn down to meet expenditures.

Table 51 compares these structural characteristics in the low and moderate scenarios. This table shows that, while the base cases differ slightly in magnitude, they are quite similar in the important structural characteristics. The support sector expands to about 53 percent of total employment in both cases. The dependency ratio (population/employment) falls by about 4 percent between 1980 and 2000 in both cases. Similarly, Anchorage is projected to contain almost 54 percent of the state's population by 2000. General fund revenues net of general fund expenditures are projected to follow a similar pattern in both cases. In the early part of the period, revenues exceed expenditures; the fund is being built up. By the end of the period, expenditures are greater than revenues and the fund must be drawn down to make up the difference in expenditures.

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TABLE 51.    STRUCTURAL CHARACTERISTICS
LOW AND MODERATE BASE CASES

|  |  | 1980 | 1990 | 2000 |
|---|---|---|---|---|
| Percent of Total Employment in Support Sector | low base case | 39. 4% | 46.1% | 53. 0% |
|  | moderate base case | 39. 5% | 46. 2% | 53.1% |
| Dependency Ratio | low base case | 2. 25 | 2. 22 | 2. 16 |
|  | moderate base case | .2.24 | 2. 22 | 2.16 |
| Percent of Total Population in Anchorage | low base case | 47.8% | 50. 0% | 53. 5% |
|  | moderate base case | 47. 8% | 50. 0% | 53.5% |
| General Fund Revenues Minus General Fund Expenditures (Millions of Nominal Dollars) | low base case | 363 | 1,029 | -599 |
|  | moderate base case | 361 | 1,044 | -546 |

HIGH BASE CASE SCENARIO

The high and moderate base case scenarios differ only in the assumption made about OCS development in the Lower Cook and Beaufort Sea.   The Lower Cook development scenarios differ in both magnitude and timing between the two cases.    Peak employment does not occur in the high case until 1984; the peak level of employment is 2,448.  Peak employment occurs in the moderate case in 1981; moderate case employment is greater than high

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case for the first four years of the period. Operations employment in the high case is almost three times as high as in the moderate case; it includes operation of an LNG plant. The Beaufort high scenario peaks in 1989 at 1,344 which is 24 percent greater than the moderate Beaufort peak. By 2000 employment is 38 percent greater in the high case. The higher Beaufort production also means greater revenues from production in state waters.

General Pattern of Development. Table 52 shows four indicators of the magnitude of economic growth in the high base case. Population is projected to be 801,117 in 2000. This is 11,830, or 1.5 percent, greater than in the moderate base case. The population falls after TAPS is completed in 1978 but does not experience a similar fall after ALCAN in 1984. The moderate base case experiences a fall of .3 percent between 1983 and 1984, while the high base case increases by one percent. This increase is a result of development activity in the Lower Cook which increases employment from 989 in 1982 to its peak of 2,448 in 1984. This increase counteracts the fall in population after ALCAN is complete. The growth rate of population between 1978 and 2000 is an average of 3.1 percent per year which is slightly higher than in the moderate base case.

The assumed growth of employment in the Lower Cook between 1982 and 1984 is not great enough to prevent a fall in employment after ALCAN is complete. Employment falls by almost 3,000 between 1983 and 1984; this is less than half the fall experienced in the moderate base case. Because

TABLE 52.   AGGREGATE INDICATORS OF ECONOMIC GROWTH
HIGH BASE CASE, ALASKA
1977-2000

|  | Population | Employment | State Expenditures (Millions of Nominal Dollars) | Fund Balance (Millions of Nominal Dollars) |
|---|---|---|---|---|
| 1977 | 410,660 | 185,508 | 1,161 | 671 |
| 1978 | 406,709 | 178,557 | 1,311 | 666 |
| 1979 | 417,661 | 184,486 | 1,415 | 967 |
| 1980 | 431,495 | 192,187 | 1,559 | 1,330 |
| 1981 | 453,534 | 205,348 | 1,723 | 1,923 |
| 1982 | 484,460 | 223,675 | 2,005 | 2,635 |
| 1983 | 507,184 | 233,949 | 2,363 | 3,391 |
| 1984 | 512,160 | 231,000 | 2,634 | 4,525 |
| 1985 | 519,471 | 231,560 | 2,824 | 5,937 |
| 1986 | 531,137 | 236,106 | 3,112 | 7,302 |
| 1987 | 546,488 | 243,560 | 3,400 | 8,673 |
| 1988 | 564,654 | 252,890 | 3,768 | 10,004 |
| 1989 | 583,731 | 262,615 | 4,166 | 11,334 |
| 1990 | 600,285 | 270,213 | 4,601 | 12,460 |
| 1991 | 616,303 | 277,510 | 4,954 | 13,467 |
| 1992 | 632,719 | 285,074 | 5,352 | 14,403 |
| 1993 | 651,220 | 294,189 | 5,784 | 15,270 |
| 1994 | 669,835 | 303,200 | 6,279 | 15,981 |
| 1995 | 689,377 | 312,806 | 6,782 | 16,518 |
| 1996 | 708,660 | 322,086 | 7,323 | 16,910 |
| 1997 | 729,940 | 332,789 | 7,898 | 17,159 |
| 1998 | 751,675 | 343,616 | 8,557 | 17,225 |
| 1999 | 776,143 | 356,320 | 9,290 | 17,091 |
| 2000 | 801,117 | 369,105 | 10,129 | 16,724 |

SOURCE :   MAP Model

of the earlier Lower Cook development in the moderate base case, employ-
ment in the high case is less than in the moderate case until 1983.
Employment grows at an annual average rate of 3.4 percent between 1978
and 1983. By 2000 employment is almost 4,400 greater than in the moder-
ate base case.

The state's fiscal position is affected in two ways by the different
base cases. First, different rates of growth in population, prices, and
personal income will affect the level of expenditures. Secondly, differ-
ential production in the Beaufort Sea will mean different revenue streams
to the state. By 2000 state expenditures are projected to have reached
$10.1 billion in the high base case. This is one percent greater than
the projected state expenditures in the moderate base case. Expenditures
are greater in the moderate base case until 1984 because of the earlier
Lower Cook OCS activity. Overall, expenditures increase at an average
rate of 9.9 percent per year. The fund balance is greater in the high
base case by $1.5 billion in 2000. The larger fund balance is due to
larger Beaufort Sea OCS revenues and the larger expenditures early in
the period in the moderate case. These early expenditures reduce the
fund and the interest earned on the fund. The fund experiences the same
pattern of growth in the high as in the moderate base case, rising to a
peak and then falling. The peak in fund balance is reached in 1998
which is one year later than in the moderate base case.

Structural Similarities and Differences. Table 53 shows the indicators
of the major structural characteristics of the high and moderate base
cases. The structural changes which occur because of the projected growth
are similar in both the high and moderate cases. The support sector will
include over 53 percent of total employment; the dependency ratio will
fall to about 2.16 people per employee; and Anchorage will contain about
54 percent of the state's population. General fund revenues net of general
fund expenditures are slightly higher in the high case, although the dif-
ference is still negative in 2000. The pattern of the fund balance is
similar in both cases.


TABLE 53. STRUCTURAL CHARACTERISTICS
HIGH AND MODERATE BASE CASES

|  |  | 1980 | 1990 | 2000 |
|---|---|---|---|---|
| Percent of Total Employment in Support Sector | high base case | 39. 4% | 46. 3% | 53.1% |
|  | moderate base case | 39. 5% | 46.2% | 53.1% |
| Dependency Ratio | high base case | 2. 25 | 2. 22 | 2. 17 |
|  | moderate base case | 2. 24 | 2. 22 | 2. 16 |
| Percent of Total Population in Anchorage | high base case | 47. 8% | 50. 0% | 53. 5% |
|  | moderate base case | 47. 8% | 50. 0% | 53. 5% |
| General Fund Revenues Minus General Fund Expenditures (Millions of Nominal Dollars) | high base case | 362 | 1, 127 | -368 |
|  | moderate base case | 361 | 1, 044 | -546 |

SUMMARY AND CONCLUSIONS

The growth of the Alaska economy between 1977 and 2000 is projected to be substantial, although the economy is not projected to grow so rapidly as it did between 1965 and 1976. This section presented three alternative base cases, each with different assumptions about the level of OCS activity in the Beaufort Sea and Lower Cook Inlet. By 2000, population is projected to be between 782,400 and 801,120, depending upon the level of OCS activity assumed. Employment is projected to be between 362,225 and 369,105.

The three base case scenarios differ only in magnitude; they exhibit simi-lar patterns of development. This pattern was illustrated by the growth in the moderate base case. The economy's growth is not projected to be constant throughout the period. The most rapid period of growth occurs during the construction of the ALCAN gasline between 1978 and 1982. During this period, the average annual growth of employment is 5.9 percent, compared to 3.3 percent for the whole period. Population grows 48 percent faster than over the entire period when ALCAN is constructed.

Economic growth provides increases in two measures of individual benefits: real per capita income and real state expenditures. Real per capita income increases by 65 percent between 1977 and 2000. This means that the real purchasing power of the average Alaskan increases with economic growth. Real per capita expenditures is a proxy for the level of services provided by the state government. Real per capita state expenditures increase by 46 percent over the projection period. Over 80 percent of the increase occurs prior to 1989 when petroleum revenues peak.

Economic growth in all three base case scenarios results in similar structural characteristics. Structural changes caused by growth affected each scenario in a similar fashion. In all scenarios, the importance of the support sector is projected to grow throughout the period. The proportion of the population which is employed is also projected to increase over the period. Population is projected to concentrate in Anchorage in all scenarios. The final structural pattern which is similar in all cases is the relationship between state revenues and expenditures. In all cases, expenditures exceed revenues by the end of the period, necessitating the reduction in the fund balance.

IV.   THE IMPACT OF NORTHERN GULF OCS DEVELOPMENT
ON THE ALASKAN ECONOMY: THE MODERATE BASE CASE


In order to capture the important dimensions of uncertainty surrounding
oil and gas development in the Northern Gulf of Alaska, the development
patterns implied by three alternative resource discovery scenarios were
examined and contrasted with the base case projections presented above.
Figure 4 shows the location of the development area. The alternate OCS
scenarios were designed to capture differences in resource quantities,
transport requirements, and technology, all of which will affect the
impacts of any development which actually occurs.   The three scenarios
which were examined included the level of development which would occur
if the mean, 95 percent, and 5 percent probability resource levels were
discovered in the Northern Gulf lease sale area.   This chapter will describe
the impacts of each of these scenarios relative to the moderate base case.
The impact of the 95 percent discovery relative to the low base case and
the 5 percent discovery relative to the high base case will be discussed
in the following chapter.   The first section of this chapter examines the
petroleum development scenarios, and the next section presents the economic
impacts implied by each of these scenarios.


## The Development Scenarios

Three offshore development scenarios were examined, based upon geological,
technical, and employment data prepared by Dames and Moore (Dames and
Moore, 1978).   The petroleum development scenarios are for the proposed
Gulf of Alaska OCS lease sale no. 55, currently scheduled for June 1980.


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FIGURE 4. LOCATION OF STUDY AREA



MIDDLETON SHELF AREA
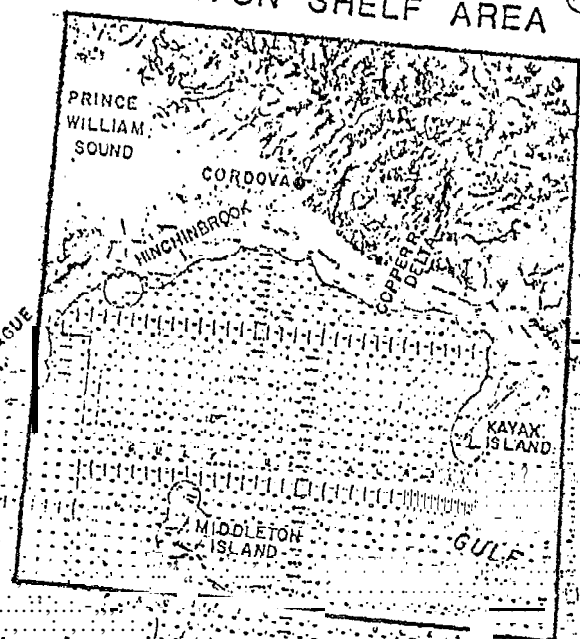
YAKATAGA SHELF AREA
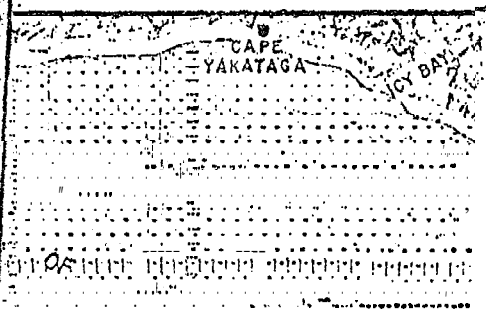
YAKUTAT SHELF AREA
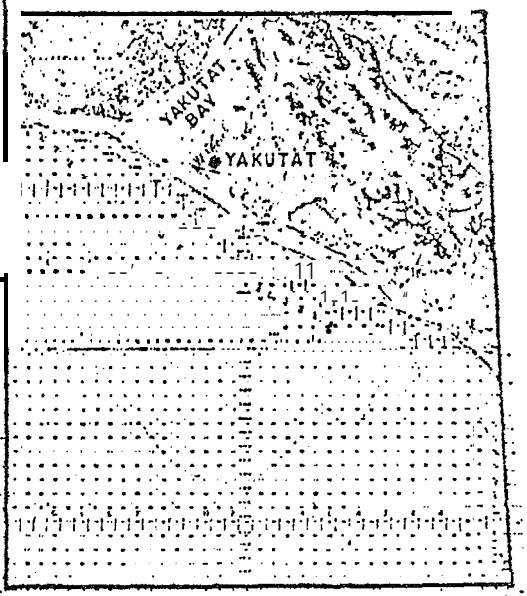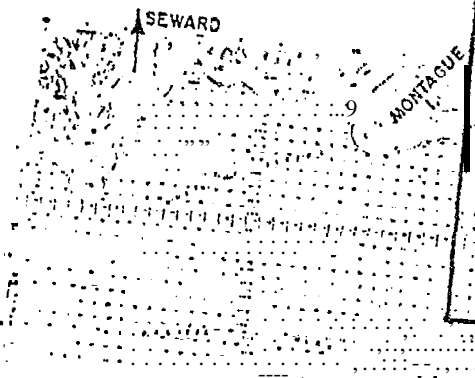
This is the second sale in the Gulf; eleven unsuccessful exploratory wells were drilled on leases from the 1976 sale. There are no current plans for drilling on these leases (Dames and Moore, 1978). The scenarios discussed below are for the 5 percent, 95 percent, and statistical mean levels of U.S.G.S. resource estimates. The 95 percent scenario contains no economic reserves, so it is the same as the exploration scenario. These scenarios will affect the Alaska economy through the direct employment associated with the field development and production and the additional revenues earned by the state.

DIRECT EMPLOYMENT

The development of the Northern Gulf OCS will have two types of employment effects, direct employment in the field and headquarters employment. Head-quarters employment is assumed to increase with development to provide the engineering support, coordination, and administration necessary for the level of activity in the field. All headquarters employment is assumed to be located in Anchorage.

The effect of direct OCS employment on the Alaska economy will depend on the extent the incomes earned in OCS development are spent in Alaska. Two factors limit the impact. First, the probable enclave nature of the development will limit the extent of the interaction with the economy when workers are on the job. Secondly, the international character of many offshore petroleum firms means they have regular, experienced crews which are dispatched to jobs around the world (Dames and Moore, 1978). The international character of these crews may mean that when they are not

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working, they will be outside Alaska. The first step in estimating the overall impact of Northern Gulf OCS development is to estimate the share of direct employment which will reside in Alaska and interact with the economy. Figure 5 illustrates the process used to derive the direct OCS employment impact on the Alaska economy.

Table 54 shows estimates of the share of direct employment to Alaska residents (SEAR) which were used to adjust the direct employment estimates provided by Dames and Moore (Dames and Moore, 1978).[1] In this context, Alaska resident means any employee who resides in Alaska and interacts with the economy during the duration of the project task. SEAR adjustments were made to the direct field employment only; headquarters employment is all assumed to reside in Alaska. The SEAR-adjusted employment is used in the scenarios provided to the MAP model to generate impacts.

SEAR coefficients were determined by the characteristics of the task and considerations of labor supply and demand. Such task characteristics as rotation, duration of the job, and specialized skills requirements were considered. It was assumed that the longer the task's off-duty rotation, the smaller was the probability that an employee would be an Alaska resident since he could travel from the site to a residence outside the state. For the short-duration jobs, it was assumed there was little reason for workers to reside in Alaska or for Alaskans to move into these jobs.

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[1] Final estimates of direct OCS employment may vary slightly in the Dames and Moore report. This difference results from a change in the gas production scenarios to account for lower productivity in gas production than originally assumed.

FIGURE 5.    DETERMINATION OF OCS EMPLOYMENT
            ESTIMATES USED IN THE MAP MODEL

```
          ┌─────────────────────────┐
          │        Direct OCS       │
          │      Field Employment   │
          └─────────────────────────┘

                       x

          ┌─────────────────────────┐
          │ Share of Direct Employment │
          │     To Alaska Residents    │
          └─────────────────────────┘
                       │
                       ▼
          ┌─────────────────────────┐
          │   Direct Alaska Resident  │
          │    OCS Field Employment   │
          └─────────────────────────┘

                       +

          ┌─────────────────────────┐
          │       OCS Related        │
          │   Headquarters Employment │
          └─────────────────────────┘
                       │
                       ▼
          ┌─────────────────────────┐
          │  OCS Employment Estimates │
          │     Used in MAP Model     │
          └─────────────────────────┘
```
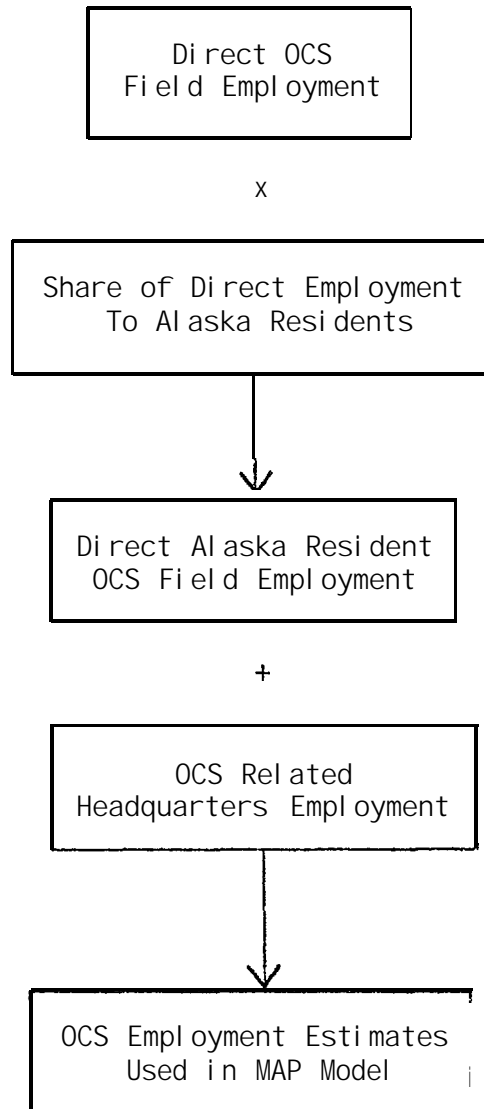
# TABLE 54. ESTIMATED SHARE OF ALASKA
## RESIDENT EMPLOYMENT BY OCS TASK

| Task | Phase | Time Period | | |
|------|-------|-----------|------|------|
| | | 1979-1984 | 1985-1989 | 1990-2000 |

### Onshore

| Task | Phase | 1979-1984 | 1985-1989 | 1990-2000 |
|------|-------|-----------|-----------|-----------|
| 1. Service Base | all phases | 1.00 | 1.00 | 1.00 |
| 2. Helicopter Service | exploration & development | .50 | .53 | .58 |
| | production | 1.00 | 1.00 | 1.00 |
| 3. Service Base Construction | development | .50 | .53 | .58 |
| 4* Pipe Coating | development | .20 | .21 | .23 |
| 5. Onshore Pipeline Construction | development | .20 | .21 | .23 |
| 6. Oil Terminal Construction | development | .50 | .53 | .58 |
| 7. LNG Plant Construction | development | .50 | .53 | .58 |
| 8. Oil Terminal Operations | production | 1.00 | 1.00 | 1.00 |
| 9. LNG Plant Operations | production | 1.00 | 1.00 | 1.00 |

### Offshore

| Task | Phase | 1979-1984 | 1985-1989 | 1990-2000 |
|------|-------|-----------|-----------|-----------|
| 1. Surveys | exploration | .20 | .21 | .23 |
| 2. Rigs | exploration | ,20 | .21 | ,23 |
| 3. Platforms | development | .10 | .30 | .33 |
| | production | 1.00 | 1.00 | 1.00 |
| 4. Platform Installation | development | .10 | .105 | .116 |
| 5. Offshore Pipeline Construction | development | .10 | .105 | .116 |
| 6. Tugboats | exploration | .40 | ,42 | .46 |
| | development | .80 | .88 | .97 |
| | production | .80 | .88 | .97 |

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Finally, the more specialized the skills required, the greater the chance the skills would not be available in Alaska and outside workers would be hired. This meant a smaller probability that the worker would reside in Alaska. These factors change in a systematic fashion through the phase of development so that the probability of workers residing in Alaska increases from the exploration to the production phase. The final factor considered was time. It was assumed that over time, as more OCS projects occur and present non-OCS petroleum projects wind down, the supply of labor for each of these tasks within Alaska will increase. This will increase the prob- ability that workers will reside in Alaska. This is reflected by the increase in SEAR coefficients through time. Appendix C describes the detailed assumptions behind the SEAR coefficients.

REVENUE

Unlike the OCS activity proposed for the Beaufort Sea, production in the Northern Gulf OCS occurs only in federal waters. Because of this, the state will not earn royalty, bonus, or severance tax revenues from the project. The major source of additional revenues will be the property tax revenues from onshore facilities. The property tax revenues earned by the state were based on the estimates of construction cost provided by Dames and Moore (Dames and Moore, 1978). The property tax which the state receives is 20 mills on certain oil and gas properties. The prop- erty tax specifically excludes such property as oil refining property, gas processing property, and interest or rights to produce oil. The property value taxed is depreciated over the life of the field and increased with inflation (Alaska Department of Revenue, 1977).

ALTERNATIVE NORTHERN GULF SCENARIOS

The Mean Probability Resource Level Scenario

The mean scenario represents activity surrounding exploration and development of tracts assumed to be leased in the 1980 sale. It is assumed that 1.4 billion barrels of oil and 5.0 trillion cubic feet of gas are discovered. In this scenario, the discoveries are located in nine separate fields, seven on the Yakutat shelf and two on the Middleton shelf (Dames and Moore, 1978).

Exploration activity in this scenario begins in 1981 and lasts for ten years. All phases of activity overlap. Field development and the construction of facilities begin in 1985 and last through 1990. Production begins in 1988. Total direct construction employment peaks in 1989. The major construction activity in 1989 is the installation of platforms. As construction employment declines, mining employment rises to a peak, of 1,899 in 1991. Petroleum employment maintains a permanent workforce of approximately 1,000 after 1995. Approximately 70 permanent positions in manufacturing result from the operation of the LNG plant which begins operations in 1989. Transportation activity peaks in 1985 with 392 employees. (Employment levels are shown in Table 55. )

The nonproportional relation between Alaska resident employment and direct employment results from the changing task composition of industry employment. Alaska resident construction employment peaks at 915 in 1987, three years prior to the peak in total construction employment. After 1987 the major construction activity is platform installation which is offshore

## TABLE 55. DIRECT EMPLOYMENT REQUIREMENTS
## MEAN SCENARIO

| | | | Mining[1] | | Manufacturing | | Transportation | |
|---|---|---|---|---|---|---|---|---|
| | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment |
| 1981 | 0 | 0 | 452 | 106 | 0 | | 162 | 68 |
| 1982 | 0 | 0 | 564 | 171 | 0 | | 206 | 87 |
| 1983 | 0 | 0 | 935 | 271 | 0 | | 348 | 146 |
| 1984 | 0 | 0 | 989 | 284 | 0 | | 368 | 155 |
| 1985 | 483 | 254 | 1,054 | 315 | 0 | | 392 | 173 |
| 1986 | 1,417 | 533 | 863 | 286 | 0 | | 358 | 290 |
| 1987 | 2,485 | 915 | 808 | 305 | 0 | | 305 | 248 |
| 1988 | 2,661 | 777 | 1,077 | 576 | 0 | | 318 | 262 |
| 1989 | 3,266 | 627 | 1,338 | 779 | 35 | 35 | 398 | 332 |
| 1990 | 2,941 | 622 | 1,702 | 1,114 | 35 | 35 | 314 | 290 |
| 1991 | 685 | 88 | 1,899 | 1,198 | 64 | 64 | 229 | 222 |
| 1992 | 0 | 0 | 1,484 | 1,034 | 70 | 70 | 196 | 191 |
| 1993 | 0 | 0 | 1,071 | 939 | 70 | 70 | 221 | 215 |
| 1994 | 0 | 0 | 840 | 840 | 70 | 70 | 221 | 215 |
| 1995 | 0 | 0 | 865 | 865 | 70 | 70 | 221 | 215 |
| 1996 | 0 | 0 | 965 | 965 | 70 | 70 | 221 | 215 |
| 1997 | 0 | 0 | 990 | 990 | 70 | 70 | 221 | 215 |
| 1998 | 0 | 0 | 1,015 | 1,015 | 70 | 70 | 221 | 215 |
| 1999 | 0 | 0 | 1,015 | 1,015 | 70 | 70 | 221 | 215 |
| 2000 | 0 | 0 | 1,015 | 1,015 | 70 | 70 | 221 | 215 |

[1]Includes headquarters employment based on 2.67 persons per exploration well, .6 persons per development well, and 40 persons per 2,000 barrels per day during production. Once peak is reached, production employment is maintained (Alaska OCS Office).

SOURCE: Dames and Moore, 1978

work, assumed to have a low Alaska resident share because it requires specialized skills and is temporary. Alaska resident mining employment peaks in 1991 which is when total mining employment peaks. By 1994 all mining employment is production employment, all of which is assumed to be Alaska resident. Manufacturing employment is assumed to be all Alaska resident. Transportation employment, like mining, has a much smaller Alaska resident component during exploration. Peak resident employment occurs in 1989 when 332 Alaska residents are employed in transportation.

The only state revenue effects of this development occur because of on-shore facilities which fall under the state's property tax. Oil terminals and onshore pipelines are the properties taxed by the state. The property tax increases to a maximum of $7.8 million in 1992. By 2000 the property tax has fallen to $6.7 million. Table 56 shows the property tax revenues from this scenario.

The 5 Percent Probability Resource Level Scenario

This scenario describes the activity surrounding the exploration, development, and production in the largest assumed find discussed in this report. It is assumed that 4.4 billion barrels of oil and 13.0 trillion cubic feet of gas are discovered. Altogether eighteen fields are developed: twelve fields on the Yakatat shelf, five fields on the Middleton Shelf, and one field on the Yakataga shelf.

Exploration begins in 1981 and lasts ten years. Mining employment reaches an early peak of 1,448 in 1984 during exploration. Field development

## TABLE 56.  NORTHERN GULF OCS PROPERTY
## TAX REVENUES

(Millions of Nominal Dollars)

|      | Mean Scenario | 5 Percent Scenario |
|------|---------------|--------------------|
| 1986 | .1            | .5                 |
| 1987 | 2.0           | .5                 |
| 1988 | 2.4           | 1.1                |
| 1989 | 7.8           | 1.5                |
| 1990 | 7.8           | 17.8               |
| 1991 | 7.8           | 17.9               |
| 1992 | 7.8           | 18.0               |
| 1993 | 7.8           | 18.0               |
| 1994 | 7.7           | 17.9               |
| 1995 | 7.7           | 17.8               |
| 1996 | 7.5           | 17.7               |
| 1997 | 7.4           | 17.4               |
| 1998 | 7.2           | 16.9               |
| 1999 | 7.0           | 16.7               |
| 2000 | 6.7           | 16.2               |

SOURCE :   Based on construction cost

begins in 1984 and lasts until 1992. This is two years longer than in
the mean scenario. Construction employment begins in 1984 and reaches a
peak of 7,861 in 1988. Mining employment reaches a peak of 3,749 in 1991
and maintains a permanent employment of approximately 2,000. Production
of oil begins in 1988 and gas in 1989. This scenario also includes an
LNG plant which begins production in 1988 and has a long-term employment
of 170. Transportation employment peaks in 1989 during development, with
761 employees. Table 57 shows the employment levels in this scenario.

As in the mean scenario, the Alaska employment share is greatest in the
production phase and smallest during exploration. Alaska mining employ-
ment peaks at" 2,461 in 1991, when total mining employment peaks. Alaska
employment plays a relatively small part in the exploration peak in 1984.
The Alaska resident construction employment peaks one year prior to total
construction employment. This is a result of the increased importance of
platform installation after 1987. Peak Alaska resident construction em-
ployment is 2,222. The shifting task composition of transportation employ-
ment accounts for the increased importance of Alaska resident employment
after production begins. After peaking in 1991 at 660, transportation
employment maintains a permanent employment of about 520.

This scenario produces property tax revenues from onshore facilities.
Property tax reveneus begin in 1986 with the completion of the first on-
shore pipeline. Revenues peak in 1992 at $18 million. By 2000 property
tax revenues have fallen to $16.2 million. (See Table 56. )

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TABLE 57. **DIRECT** EMPLOYMENT REQUIREMENTS
5 PERCENT SCENARIO

| | Construction | | Mining[1] | | Manufacturing | | Transportation | |
|---|---|---|---|---|---|---|---|---|
| | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment |
| 1981 | 0 | o | 541 | 166 | 0 | | 196 | 82 |
| 1982 | 0 | 0 | 927 | 266 | 0 | | 343 | 144 |
| 1983 | 0 | 0 | 1,426 | 340 | 0 | | 441 | 185 |
| 1984 | 1,529 | 765 | 1,448 | 418 | 0 | | 539 | 227 |
| 1985 | 3,461 | 2,101 | 1,315 | 391 | 0 | | 490 | 430 |
| 1986 | 4,748 | 2,208 | 965 | 370 | 0 | | 417 | 340 |
| 1987 | 4,866 | 2,222 | 900 | 399 | 0 | | 445 | 363 |
| 1988 | 7,861 | 1,888 | 1,588 | 798 | 85 | 85 | 761 | 628 |
| 1989 | 6,051 | 998 | 2,681 | 1,539 | 85 | 85 | 656 | 536 |
| 1990 | 3,799 | 444 | 3,712 | 2,300 | 170 | 170 | 688 | 650 |
| 1991 | 3,867 | 449 | 3,749 | 2,461 | 170 | 170 | 699 | 660 |
| 1992 | 1,200 | 139 | 3,603 | 2,279 | 170 | 170 | 566 | 519 |
| 1993 | 0 | 0 | 2,926 | 2,248 | 170 | 170 | 512 | 501 |
| 1994 | 0 | 0 | 2,729 | 2,154 | 170 | 170 | 539 | 525 |
| 1995 | 0 | 0 | 2,126 | 2,014 | 170 | 170 | 539 | 525 |
| 1996 | 0 | 0 | 2,044 | 2,044 | 170 | 170 | 539 | 525 |
| 1997 | 0 | 0 | 2,144 | 2,144 | 170 | 170 | 539 | 525 |
| 1998 | 0 | 0 | 2,194 | 2,194 | 170 | 170 | 539 | 525 |
| 1999 | 0 | 0 | 2,194 | 2,194 | 170 | 170 | 539 | 525 |
| 2000 | 0 | 0 | 2,156 | 2,156 | 170 | 170 | 527 | 513 |

[1] Includes headquarters employment based on 2.67 persons per exploration well. .6 persons per development well, and 40 persons per 2,000 barrels per day during' production. Once peak is reached, production employment is maintained (Alaska OCS Office).

SOURCE : Dames and Moore, 1978

## The 95 Percent Probability Resource Level Scenario

The 95 percent probability resource level for the lease sale area in the Northern Gulf is no oil or gas resources. Because there are no resources, this scenario describes an exploration-only case. Exploration begins in 1981 and lasts four years. The maximum employment occurs in the first two years with 541 mining employees and 196 transportation employees. The Alaska share of this employment is low; at its maximum, it includes 149 mining employees and 82 transportation employees. Because there is no production, there are no property taxes generated by this project. (See Table 58.)

## Definition and Measures of Impact

OCS development will lead to changes in those factors which have been isolated as important to economic growth: exogenous employment, personal income, and state expenditures. Changes in these factors will result in changes in population, the structure of employment, the state's fiscal position, and the regional distribution of growth. These changes are the economic impact of OCS development.

We will examine the impact of each of the three petroleum scenarios. The impacts will be compared to economic growth in the moderate case. The impact will vary since the scenarios vary in terms of their primary employment impact, timing, level of production, and revenues which accrue to the state. The impacts will be measured as changes from the base case. In making this comparison, it must be assumed that the economy responds the same to employment and revenues generated by Northern Gulf OCS development as it did to similar changes in the past.

TABLE 58.  DIRECT EMPLOYMENT REQUIREMENTS
95 PERCENT SCENARIO

| | Mining[1] | | Transportation | |
|---|---|---|---|---|
| | Total Direct Employment | SEAR Adjusted Employment | Total Direct Employment | SEAR Adjusted Employment |
| 1981 | 541 | 149 | 196 | 82 |
| 1982 | 541 | 149 | 196 | 82 |
| 1983 | 405 | 114 | 142 | 62 |
| 1984 | 111 | 21 | 40 | 17 |
| 1985 | 0 | 0 | 0 | 0 |

[1] Includes headquarters employment based on 4 persons per exploration well, .6 persons per development well, and 40 persons per 2,000 barrels per day during production.  Once peak is reached, production employment is maintained (Alaska OCS Office).

SOURCE :   Dames and Moore, 1978

Rapid economic growth associated with OCS development will affect most economic variables. Although many variables will be affected, a much smaller number is important; and information on these dimensions of impact will describe the effect of rapid growth on the state economy. Petroleum development in the Alaska OCS can have two major types of impact. First, OCS development will affect the magnitude of the economic indicators. OCS development will expand the economy. Secondly, OCS development may change the process of growth. OCS development may change certain structural trends observed in the base case. Both of these dimensions will be considered when the impact of CCS development is examined.

The impact of any specific scenario can be discussed by referring to the following set of questions:

1.  How has the magnitude of economic indicators been changed by OCS development?

    a.  How has the growth of the aggregate indicators of economic activity--employment, population, personal income--been affected by OCS development?

    b.  How has OCS development affected the state's fiscal position? Have state revenues and expenditures changed? What is the effect on the fund balance?

    c.  What is the effect of OCS development on the earning power of individuals, as measured by real per capita income?

d.   What is the effect of OCS development on the
average level of services, as measured by real
per capita state expenditures, provided by the
state?

2.   Has OCS development changed the process of growth?

a.   Are the components of population growth changed in
relative importance?

b.   Are past trends in the age-sex distribution and
its effect on the dependency ratio changed by OCS
development?

c.   Are past trends in the composition of employment
changed by OCS development?

d.   Does OCS development change the interaction among
regions?

## Summary of the Moderate Base Case

The moderate base case is one of three base cases used in this report.
The alternative base cases used in this study differ by the assumed level
of previous OCS activity; the non-OCS assumptions in all three base
cases are similar.  The moderate base case includes moderate development
scenarios of the first Lower Cook OCS lease sale area and the Beaufort
Sea OCS lease sale area.

Substantial growth is projected over the period 1978 to 2000 for the
moderate base case.  Employment is projected to reach 365,000 by 2000

arid grow at an annual average rate of 3.3 percent.  The most rapid growth occurs with the construction of the ALCAN gas line between 1981 and 1984.  Population is projected to grow at a rate slightly less than employment and reach 789,000 by 2000.  Personal income is projected to expand at an average annual rate of 10.6 percent between 1978 and 2000. The growth of these aggregate variables, while substantial, is less than the growth during the period 1965-1976.

Four structural characteristics of this projected growth were observed. First, as the scale of the economy expands, the importance of the support sector increases.  Secondly, the changing age distribution of the population and labor force participation lead to decreases in the dependency ratio (population/employment).  Third, as the state grows, more of this growth is concentrated in Anchorage.  Finally, the state's fund balance increases to a peak and then falls as expenditures exceed revenues and the fund balance is used to make up the difference.

## The Impacts of Northern Gulf
## OCS Development: Mean Scenario

This section will describe the economic impact of the mean Northern Gulf OCS development scenario.  The impact of this scenario is, as would be expected, intermediate relative to the impacts of the high and low scenarios.  Because of this, the mean scenario impacts will be described in detail in this section, while the impacts of the 5 percent and 95 percent scenarios will be described as they relate to this scenario.

The mean Northern Gulf OCS development scenario includes the development of a number of fields. Each phase of activity--exploration, development, and production--occurs at different times in each field, so the phases of activity are not distinct. Exploration begins in 1981. Development begins in 1985. Both of these phases end in 1990. Production begins two years prior to the end of exploration and development in 1988. This schedule of activity provides two significant time periods to examine: 1980-1990, when development and exploration occur, and 1990-2000, when only production activity occurs.

EMPLOYMENT

This section will examine the impact of OCS development on employment. Employment is one of the aggregate indicators of economic growth. OCS development increases the growth of employment in the projection period. OCS development not only affects the magnitude of employment growth but may also change the structure of employment observed in the base case. If OCS development affects the growth of industries differently than in the base case, the structure will change.

By 2000 employment is projected to be approximately 5,800, or 1.6 percent greater than in the moderate base case. (See Table 59.) The average growth rate between 1978 and 2000 has increased slightly from 3.3 percent per year in the base case to 3.4 percent per year with OCS development. The peak impact occurs in 1990 when employment is 10,300, or 3.9 percent greater than in the base case. This is the same year that total direct Alaska resident employment reaches its peak.

TABLE 59.    EMPLOYMENT IMPACT
NORTHERN GULF OCS
MEAN SCENARIO, ALASKA

|      | Base Case Employment | Mean OCS Scenario Employment | Impact |
|------|---------------------|------------------------------|--------|
| 1980 | 194,054             | 194,054                      | 0      |
| 1985 | 224,931             | 227,742                      | 2,811  |
| 1990' | 266,632            | 278,055                      | 11,423 |
| 1995 | 308,016             | 312,619                      | 4,603  |
| 2000 | 364,721             | 370,496                      | 5,775  |

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[1] Peak direct Alaska resident employment. The end of the exploration-development phase.

SOURCE :    MAP Model

The overall general pattern of employment impact follows the pattern of direct Alaska resident employment. Direct employment is close to 20 percent of the total impact throughout the period. Development of the Northern Gulf OCS does not prevent the fall in employment after the peak ALCAN construction years in 1983. The growth of employment from 1980, the year of the OCS lease sale, to 1990, the end of both the exploration and development, averages 3.7 percent per year. This is 13 percent greater than in the base case. The growth rate after 1990 is less than in the base case. The reduced rate of growth in the production period is a result of the decrease in employment impact from its peak in 1990.

The growth caused by OCS development does not significantly change the structure of employment from that observed in the base case. Table 60 compares the structure of the economy, as described by the employment distribution in the base and impact cases. The major change in the structure of the economy observed in the base case is supported by the introduction of the mean Northern Gulf OCS development scenario. The support sector increases in importance throughout the projection period, increasing to approximately 53 percent in both cases.

POPULATION

Population is an aggregate indicator of economic activity which measures the response of people to increased employment opportunities. OCS development will increase the magnitude of population growth. OCS development may also change the characteristics of the population such as the age-sex

TABLE 60.    THE STRUCTURE OF THE ECONOMY
MEAN SCENARIO
ALASKA

| | Proportion of Total Employment | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| **Support Sector** | | | | | |
| Moderate Base | 39.5 | 42.7 | 46.2 | 49.6 | **53.1** |
| Mean Scenario | 39.5 | 42.9 | 46.8 | 49.8 | 53.2 |
| **Government** | | | | | |
| Moderate Base | 36.0 | 33.1 | 29.6 | 26.5 | 23.1 |
| Mean Scenario | 36.0 | 32.7 | 28.8 | 26.2 | 22.9 |
| **Basic Sector** | | | | | |
| Moderate Base | 24.5 | 24.2 | 24.2 | 23.8 | 23.8 |
| Mean Scenario | 24.5 | 24.3 | 24.4 | 24.0 | 24.0 |

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Support Sector includes transportation-communication-public utilities, trade, finance, and service employment.

Government includes state, local, and federal employment.

Basic Sector includes mining, manufacturing, agriculture-forestry-fisheries, and construction employment.

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distribution or the importance of the components of change. This section will examine the impact on population of Northern Gulf OCS development.

Population is 16,440 greater by 2000 because of Northern Gulf OCS development; this is a 2.1 percent increase over the base case. Population impact peaks in 1990 at about 21,000, which is 3.5 percent greater than the base case. This is the year in which both the employment impact and the level of direct Alaska resident employment on the project reach their peak. The average growth rate between 1978 and 2000 is 3.2 percent per year. This is a slight increase from the 3.1 percent rate in the base case. As in the base case, population grows slightly slower than employment; the dependency ratio falls from 2.28 in 1978 to 2.17 in 2000. Table 61 describes the population impact.

The pattern of growth is affected by OCS development. The development of the Northern Gulf OCS does not reverse the decrease experienced after the peak ALCAN construction year, 1983. In both cases, population falls by less than one percent. Population, like employment, grows faster than in the base case in the period from the beginning of exploration to the end of development and grows slower after that. Between 1980 and 1990, the average annual rate of growth is 3.5 percent in the mean scenario and 3.1 percent in the base case. Between 1990 and 2000, the rate of growth in the mean scenario is 2.8 percent, compared to 2.9 percent in the base case. The main reason for this is that impact population increases throughout exploration and development. After that, impact population falls and stabilizes during production.

TABLE 61.    POPULATION IMPACT
NORTHERN GULF OCS
MEAN SCENARIO, ALASKA

|       | Base Case Population | Mean OCS Scenario Population | Impact |
|-------|------------------|----------------------|--------|
| 1980  | 434,173          | 434,173              | 0      |
| 1985  | 509,057          | 513,372              | 4,315  |
| 1990' | 591,580          | 612,523              | 20,944 |
| 1995  | 677,649          | 692,017              | 14,368 |
| 2000  | 789,287          | 805,725              | 16,437 |

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[1] Peak direct Alaska resident employment. The end of the exploration-development phase.

SOURCE :    MAP Model

Northern Gulf OCS development affects the components of population change.
The most important effect occurs during the buildup to the peak impact in
1990.    Table 62 compares the role of migration in population change between
1984 and 1995.    These years cover the peak development years when the
population impact from OCS development increases to its peak of 21,000
in 1990 and then falls to a constant level of approximately 15,000 by
1996.    The importance of migration as a component of population change
is increased relative to the base case during this period.    Migration
accounts for over 50 percent of the population change from 1986 to 1990
in the OCS case, while it accounts for over 50 percent only in 1988 and
1989 in the base case.    Between 1990 and 1995, migration is less important
to population change than in the base.    The decrease in level of employ-
ment in the Northern Gulf and the higher number of births resulting from
high population are responsible for this effect. By the time the popula-
tion impact stabilizes in 1995, the importance of migration as a component
of population change is the same;  by 1996 migration is responsible for
5"1.4 percent of the change in population in both cases.

Two related trends concerning the structure of the population were ob-
served in both the base case and the historical period.    The first was
the reduction in the dependency ratio.    This trend is also projected to
occur in the OCS development case.    By 2000 the dependency ratio in both
the base and OCS development cases has fallen to 2.17. The major reasons
for this are an increase in the labor force participation of the working-
age population and an increase in the proportion of working-age population
in the population.    This is related to the second observed change in the

TABLE 62.  THE MIGRATION COMPONENT OF POPULATION CHANGE
NORTHERN GULF MEAN OCS SCENARIO
1986-1996


Migration as a Percent of Total Population Change

|      | Moderate Base Case | Mean OCS Scenario |
|------|--------------------|-------------------|
| 1986 | 43.1               | 53.6              |
| 1987 | 49.1               | 59.7              |
| 1988 | 53.5               | 58.8              |
| 1989 | 53.2               | 55.4              |
| 1990 | 45.2               | 50.0              |
| 1991 | 40.2               | 28.5              |
| 1992 | 42.1               | 25.5              |
| 1993 | 46.8               | 40.2              |
| 1994 | 46.5               | 42.4              |
| 1995 | 49.1               | 47.5              |
| 1996 | 51.4               | 51.4              |

SOURCE :   MAP Model

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structure of the population, the aging of the population, Table 63 shows
the age-sex distribution prior to OCS development and at the end of the
projection period. As in the base case, the population is projected
to age. The population over 30 increases from 37.6 percent in 1980 to
43 percent in 2000.

PERSONAL INCOME

The final aggregate indicator of economic growth is personal income. The
impact of OCS development is to increase personal income relative to the
base case. (See Table 64. ) By 2000 Northern Gulf OCS development will
have increased the level of personal income by $937.6 million, or 2.4 per-
cent. Personal income is projected to increase at an average annual rate
of 10.8 percent between 1978 and 2000. This is slightly greater than the
growth rate in the base case of 10.7 percent per year. The peak impact
occurs in 1990, when personal income is $1.1 billion, or 7.3 percent
greater than in the base case.

The impact of Northern Gulf OCS development on personal income rises to
its 1990 peak, then falls until 1994. This coincides with the decrease
in the level of project employment. After 1994 direct resident employment
is stable; the rise in personal income impact is a result of increasing
prices and wages. OCS development is not enough to prevent the fall in
personal income after the peak ALCAN year in 1983. The magnitude of the
fall is similar in both the base and impact cases. Growth in personal
income averages a rate of 11.4 percent per year during the development
and exploration phase. After the end of this phase in 1990, the average

TABLE 63.   AGE-SEX STRUCTURE OF THE POPULATION
NORTHERN GULF MEAN OCS SCENARIO
ALASKA

| | 1980 | | | 2000 | |
| Age Cohorts | Males | Females | | Males | Females |
|---|---|---|---|---|---|
| 0-14 | 15.08 | 14.56 | | 14.27 | 13.81 |
| 15-29 | 18.47 | 14.33 | | 15.84 | 13.09 |
| 30-49 | 13.35 | 12.12 | | 14.83 | 13.37 |
| 50-59 | 3.31 | 2.92 | | 3.83 | 3.70 |
| 60 + | 3.06 | 2.81 | | 3.37 | 3.90 |

SOURCE :   MAP Model

TABLE 64.   PERSONAL INCOME IMPACT
NORTHERN GULF OCS MEAN SCENARIO
ALASKA

(Millions of Nominal Dollars)

|        | Base Case<br>Personal Income | Mean OCS Scenario<br>Personal Income | Impact |
|--------|----------------|----------------|--------|
| 1980   | 5,395          | 5,395          | 0      |
| 1985   | 8,810          | 9,008          | 198    |
| 1990'  | 14,836         | 15,919         | 1,083  |
| 1995   | 23,829         | 24,367         | 537    |
| 2000   | 39,559         | 40,496         | 937    |

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[1] Peak direct Alaska resident employment. The end of the exploration. development phase.

SOURCE :   MAP Model

rate of growth is 9.8 percent per year. As with employment and population, the rate of growth of personal income is faster during the exploration-development phase than during the same time period in the base case and slower than in the base case after this period.

The growth in personal income reflects the ability of the economy to generate increased returns to factors. It is not the best measure of the welfare of the region because it reflects both the growth of employment and prices. One measure of welfare is real per capita income. This measures the command of the average individual over goods and services. Real per capita income accounts for the effect of prices and population on the growth in personal income. Table 65 shows the impact of Northern Gulf development on real per capita income. The development of the Northern Gulf OCS has two differential periods of impact. OCS activity has a positive effect on real per capita incomes until 1992; after this, the impact on real per capita income is negative. The impact on real per capita income is greatest in 1987, the year of the peak direct Alaska resident construction employment; real per capita income is $140, or 3.0 percent greater than in the base case. By 2000 real per capita income is less than but not significantly different from the base case. The differential between the OCS development and base cases is affected by the composition of employment. The greatest difference occurs when the peak in high wage construction employment occurs, not when the peak in total employment occurs. Real per capita income as a measure of welfare does not consider the distribution of income.

TABLE 65.    REAL PER CAPITA INCOME IMPACT
NORTHERN GULF OCS MEAN SCENARIO
ALASKA

| | Real Per Capita Income | | | Relative Price Index | | |
|---|---|---|---|---|---|---|
| | Base Case | Mean Scenario | Impact | Base Case | Mean Scenario | Impact |
| 1980 | 4,029 | 4,029 | 0 | 308.4 | 308.4 | 0 |
| 1985 | 4,463 | 4,511 | 48 | 387.8 | 389.0 | 1.2 |
| 1987[1] | 4,732 | 4,873 | 140 | 425.5 | 429.1 | 3.6 |
| 1990[2] | 5,119 | 5,250 | 131 | 489.9 | 495.1 | 5.2 |
| 1995 | 5,720 | 5,706 | -14 | 614.8 | 617.1 | 2.3 |
| 2000 | 6,456 | 6,448 | -7 | 776.4 | 779.5 | 3.1 |

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[1]Peak real per capita income impact.

[2]Peak direct Alaska resident employment. The end of the exploration-development phase.

SOURCE :    MAP Model

The rapid growth which occurs during the exploration and development phases increases the price level relative to the base case. The relative price index is one percent greater than in the base by 1990, the end of the exploration-development phase. After 1990 the economy in the OCS development case is projected to expand less rapidly than in the base case. Because of this, prices do not increase as fast in the OCS case, and the price differential between the cases is reduced.

THE STATE FISCAL POSITION

The development of the Northern Gulf OCS will affect the state fiscal position in two ways. First, OCS development will affect the revenues received by the state. The state will receive direct revenues from the OCS activity in the form of property taxes. The extra economic growth which will result because of OCS activity will also affect state revenues. Secondly, OCS development will affect the state's fiscal position through its impact on state expenditures. The increase in population and economic activity which will result from OCS development may change the determinants of state expenditures. Both of these changes will affect the fund balance and the level of services provided by the state. This section will describe the impact of OCS development on the state's fiscal position.

REVENUES

Northern Gulf OCS development provides the state with a new source of revenue, property taxes from onshore facilities. However, the major revenue impact results from those revenues not directly generated by the project. Property tax revenues from Northern Gulf OCS development are projected to

be minimal in the mean scenario. Between 1989 and 1993, they are approximately $7.8 million per year. This is only .2 percent of the total revenues in 1990. The direct property tax revenues fall to $6.7 million by 2000.

The overall revenue impact is much larger. Table 66 illustrates the impact of OCS development on total general fund revenues and endogenous revenues, which is a component of general fund revenues. By 1990, total general fund revenues are about $5 billion. This is $95 million greater than in the base case, a two percent increase because of OCS development. The revenue impact falls with the decrease in direct employment until 1995, when direct. resident employment stabilizes. After 1995, the revenue impact increases. By 2000, the impact on total general fund revenues is $95 million. Total general fund revenues grow only slightly faster because of OCS development over the 1980-to-2000 period. After 1995, general fund revenues increase at a rate of 5.6 percent per year compared to 5.5 percent in the base case.

The major components of impact revenues are the endogenous revenues, those revenues generated by the growth of the economy.[1] The income taxes paid by OCS resident Alaska employees are included in these revenues. In 1995, when the impact on general fund revenues is the greatest, endogenous revenues account for 88 percent of the revenue impact. By 2000, these revenues account for 95 percent of the impact. Endogenous revenues

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[1] Endogenous revenues include personal income taxes, nonpetroleum corporate income taxes, business license taxes, motor fuels tax, alcohol tax, cigarette tax, ad valorem tax, school tax, fees and license revenues, ferry revenues, and miscellaneous taxes and revenues.

TABLE 66.   STATE REVENUE IMPACT
NORTHERN GULF OCS MEAN SCENARIO
ALASKA

(Millions of Nominal Dollars)

| | General Fund Revenues | | | Endogenous Revenues | | |
|---|---|---|---|---|---|---|
| | Base Case | Mean Scenario | Impact | Base Case | Mean Scenario | Impact |
| 1980 | 1,625 | 1,625 | 0 | 231 | 23? | 0 |
| 1985 | 3,629 | 3,639 | 10 | 450 | 458 | 8 |
| 1990[1] | 4,712 | 4,804 | 91 | 859 | 945 | 76 |
| 1991[2] | 4,880 | 4,975 | 95 | 979 | 1,063 | 84 |
| 1995 | 5,864 | 5,911 | 47 | 1,600 | 1,647 | 46 |
| 2000 | 7,678 | 7,773 | 95 | 3,071 | 3,161 | 90 |

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[1] Peak direct Alaska resident employment. The end of the exploration-development phase.

[2] Peak revenue impacts.

SOURCE :   MAP Model

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increase to $3.2 billion by 2000.   This is 3 percent greater than in the

base case.   As with total revenues, the impact peaks in 1991 and begins

rising again after 1995 when direct employment stabilizes.   Over the

period 1980 to 2000, endogenous revenues are projected to increase at an

average rate of 14 percent per year.   This is greater than the 13.8 percent

rate of increase in the base case.


STATE EXPENDITURES

Table 67 shows the expenditure impact of OCS development. Total expendi-

tures increase because of OCS development and the pattern of expenditure

impact follows the projected pattern of OCS direct resident employment.

By 2000, state expenditures are projected to be $10.1 billion with Northern

Gulf OCS development; this is $106 million, or one percent, greater than

in the base case.   The maximum expenditure impact is achieved nine years

earlier.   In 1991, state expenditures are $188 million, or 4 percent greater

than in the base case.   Expenditures increase at a rate of 11.3 percent

per year between 1980 and 1991, when they peak, and 7.9 percent after 1991.

This is greater than the base case rate of 10.9 percent in the earlier

period but less than the 8.3 percent in the later period.


Expenditures increase for two reasons.   First, expenditures increase be-

cause of increases in population and prices.   As population and prices

increase, expenditures must increase to maintain the same level of

service.   Secondly, expenditures will increase if the level of service

provided by state government increases. Real per capita expenditures

are a measure of the level of services provided by the state.   Table 67

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## TABLE 67. STATE GOVERNMENT EXPENDITURE IMPACTS
## NORTHERN GULF OCS MEAN SCENARIO
## ALASKA

| | Total State Expenditures (Millions of Nominal Dollars) | | | Real Per Capita State Expenditures | | |
|---|---|---|---|---|---|---|
| | Base Case | Mean Scenario | Impact | Base Case | Mean Scenario | Impact |
| 1980 | 1,567 | 1,567 | 0 | 1,170 | 1,170 | 0 |
| 1985 | 2,748 | 2,762 | 15 | 1,392 | 1,383 | - 9 |
| 1990[1] | 4,557 | 4,713 | 157 | 1,572 | 1,554 | -18 |
| 1991[2] | 4,904 | 5,092 | 188 | 1,578 | 1,575 | - 3 |
| 1995 | 6,667 | 6,733 | 66 | 1,600 | 1,577 | -24 |
| 1996 | 7,201 | 7,268 | 67 | 1,601 | 1,576 | -25 |
| 2000 | 10,029 | 10,135 | 106 | 1,637 | 1,614 | -23 |

[1] Peak direct Alaska resident employment. The end of the exploration-development phase.

[2] Peak state expenditure impact.

SOURCE : MAP Model

shows the impact of OCS development on the real per capita expenditures.
Real per capita expenditures are less than in the base case throughout
the period.   The difference is less than 1.5 percent throughout the
period.   The maximum difference in real per capita expenditures is in 1996
when they are $25 less than in the base case.   By 2000, real per capita
expenditures are $1,614 with OCS development; this is 1.4 percent
less than in the base case.


FUND BALANCE
The state's fund balance consists of the total of the permanent and
general fund.   The permanent fund will not be affected by Northern Gulf
OCS development because OCS development on the Northern Gulf does not
produce the type of revenues subject to the permanent fund. The fund
balance impact will be on the general fund.   Table 68 shows the impact of
OCS development on the fund balance.   The fund balance follows the same
pattern as in the base case, rising to a peak in 1997 and then falling as
the fund balance is drawn on to meet expenditures. However, development
of the Northern Gulf OCS according to the mean scenario reduces the level
of the fund balante.   By the end of the exploration-development phase in
1990, the fund balance is projected to be $150 million less than in the
base case. This is a 1.2 percent reduction.   By the end of the projection
period in 2000, the fund balance is $14.9 billion, or almost 2 percent
less than in the base case.   The reduced fund balance generates less
interest revenue which contributes to the reduction in the fund balance.

TABLE 68.    IMPACT ON STATE FISCAL POSITION
NORTHERN GULF OCS MEAN SCENARIO
ALASKA

(Millions of Nominal Dollars)

|  | Fund Balance | | | General Fund Revenues Minus General Fund Expenditures | | |
|---|---|---|---|---|---|---|
|  | Base Case | Mean Scenario | Impact | Base Case | Mean Scenario | Impact |
| 1980 | 1,329 | 1,329 | 0 | 361 | 361 | 0 |
| 1985 | 5,936 | 5,925 | - 11 | 1,429 | 1,426 | - 2 |
| 1990[1] | 12,28? | 12,131 | -150 | 1,044 | 1,004 | -39 |
| 1991[2] | 13,193 | 12,983 | -210 | 912 | 851 | -60 |
| 1995 | 15,809 | 15,513" | -296 | 416 | 409 | - 7 |
| 19973 | 16,164 | 15,864 | -300 | 91 | 88 | - 2 |
| 2000 | 15,200 | 14,913 | -287 | -546 | -536 | 10 |

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[1] Peak direct Alaska resident employment. The end of the exploration-development phase.

[2] Maximum impact on General Fund revenues net of expenditures.

[3] Maximum fund balance impact.

SOURCE :    MAP Model

The fund balance is reduced because the increased revenues associated with OCS development do not cover the increased cost. The difference between general fund revenues and general fund expenditures describes the imbalance between revenues and expenditures. The addition of the Northern Gulf OCS development according to the mean scenario reduces net revenues below their base case levels between 1981 and 1997. During this period, the revenue impact of OCS development is less than the expenditure impact. This results in part from the reliance on petroleum revenues which are not substantially increased by OCS development. After 1997, the OCS impact on net revenues is positive, which means the revenue impact is greater than the expenditure impact. This is not enough to make the overall fund balance impact positive, but it does reduce the negative fund balance impact of OCS development. The negative impact on the fund is at its maximum in 1997 when the fund balance is $300 million less than in the base case. By 2000, the fund balance is only $287 million less than in the base case. After 1997, expenditures in both the base and impact cases grow at similar rates, while revenues grow slightly faster with OCS development. This difference in growth rates causes the reduction in the negative fund balance impact by 2000. The growth in revenues is primarily a result of the faster growth of endogenous revenues.

The overall impact of Northern Gulf OCS development on the state fiscal position is negative. The fiscal position is a combination of the impact on state services as measured by real per capita expenditures and the fund balance. A clear negative fiscal impact can be seen since the OCS development decreases both the fund balance and the level of real per capita income from their base case levels.

THE REGIONS

This section examines the regional impacts of OCS development on two regions, Anchorage and Southcentral Alaska. Different types of impact can be expected in each region since the character of the regions differs. Anchorage is the metropolitan center of the state. OCS development will impact Anchorage through both the direct OCS headquarters employment and Anchorage's role as the administration and distribution center for the state. Southcentral will be mainly affected by the direct OCS development; Northern Gulf activity occurs within Southcentral Alaska. This section will describe the impact of OCS activity on each region in terms of the growth of the aggregate indicators of economic growth--population, employ-ment, and disposable real personal income--and changes in the structure of the economy as measured by the distribution of employment.

Anchorage

Table 69 shows the impact on Anchorage of developing the Northern Gulf OCS according to the mean scenario. As at the state level, each of these indicators increases because of OCS activity. The pattern of increase follows the pattern of direct resident employment impact.

Population is projected to Increase to 431,026 by .2000 with Northern Gulf OCS development. This is an 8,417, or 2 percent, increase over the base case. Population grows at an average annual rate of 3.7 percent from 1980 to 2000. This is slightly faster than the 3.6 percent growth rate in the base case over the same time period. The Anchorage popula-tion impact peaks in 1990, when population is 10,343 greater than in the

TABLE 69.   IMPACT ON AGGREGATE INDICATORS OF ECONOMIC GROWTH
NORTHERN GULF OCS MEAN SCENARIO
ANCHORAGE

|  | Population | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 207,323 | 207,323 | 0 |
| 1985 | 248,194 | 249,962 | 1,768 |
| 1990 | 295,590 | 305,932 | 11,343 |
| 1995 | 350,467 | 357,795 | 7,328 |
| 2000 | 422,609 | 431,026 | 8,417 |

|  | Employment | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 91,938 | 91,938 | |
| 1985 | 110,055 | 111,258 | 1,20: |
| 1990 | 134,221 | 139,743 | 5,522 |
| 1995 | 160,260 | 162,462 | 2,202 |
| 2000 | 196,092 | 199,012 | 2,920 |

|  | Real Disposable Personal Income (Millions of Constant Dollars) | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 677 | 677 | 0 |
| 1985 | 887 | 899 | 12 |
| 1990 | 1,177 | 1,235 | 58 |
| 1995 | 1,524 | 1,547 | 23 |
| 2000 | 2,015 | 2,047 | 32 |

SOURCE :   MAP Model

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base case. Even though the major direct employment occurs in the South-central region, Anchorage has almost half of the population impact. In 1990, 49 percent of the state population impact occurs in Anchorage; by 2000, the Anchorage impact is 51 percent of the statewide impact. As in the base case, population continues to concentrate in Anchorage. By 2000, Anchorage contains 53.5 percent of the state population in both the base case and the OCS development. case.

Employment also increases because of Northern Gulf OCS development. By 2000, employment is projected to be 199,012, which is almost 3,000 greater than in the base case. Over the impact period, 1980-2000, employment grows at an average rate of 3.9 percent per year in the OCS development case, which is a slight increase over the base case growth rate. The Anchorage employment impact also peaks in 1990 at 5,522, which is 4 percent greater than the base case population. Anchorage has close to 50 percent of the OCS employment impact throughout the period. As in the base case, population increases slower than employment; the dependency ratio has fallen to 2.17 by 2000. This is slightly higher than the 2.16 dependency ratio in the base case in 2000.

Real disposable income is projected to be $2.0 billion in 2000, an increase of $32 million over the base case. Real disposable income increases at an average rate of 5.7 percent per year from 1980 to 2000, which is slightly faster than the 5.6 percent growth rate in the base case.

ECONOMIC STRUCTURE

The impact of OCS development in the Northern Gulf may not affect all industries equally. Table 70 illustrates the effect of OCS development on the structure of employment. All of the industrial sectors grow with OCS development. As in the base case, the most rapid growth occurs in the support sector. Over the impact period, 1980-2000, transportation-communication-utilities and local construction increases its share of employment from 14.9 percent to 17.7 percent; and trade, services, and finance-insurance-real estate increases its share from 46.4 percent to 58.9 percent. The basic sector maintains a relatively constant share of employment; the increase in this sector comes mainly from the growth in manufacturing. Although government employment increases, its share falls from 34.6 percent to 19.2 percent between 1980 and 2000. The development of the Northern Gulf OCS supports the changing structure of the economy projected in the base case.

## Southcentral Alaska

Table 71 describes the impact of Northern Gulf OCS development according to the mean scenario on the Southcentral region of Alaska. This table shows three aggregate indicators of economic growth which are projected to increase with OCS development. The lease sale areas are located in the Southcentral region, so the major direct impact will occur in this region. The relatively underdeveloped support sector of the region will limit the impact of OCS development.

## TABLE 70.   ECONOMIC STRUCTURE
### NORTHERN GULF OCS MEAN SCENARIO
### ANCHORAGE

| | Support Sector I | | Support Sector II | | Government | | Basic Sector | |
|---|---|---|---|---|---|---|---|---|
| | Employment | % of Total | Employment | % of Total | Employment | % of Total | Employment | % of Total |
| 1980 | 42,516 | 46,4 | 13,652 | 14.9 | 31,763 | 34.6 | 3,746 | 4.1 |
| 1985 | 54,917 | 49.7 | 17,453 | 15.8 | 33,527 | 30.3 | 4,632 | 4.2 |
| 1990 | 74,018 | 53,6 | 22,850 | 16.5 | 35,580 | 25.8 | 5,692 | 4.1 |
| 1995 | 89,403 | 56.0 | 27,195 | 17.0 | 36,368 | 22.8 | 6,780 | 4.3 |
| 2000 | 114,667 | 58.9 | 34,495 | 17.7 | 37,427 | 19.2 | 8,107 | 4.3 |

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Support Sector I includes trade, services, and finance-insurance-real estate employment.

Support Sector II includes transportation-communication-public utilities and other construction employment.

Government includes state, local, and federal employment.

Basic Sector includes manufacturing, agriculture-forestry-fisheries, mining, and exogenous construction employment.

SOURCE:   MAP Model

TABLE 71.   IMPACT ON AGGREGATE INDICATORS OF ECONOMIC GROWTH
NORTHERN GULF OCS MEAN SCENARIO
SOUTHCENTRAL

|  | Population | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 59,054 | 59,054 | 0 |
| 1985 | 63,915 | 66,203 | 2,287 |
| 1990 | 70,015 | 76,801 | 6,786 |
| 1995 | 74,402 | 78,879 | 4,478 |
| 2000 | 81,385 | 86,386 | 5,001 |

|  | Employment | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 23,745 | 23,745 | 0 |
| 1985 | 26,323 | 27,497 | 1,174 |
| 1990 | 30,054 | 33,520 | 3,466 |
| 1995 | 32,810 | 34,629 | 1,819 |
| 2000 | 36,886 | 38,978 | 2,092 |

|  | Real Disposable Personal Income (Millions of Constant Do?lars) | | |
|---|---|---|---|
|  | Base Case | Mean Scenario | Impact |
| 1980 | 184 | 184 | 0 |
| 1985 | 2?9 | 235 | 16 |
| 1990 | 277 | 329 | 52 |
| 1995 | 330 | 355 | 25 |
| 2000 | 407 | 439 | 31 |

SOURCE :   MAP Model

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Population is projected to grow at an average annual rate of 1.9 percent from the lease sale in 1980 to the end of the period. By 2000, the population is 86,386, which is 5,001 or 6.1 percent greater than in the base case. The peak population impact occurs at the end of the exploration-development phase in 1990. Population is almost 6,800 greater than in the base case.

Employment is projected to increase to 38,978 by 2000, which is almost 2,100 greater than in the base case. With Northern Gulf development, employment increases at an annual rate of 2.5 percent between 1980 and 2000, compared to 2.2 percent in the base case. Peak employment impact occurs in 1990 when development and exploration end and peak direct Alaska resident employment occurs. In 1990 employment is 3,466 greater than in the base case. Direct resident OCS employment accounts for 46 percent of the total employment impact in 1990 and 41 percent in 2000.

Real disposable personal income in 2000 is $31 million greater than the base case because of OCS development. As with the population and employ-ment impacts, the peak real disposable personal income impact occurs at the end of the exploration-development phase in 1990. Real disposable personal income is $52 million, or 20 percent, greater than in the base case in 1990. The importance of the high wage OCS employment results in this increase. Northern Gulf OCS development has a major impact on Southcentral Alaska.

ECONOMIC STRUCTURE

Northern Gulf OCS development according to the mean scenario supports
the structural change which was projected in the base case. All sectors
increase employment between 1980 and 2000; however, the rate of increase
differs between industries.   As in the base case, government's share
decreases from 20.2 percent in 1980 to 16.3 percent. Trade, service,
and finance-insurance-real estate expands its share of employment from
38.2 percent to 42.6 percent between 1980 and 2000. This response is
expected, since the local economy will expand the goods and services
produced locally as its scale increases.   With the buildup of OCS activity
in the Northern Gulf, the basic sector increases its share from 26.9 per-
cent in 1980 to 27.5 percent in 1990.   After the peak in Northern Gulf
activity and the shutdown of the Upper Cook Inlet fields in 1990, the
basic sector's share of total employment is reduced to 25.5 percent.
Table 72 describes these structural changes.


### The Impacts of Northern Gulf
### OCS Development: 5 Percent Scenario

The five percent probability resource level scenario projects a higher
level of oil and gas discovery than the mean scenario. The higher level
of discovery requires greater development activity than in the mean sce-
nario.   The most important difference between these scenarios is the mag-
nitude of direct employment; differences in magnitude are also the major
differences between the impacts associated with each scenario. This
section will describe the magnitude of the impact associated with the

## TABLE 72. ECONOMIC STRUCTURE
## NORTHERN GULF OCS MEAN SCENARIO
## SOUTHCENTRAL

| | Support Sector I " | | Support Sector II | | Government | | Basic Sector | |
|---|---|---|---|---|---|---|---|---|
| | Employment | % of Total | Employment | % of Total | Employment | % of Total | Employment | % of Total |
| 1980 | 9,173 | 38.2 | 3,515 | 14.7 | 4,837 | 20.2 | 6,462 | 26.9 |
| 1985 | 10,792 | 38.8 | 4,316 | 15.5 | 5,412 | 19.4 | 7,317 | 26.3 |
| 1990 | 3,321 | 39.1 | 5,338 | 15.7 | 6,058 | 17.8 | 9,358 | 27.5 |
| 1995 | 4,641 | 41.4 | 5,442 | 15.4 | 6,265 | 17.7 | 9,040 | 25.5 |
| 2000 | 7,155 | 42.6 - | 6,157 | 15.3 | 6,548 | 16.3 | 10,369 | 25.8 |

Support Sector I includes trade, services, and finance insurance-real estate employment,

Support Sector 11 includes transportation-communication-public utilities and other construction employment.

Government includes state, local, and federal employment.

Basic Sector includes manufacturing, agricul ture-forestry-fisheries, mining, and exogenous construction employment.

SOURCE : MAP Model

5 percent scenario in terms of four measures of economic activity: employ-
ment, population, state expenditures, and the fund balance.  We will also
compare the structural similarities and differences between the mean sce-
nario and the 5 percent scenario.

The five percent scenario includes the development of eighteen fields. The
number of fields developed means that the phases of development will over-
lap.  For our analysis, we will concentrate on the period between the lease
sale in 1980 and the end of exploration in 1991. This year is also the
year of peak direct resident employment.  This period includes explora-
tion which lasts from 1981 to 1991 and the major portion of the develop-
ment phase which lasts from 1984 to 1992. The period after 1992 is
dominated by production.

GENERAL PATTERN OF GROWTH
The general pattern of development projected with the inclusion of the
5 percent Northern Gulf scenario is shown in Table 73.  Four indicators--
employment, population, state expenditures, and fund balance--are shown.
The other variables mentioned in the discussion can be found in Appendix D.
This scenario, like the mean scenario, increases employment, population,
and state expenditures throughout the projection period.  There are two
major differences between the scenarios.  First, the maximum population
and employment increases do not occur when peak direct employment occurs
as in the moderate scenario.  Secondly, unlike the mean scenario, the
5 percent scenario has a positive fund balance impact in the final year
of the projection period.  In this section, we will discuss the impact of

TABLE 73.    THE IMPACT ON MAJOR ECONOMIC INDICATORS
NORTHERN GULF OCS 5 PERCENT SCENARIO
ALASKA

| | Population | | | Employment | | |
|---|---|---|---|---|---|---|
| | Base Case | 5% Scenario | Impact | Base Case | 5% Scenario | Impact |
| 1980 | 434,173 | 434,173 | 0 | 194,054 | 194,054 | 0 |
| 1985[1] | 509,057 | 528,700 | 19,643 | 224,931 | 238,432 | 13,501 |
| 1988[1] | 556,942 | 595,911 | 38,969 | 249,550 | 271,304 | 21,754 |
| 1990[2] | 591,580 | 629,269 | 37,689 | 266,632 | 283,943 | 17,311 |
| 1991[2] | 606,771 | 645,384 | 38,613 | 273,502 | 290,443 | 16,941 |
| 1995 | 677,649 | 710,099 | 32,450 | 308,016 | 318,397 | 10,381 |
| 2000 | 789,287 | 824,222 | 34,935 | 364,721 | 376,353 | 11,631 |

| | State Expenditures (Millions of Nominal Dollars) | | | Fund Balance (Millions of Nominal Dollars) | | |
|---|---|---|---|---|---|---|
| 1980 | 1,567 | 1,567 | 0 | 1,329 | 1,329 | 0 |
| 1985 | 2,748 | 2,795 | 47 | 5,936 | 5,945 | 9 |
| 1988 | 3,750 | 4,019 | 268 | 9,980 | 9,826 | -154 |
| 1990 | 4,557 | 4,801 | 245 | 12,281 | 12,007 | -274 |
| 1991 | 4,904 | 5,124 | 220 | 13,193 | 12,892 | -301 |
| 1995 | 6,667 | 6,798 | 131 | 15,809 | 15,508 | -300 |
| 2000 | 10,029 | 10,180 | 151 | 15,200 | 15,290 | 90 |

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[1]Peak employment and population impact.

[2]Peak direct Alaska resident employment. The end of the exploration-development phase.

SOURCE :    MAP Model

Northern Gulf OCS development according to the 5 percent scenario as well as the differences between the mean and 5 percent scenarios.

Population is projected to be 824,222 by 2000. This is 34,935 or 4.4 percent greater than population in the base case population.   Between 1980 and 2000, the population growth rate averages 3.3 percent per year which is greater than the 3.0 percent rate in the base case for the same time period.   The maximum increase in population as a result of OCS development occurs in 1988 when population is almost 39,000 greater than in the base case.   This is the same year that direct resident construction employment reaches its peak.   By 1991 when exploration ends, population impact has risen to another peak of 38,600.   The growth rate between 1980 and the end of exploration averages 3.7 percent per year, compared to 3.1 percent in the base case.   After the major development and exploration activity is over in 1991, the growth slows to 2.8 percent per year, which is less than the base case growth rate during this same period.

The pattern of population growth and impact can be explained by the growth of total employment.   Total employment is projected to be 11,631, or 3.2 percent greater than in the base case by 2000. The inclusion of the Northern Gulf 5 percent development scenario increases the growth rate between 1980 and 2000 from 3.2 percent per year in the base case to 3.4 percent per year. As with population, the maximum increase in employment occurs in 1988.   Total direct resident employment in 1988 is 3,399, which is 341 less than the maximum direct employment which occurs in 1991.   The major difference is the composition of this employment.

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In 1988, over 55 percent of the direct resident employment is in construc-
tion.   By 1991, only 12 percent are construction employees. The differ-
ential incomes earned by workers in the construction industry account for
the earlier total peak impact.   Employment in the support sector is deter-
mined by demand for output, which is a function of real income.   The
higher construction incomes allow them to have a greater impact than an
equal number of other workers.   The effect of these high incomes makes the
real per capita income impact greatest in 1987 when direct construction
employment is greatest.

The state fiscal position is affected by Northern Gulf OCS development
according to the 5 percent scenario.   This impact is shown by state expen-
diture and the fund balance.   State expenditures are projected to increase
to $10.2 billion by 2000;  this is $151 million or 1.5 percent greater
than in the base case.   The growth rate between 1980 and 2000 is only
slightly greater than in the base case.   State expenditures grow at an
average rate of 9.8 percent per year over the period,  compared to 9.7 per-
cent in the base case.   The average rate of growth in expenditures is
11.4 percent per year between 1980 and 1981 and falls to 7.9 percent per
year between 1991 and 2000.   Expenditures grow faster in the base case
after 1991.   As in the mean scenario, all determinants of the growth in
expenditures--population, prices, per capita real income--grow slower
during this period as the adjustment from peak impact to production
employment is made.   The growth in expenditures is not so rapid as either
population or prices.   Because of this, real per capita expenditures

are lower than in the base case. By 2000, real per capita expenditures are .$58 or 3.6 percent less than in the base case.

The pattern of the fund balance growth in this scenario is similar to the base case pattern. The fund rises to a maximum amount in 1997, then falls in both cases. With Northern Gulf OCS development, the fund rises to a maximum of almost $16 billion by 1997. After this, the fund is drawn down as the general fund is used to make up the difference between expenditures and revenues. The pattern of fund balance growth with Northern Gulf OCS development in the 5 percent scenario differs in two ways from the base case. First, the peak in 1997 is not so great. The fund is $201 million less in 1997 with OCS development. Secondly, the fund balance does not fall by as much after 1997. By 2000, the fund balance is actually greater by $90 million than in the base case; the fund balance is .6 percent greater in 2000 because of OCS development.

The pattern is similar to the one in the mean Northern Gulf scenario. In both scenarios, the negative impact on the fund balance was reduced after 1997. The major cause of this pattern is the more rapid increase in revenues than expenditures in the latter part of the period. This positive impact on the fund balance is eliminated when prices are considered. OCS development increases the price level over the base case; this has the effect of reducing the real value of the fund balance. Since the fund balance is determined most significantly by a fixed flow of petroleum revenues which are not affected by Alaskan prices, price increases generally reduce the real value of the fund. The fund balance

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measured in constant dollars is reduced throughout the period by OCS
development.  By 2000, the real fund balance is $9 million less than in
the base case.  The negative impact on both the real fund balance and
real per capita income means that OCS development according to the
5 percent scenario has a negative impact on the state's fiscal position.

STRUCTURAL SIMILARITIES AND DIFFERENCES
The major structural characteristics of the projected economic growth
which were observed to be important in the base case were the increased
importance of the support sector, the decreasing dependency ratio, the
concentration of population in Anchorage, and the pattern of fund bal-
ance growth.  The mean Northern Gulf OCS development scenario was shown
to support the base case trends.  Table 74 compares indicators of these
structural characteristics between the mean scenario and the 5 percent
scenario.

Similar structural changes occur in both the mean and 5 percent scenario
cases.  Both of these scenarios support the base case trends projected
in these characteristics.

The Impacts of Northern Gulf
OCS Development: 95 Percent Scenario

Table 75 shows the impact of the 95 percent Northern Gulf OCS development
scenario on employment, population, state expenditures, and fund balance.
This scenario describes the exploration-only case when no petroleum re-
sources are found.  The scenario has only minimal impact on the Alaska
economy.

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TABLE 74.   STRUCTURAL CHARACTERISTICS OF THE ALASKA ECONOMY
NORTHERN GULF OCS 5 PERCENT SCENARIO

|  | 1980 | 1990 | 2000 |
|---|---|---|---|
| **Percent of Employment in the Support Sector** | | | |
| Mean Scenario | 39.5 | 46.8 | 53.2 |
| 5% Scenario | 39.5 | 47.0 | 53.4 |
| **Dependency Ratio (Population/Employment)** | | | |
| Mean Scenario | 2.24 | 2.20 | 2.17 |
| 5% Scenario | 2.24 | 2.22 | 2.19 |
| **Percent of Population in Anchorage** | | | |
| Mean Scenario | 47.8 | 49.9 | 53.5 |
| 5% Scenario | 47.8 | 49.9 | 53.4 |
| **General Fund Revenues Minus General Fund Expenditures (Millions of Nominal $)** | | | |
| Mean Scenario | 361 | 1,004 | - 536 |
| 5% Scenario | 361 | 1,002 | - 428 |

TABLE 75.   THE IMPACT ON MAJOR ECONOMIC INDICATORS
NORTHERN GULF OCS 95 PERCENT SCENARIO
ALASKA

| | Population | | | Employment | | |
|---|---|---|---|---|---|---|
| | Base Case | 95% Scenario | Impact | Base Case | 95% Scenario | Impact |
| 1980 | 434,173 | 434,173 | 0 | 194,054 | 194,054 | 0 |
| 1981 | 455,563 | 456,248 | 686 | 206,479 | 206,985 | 507 |
| 1982 | 486,359 | 487,443 | 1,084 | 224,637 | 225,380 | 743 |
| 1983 | 502,802 | 503,935 | 1,133 | 230,228 | 230,934 | 706 |
| 1984 | 501,479 | 502,222 | 742 | 223,159 | 223,513 | 353 |
| 2000 | 789,287 | 789,450 | 163 | 364,721 | 364,731 | 10 |

| | State Expenditures (Million of Nominal Dollars) | | | Fund Balance (Millions of Nominal Dollars) | | |
|---|---|---|---|---|---|---|
| 1980 | 1,567 | 1,567 | 0 | 1,329 | 1,329 | 0 |
| 1981 | 1,744 | 1,744 | 0 | 1,913 | 1,913 | 1 |
| 1982 | 2,015 | 2,020 | 5 | 2,619 | 2,618 | - 1 |
| 1983 | 2,371 | 2,375 | 8 | 3,362 | 3,358 | - 4 |
| 1984 | 2,581 | 2,588 | 7 | 4,507 | 4,499 | - 8 |
| 2000 | 10,029 | 10,030 | 1 | 15,200 | 15,154 | -46 |

SOURCE :   MAP Model

Exploration occurs between 1981 and 1984. There is direct OCS employment only in these four years. The scenario increases employment and population by less than one percent. The maximum population impact occurs in 1983 when population is .2 percent greater than in the base case. At its maximum difference, employment is only .3 percent greater than in the base case.

The long-term impact is a result of adjustments during the exploration phase. For example, the growth during exploration phase increases state expenditures. State expenditures increase from this new base throughout the projection period. The major long-term impact of this development scenario is on the fund balance. By 2000 the fund balance is $46 million less than in the base case. The increased expenditures and the reduced interest revenues account for the growing negative impact on fund balances. The minimal impact of this scenario means that it will not affect the structural changes found in the base case.

## Summary and Conclusions

Northern Gulf OCS development will change the magnitude of economic indicators. In all three cases--the 5 percent, mean, and 95 percent scenarios-- the aggregate indicators of economic activity increase. If the Northern Gulf OCS is developed according to the 5 percent scenario, employment will be 3.2 percent larger than the base case in 2000, population will be 4.4 percent larger, and personal income will be 4.8 percent larger. The mean scenario increases employment by 1.6 percent over the base case in

2000; population, by 2.0 percent; and personal income, by 2.4 percent. The 95 percent scenario is the exploration-only case, and it increases the aggregate indicators by less than one percent.

Northern Gulf OCS development provides increased revenues directly from property taxes and indirectly from the increase in economic activity. State expenditures also increase. The pattern in both the production cases, the mean and 5 percent scenarios, is that over most of the period, the expenditure impact is greater than the revenue impact.  This means that the fund balance is drawn down.  After production begins, this trend is reversed and revenues increase faster than expenditures, leading to a reduction in the negative fund balance impact. By 2000 the fund balance impact in the 5 percent case is positive.

Two measures of individual welfare are real per capita income and real per capita state expenditures.  In both the development cases, the impact on real per capita income is positive during exploration and development. Once production begins, the changing composition of employment and higher prices lead to a reduction in real per capita incomes below the base case levels.  Real per capita expenditures are less than in the base case in both production cases.

Overall, the process of growth remains unchanged by OCS development. The structural changes and changing relationships projected in the base case are supported by OCS development.  One change is an increased importance

of migration as a component of population change during the buildup to peak employment impacts. This is only a short-run change, and base case proportions are reached once direct employment stabilizes. The increased proportion of employees in the population is also observed in both development cases. As in the base case, the increased scale of the economy increases the importance of the support sector as the economy provides more of its own goods and services. Finally, development of the Northern Gulf OCS increases the concentration of population in Anchorage.

V.    THE IMPACT OF NORTHERN GULF OCS DEVELOPMENT:
THE CUMULATIVE CASE


The impact of Northern Gulf OCS development will depend on the base case

to which it is compared.   In chapter III, we developed three base cases,

each containing a different level of previous OCS lease sale activity.

Varying the base case by the level of previous OCS activity will allow us

to bracket the range of possible Northern Gulf OCS impact. Since the

level of previous OCS activity is one variable which can be controlled to

some extent by BLM, the sensitivity of the Northern Gulf OCS impacts to

the level of previous OCS activity is of interest. In the last chapter,

we provided an analysis of the impact of OCS development relative to the

moderate base case.   In this chapter, we will examine the range of impacts

from the 5 percent scenario on the high base case and the 95 percent

scenario on the low base case.   For the most part, these impacts will

differ only in magnitude from those discussed in the mean scenario. The

changes in magnitude will be described by the general pattern of growth.

Structural similarities and differences will also be discussed.


The Impact of Northern Gulf OCS Development
At the 5 Percent Level: The High Base Case


THE HIGH BASE CASE

The major difference between the high and moderate base cases is the

level of activity assumed in the Lower Cook and Beaufort OCS lease sale

areas.   The high case has a peak direct employment which is more than


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one-and-one-half times greater than in the moderate case in the Lower
Cook and 24 percent greater in the Beaufort.  The high Lower Cook scenario
also includes construction and operation of an LNG facility.  The high
base case has greater levels of economic activity than the moderate case.
Population is projected to be 80?,117 by 2000 in the high base case, with
a 3.1 percent average annual growth rate.   Employment is projected to
increase to 369,105 by 2000.   This is almost 4,400 greater than employment
in the moderate base case.   The overall state fiscal position differs
between the cases.   Expenditures by 2000 are about one percent greater in
the high base case than in the moderate case.   The larger Beaufort revenues
also lead to an increase in the fund balance between the high and moderate
base cases.   By 2000 the fund balance in the high base case is $16.7 billion
which is $1.5 billion greater than in the moderate base case.   The change
in the structural characteristics found in the moderate base case are
also found in the high base case.

THE GENERAL PATTERN OF GROWTH

Table 76 examines the economic growth with Northern Gulf OCS development
according to the 5 percent scenario relative to the high base case.
Comparing these cases shows us the impact of OCS development. The impact
is similar to that projected in the other cases; population, employment,
and state expenditures all increase as a result of OCS development. The
fund balance is reduced because of OCS development, but the negative
impact decreases by the end of the period.

TABLE 76. THE IMPACT ON MAJOR ECONOMIC INDICATORS
NORTHERN GULF OCS
5 PERCENT SCENARIO/HIGH BASE CASE

| | Population | | | Employment | | |
|---|---|---|---|---|---|---|
| | Base Case | 5% Scenario | Impact | Base Case | 5% Scenario | Impact |
| 1980 | 431,495 | 431,495 | 0 | 192,187 | 192,187 | 0 |
| 1985[1] | 519,471 | 540,357 | 20,886 | 231,560 | 245,927 | 14,367 |
| 1988[1] | 564,654 | 605,100 | 40,446 | 252,890 | 275,525 | 22,635 |
| 1990[2] | 600,285 | 639,451 | 39,166 | 270,213 | 288,328 | 18,115 |
| 1991[2] | 616,303 | 656,425 | 40,121 | 277,510 | 295,235 | 17,725 |
| 1995 | 689,377 | 723,291 | 33,914 | 312,806 | 323 807 | 11,001 |
| 2000 | 801,117 | 837,888 | 36,771 | 369,105 | 381,508 | 12,403 |

| | State Expenditure (Millions of Nominal Dollars) | | | Fund Balance (Millions of Nominal Dollars) | | |
|---|---|---|---|---|---|---|
| 1980 | 1,559 | 1,559 | 0 | 1,330 | 1,330 | 0 |
| 1985 | 2,824 | 2,904 | 80 | 5,937 | 5,922 | - 14 |
| 1988 | 3,768 | 4,071 | 302 | 10,004 | 9,745 | -259 |
| 1990 | 4 ,60? | 4,877 | 276 | 12,460 | 12,021 | -439 |
| 1991 | 4,954 | 5,206 | 252 | 13,465 | 12,968 | -499 |
| 1995 | 6,782 | 6,945 | 162 | 16,518 | 15,868 | -649 |
| 2000 | 10,129 | 10,343 | 214 | 16,724 | 16,164 | -559 |

[1]Maximum population and employment impact.

[2]Peak direct Alaska resident employment. The end of the exploration-development phase.

SOURCE : MAP Model

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Population increases at an average rate of 3.4 percent per year from the beginning of OCS development in 1980 to the end of the period in 2000. In 2000 population is projected to be 837,888 which is 4.6 percent greater than in the base case. The maximum increase in population as a result of OCS development occurs in 1988 when population is 40,446, or 7.2 percent greater than in the base case. The growth rate during the exploration-development phase (1980-1991) averages 3.9 percent per year. After 1991, when production is the dominant activity, the growth rate averages 2.8 percent per year. The economy grows faster than in the base case during the exploration and development phase and slower during the production phase.

Employment is projected to increase to 381,508 by 2000. This is 12,403 greater than in the base case. The growth rate over the period of OCS development increases from 3.3 percent per year in the base case to 3.5 percent per year with OCS development. The peak employment impact occurs in 1988 when total employment is 27,635, or 9 percent greater than in the base case. Direct OCS resident employment does not peak until 1991. The reason the maximum employment increase from OCS development occurs before the peak direct project employment concerns the composition of employment. A larger proportion of direct resident employment in 1988 is construction employment. The higher incomes earned by these workers increase their impact on the economy. The impact on personal income from OCS development is also greatest in 1988. Employment, like population, increases faster in the exploration-development phase (1980-1991) than after 1991 when production is the dominant activity.

The state's fiscal position is affected by Northern Gulf OCS development. By 2000 state expenditures are projected to be $214 million or 2.1 percent greater than in the base case; total expenditures are projected to be $10.3 billion by 2000. The maximum impact of OCS development on state expenditures occurs in 1989 when expenditures are $324 million greater than in the base case. This is 8 percent greater than in the base case. The maximum expenditure impact occurs after the maximum population impact because of the lags built into the expenditure rule. The pattern of expenditure growth differs between the base case and the 5 percent scenario. Expenditures increase faster with Northern Gulf OCS development than in the base case, 11.6 percent per year compared to 11.1 percent, during the exploration-development phase (1980-1991). After 1991 the increase in expenditures is more rapid in the base case, 8.3 percent compared to 7.9 percent per year. The increase over the base case is not so great as the combined increase in prices and population, so OCS development has a negative impact on real per capita state expenditures. Real per capita state expenditures are $51 less than in the base case by 2000.

The pattern of fund balance growth is similar in both the base case and the OCS development case. In both cases, the fund rises to a peak in 1998 and then falls as the fund balance is drawn down to make up the difference between revenues and expenditures. At its peak in 1998, the fund balance with OCS development is $16.6 billion, which is $628 million less than in the base case. By 1995 the fund balance is $649 million, or 4 percent less than in the base case because of OCS development. By 2000 the negative fund balance impact has been reduced to $559 million.

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This pattern of fund balance impact was projected in both the mean and 5 percent scenarios with the moderate base case.

The relative impacts of the 5 percent development scenario are similar when they occur with either the moderate or high base case. The population impact in 2000 differs between these cases by only 5.3 percent; the population impact is 34,935 with the moderate base case and 36,771 with the high scenario. The employment impact in 2000 is 11,631 with the moderate base case and 12,403 with the high base case, a difference of less than 7 percent. The fiscal impacts are less similar. The expenditure impacts differ by over 40 percent in 2000. The fund balance impact is positive with the moderate base case and negative with the high base case. The pattern of fund balance impact is similar in each case, with the negative fund balance impact being reduced by the end of the period. The lower expenditures and relatively greater size of OCS development in the moderate case are responsible for the positive fund impact by 2000.

STRUCTURAL SIMILARITIES AND DIFFERENCES

Table 78 compares certain structural characteristics of economic growth in the mean OCS-moderate base case scenario and the 5 percent OCS-high base case scenario. These indicators describe the four types of structural change found in the base case: first, the increased importance of the support sector as the scale of the economy increases; secondly, the increasing proportion of the population which is employed; third, the continuing concentration of population in Anchorage; finally, the pattern of state expenditure which results in their being greater than revenues.

TABLE 77.  STRUCTURAL CHARACTERISTICS OF THE ALASKA ECONOMY
NORTHERN GULF OCS
OCS-MODERATE BASE SCENARIO/
5% OCS-HIGH BASE SCENARIO

|                                                                                              | 1980 | 1990  | 2000  |
|----------------------------------------------------------------------------------------------|-------|-------|-------|
| Percent of Employment in the Support Sector                                                  |       |       |       |
| Mean Scenario                                                                                | 39.5  | 46.8  | 53.2  |
| 5% Scenario                                                                                  | 39.4  | 47.1  | 53.4  |
| Dependency Ratio (Population/Employment)                                                     |       |       |       |
| Mean Scenario                                                                                | 2.24  | 2.20  | 2.17  |
| 5% Scenario                                                                                  | 2.25  | 2.22  | 2.20  |
| Percent of Population in Anchorage                                                           |       |       |       |
| Mean Scenario                                                                                | 47.8  | 49.9  | 53.5  |
| 5% Scenario                                                                                  | 47.8  | 49.9  | 53.5  |
| General Fund Revenues Minus General Fund Expenditures (Millions of Nominal $)               |       |       |       |
| Mean Scenario                                                                                | 361   | 1,004 | - 536 |
| 5% Scenario                                                                                  | 363   | 1,054 | - 326 |

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The development of the Northern Gulf OCS, according to the 5 percent scenario given the high base case, experiences the structural change which is similar to that found in the mean scenario case. The support sector increases its share of employment to about 53 percent in both cases. The dependency ratio decreases through the projection period, although it is slightly higher in the 5 percent scenario. By 2000, Anchorage has increased its share of state population to about 54 percent in both cases. In both the mean OCS-moderate base scenario and the 5 percent OCS-high base case scenario, general fund revenues net of expenditures are negative by 2000. In both cases, the fund balance must be drawn on to meet expenditures by 2000.

The Impact of Northern Gulf OCS Development
At the 95 Percent Level: The Low Base Case

THE LOW BASE CASE

The low base case scenario contains the same non-OCS assumptions as the moderate and high base case scenarios. It differs from these cases in its assumptions about OCS activity in the Lower Cook and Beaufort Sea. Lower Cook is assumed to have exploration only in this scenario. Production occurs in the Beaufort. Peak employment in the Beaufort reaches 740 in 1989; this is 68 percent of the peak in the moderate Beaufort scenario. The growth in the low base case is less than in the moderate case. Over the period 1978-2000, population is projected to increase at an average rate of 3 percent per year. Population is projected to be 782,438 by 2000. Employment is projected to increase to 362,225 by 2000

in the low case.  State expenditures are less than one percent lower than in the moderate case by 2000.  They are projected to be almost $10 billion by 2000. The fund balance is $300 million less than in the moderate base case by 2000.  In 2000 the fund balance is projected to be $14.9 billion. The pattern of fund balance growth is similar in both cases, rising to a peak of $16 billion in 1997, then falling as funds are used to make up the difference between expenditures and revenues.  The structural changes found in the moderate base case are also found in the low base case.

THE GENERAL PATTERN OF GROWTH

The 95 percent scenario describes the activity associated with only exploration in the Northern Gulf OCS.  The development has minimal impact on the Alaska economy. Table 78 shows the impact of exploration on population, employment, state expenditures, and the fund balance.  The maximum increase in population occurs in 1983 when OCS exploration activity increases population by 1,134, or .2 percent.  The maximum employment impact occurs in 1982.  Employment is 743 or .3 percent greater than in the base case because of exploration activity.  The expenditure impact follows the same pattern.  Expenditures are $8 million or .3 percent greater in 1983.  By 2000 expenditures are still $1 million greater than in the base case. The extra expenditures throughout the period result in the fund balance being $42 million less by 2000. These impacts are similar to those experienced with the moderate base case.

Because of the small impacts associated with OCS exploration, the structural change projected in the base case is not affected.

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TABLE 78.    THE IMPACT ON MAJOR ECONOMIC INDICATORS
NORTHERN GULF OCS
95 PERCENT SCENARIO/LOW BASE CASE

| | Population | | | Employment | | |
|---|---|---|---|---|---|---|
| | Base Case | 95% Scenario | Impact | Base Case | 95% Scenario | Impact |
| 1980 | 431,495 | 431,495' | 0 | 192,187 | 192,18 | 0 |
| 1981 | 451,557 | 452,241 | 684 | 203,886 | 204,393 | 506 |
| 1982 | 482,344 | 483,427 | 1,084 | 222,330 | 223,073 | 743 |
| 1983 | 498,942 | 500,007 | 1,134 | 228,242 | 228,948 | 706 |
| 1984 | 497,291 | 498,073 | 782 | 221,077 | 221,443 | 366 |
| 2000 | 782,438 | 782,602 | 164 | 362,225 | 362,233 | 8 |

| | State Expenditures (Millions of Nominal Dollars) | | | Fund Balance (Millions of Nominal Dollars) | | |
|---|---|---|---|---|---|---|
| 1980 | 1,559 | 1,559 | 0 | 1,330 | 1,330 | 0 |
| 1981 | 1,723 | 1,723 | 0 | 1,921 | 1,921 | 0 |
| 1982 | 1,988 | 1,993 | 5 | 2,640 | 2,639 | - 1 |
| 1983 | 2,348 | 2,356 | 8 | 3,393 | 3,389 | - 4 |
| 1984 | 2,559 | 2,567 | 7 | 4,548 | 4,540 | - 8 |
| 2000 | 9,965 | 9,966 | 1 | 14,900 | 14,858 | -42 |

SOURCE :    MAP Model

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# VI.   SENSITIVITY ANALYSIS

Our knowledge of future events is uncertain. In spite of this uncertainty, we need to make assumptions about certain future events.   Events which are important to the future economy must be incorporated in our projections. These assumptions which form the basis for both the base case and OCS development scenarios are uncertain.   The uncertainty surrounding these assumptions makes it necessary to investigate the extent to which our major findings are sensitive to the more important of these assumptions.

The previous sections tested the sensitivity of Northern Gulf OCS impacts to OCS-related assumptions.   By examining the alternate OCS scenarios, we saw the effect of varying resource discovery levels on impacts.   Examining the cumulative cases provided an indication of the sensitivity of our results to the level of previous OCS activity.   In this section, we will test the sensitivity of our results to two general categories of assump-tions.   The first set includes the assumptions about the level of activity in the base case.   We will examine the effect on the OCS impact results of major changes in the base case assumptions.   The second set of assump-tions to be examined concerns the state expenditure policy which was assumed to be adopted in the forecast period.   Changes in the assumed expenditure policy will alter the effect of OCS development on state expenditures and may change the impacts on the economy.

In this section, six specific sensitivity tests were conducted on the mean Northern Gulf OCS development scenario.   Comparing these results to

the mean results in our **basic** case will allow us to assess the sensitivity of our results **to** these major sets of assumptions.

### Sensitivity **to Major** Changes in the Base Case

The base case assumptions used in this study contain an element of uncertainty concerning two major construction projects, the ALCAN **gasline** and the state capital move from Juneau to Willow. ALCAN construction is included in our assumptions; the capital move is not. This section tests the sensitivity of our results to these assumptions.

In the base case, the **ALCAN gasline** is assumed to be constructed between 1981 and 1984 to transport natural gas from Prudhoe Bay to the "Lower 48." There is uncertainty concerning not only the timing of this construction but also the eventuality of construction. For a variety of reasons, including the recent recognition of substantial oil and gas reserves in Canada and Mexico, the outlook concerning the feasibility of the ALCAN line has changed since it was approved **(Tussing** and Barlow, 1979). Because of this uncertainty, it is necessary to test the effect on OCS impact of changes in the ALCAN assumptions.  We examine the effect on the OCS impact of eliminating ALCAN construction from the base case. Eliminating ALCAN has two types of direct effects. First, major exogenous employment will be eliminated from 1981 to 1984. Secondly, eliminating ALCAN **will** reduce state revenues.  Without the ALCAN, there will be no gas production in either **Prudhoe** or the Beaufort Sea. The state will not earn royalties, production taxes, or corporate income taxes from this gas. The reduction in revenues **will** affect economic activity through its effect on state expenditures.

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The sensitivity of our findings to increased levels of exogenous base case activity was also tested. The base case assumptions did not include the capital move from Juneau to Willow. Although Alaskans voted to move the capital in 1974, recent cost estimates and disagreement over the method of paying for the move have made it less likely. In the sensitivity test, the major direct effect of the capital move is assumed to be the increased construction activity connected with the move. State government employment is not assumed to be affected by the move. (See Table 79. ) The capital move is assumed to occur between 1981 and 1984, which is at the same time as the ALCAN construction.

TABLE 79.   CAPITAL MOVE SCENARIO

| | Construction Employment |
|---|---|
| 1980 | 0 |
| 1981 | 869 |
| 1982 | 664 |
| 1983 | 1,185 |
| 1984 | 1,135 |
| 1985 | 716 |

SOURCE:   Alaska Department of Labor, Alaska's Economic Outlook to 1985, 1978.

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Table 80 compares the impact of the mean Northern Gulf OCS development scenario on three sets of base case assumptions: the basic case, the no-ALCAN case, and the capital move case. These tests show that the magnitude of OCS impact is relatively insensitive to changes in the base case assumptions. However, since the base case is changed in each case, the relative effect of OCS development will differ in each case. During the OCS exploration and development phase (1980-1990), the impacts in all three cases vary by small amounts. In the peak OCS development year, 1990, the population and employment impacts of the no-ALCAN and capital move cases vary by less than 200 people from the base case. Personal income varies by less than one percent. By 2000, the differences have increased but not significantly. The major reasons for the difference in the impact are the scale of the economy and the state expenditures. The scale of the economy affects the price level and price level impact of OCS development as well as the response of the endogenous sector to OCS development. By 2000, the state expenditure impact is greater in the no-ALCAN case than in either of the other cases; this determines the difference in the other variables. Expenditure differences result from the long-run revenue differences in the ALCAN case. Even in 2000, the impacts differ by less than 10 percent.

## Sensitivity to State Expenditure Policy

In the previous analysis, it was necessary to specify an expenditure rule which captured the essential features of state fiscal policy. Inasmuch as state expenditures are actually a matter of policy choice, the expenditure rule could follow any one of an infinite number of possible specifications.

TABLE 80.   THE IMPACT OF NORTHERN GULF OCS DEVELOPMENT
WITH THREE ALTERNATE BASE CASES:
BASIC CASE, NO ALCAN CONSTRUCTION,
AND-THE CAPITAL MOVE
MEAN SCENARIO

|  | 1981 | 1983 | 1990 | 2000 |
|---|---|---|---|---|
| **Population Impact** | | | | |
| Basic Case | 515 | 1,893 | 20,944 | 16,437 |
| No ALCAN | 502 | 1,760 | 21,118 | 17,428 |
| Capital Move | 522 | 1,917 | 20,926 | 16,490 |
| **Employment Impact** | | | | |
| Basic Case | 380 | 1,278 | 11,423 | 5,775 |
| No ALCAN | 372 | 1,187 | 11,530 | 6,300 |
| Capital Move | 385 | 1,295 | 11,408 | 5,786 |
| **Personal Income Impact** (Millions of Nominal Dollars) | | | | |
| Basic Case | 19 | 74 | 1,083 | 938 |
| No ALCAN | 18 | 64 | 1,078 | 1,009 |
| Capital Move | 19 | 77 | 1,080 | 936 |
| **State Expenditures Impact** (Millions of Nominal Dollars) | | | | |
| Basic Case | 4 | 15 | 157 | 106 |
| No ALCAN | 4 | 13 | 163 | 146 |
| Capital Move | 4 | 15 | 155 | 106 |
| **Fund Balance Impact** (Millions of Nominal Dollars) | | | | |
| Basic Case | 1 | -3 | -150 | -287 |
| No ALCAN | 1 | -3 | -164 | -552 |
| Capital Move | 1 | -3 | -148 | -276 |

SOURCE :   MAP Model

The expenditure rule chosen in the analysis assumes that real per capita expenditures grow at a rate equal to one-half the rate of growth in real per capita income. Expenditures are also assumed to increase with increases in the available general fund balance. Past pattern of state expenditures points to these factors as determinants of expenditure growth (Scott, 1978). Even if we accept the general form of this rule, the relative effect of any one component may vary and the sensitivity of the measured impacts to this variation needs to be tested.

Three alternative formulations of the basic expenditure rule were tested. Each alternate rule differed by the assumed influence of real per capita income and the available general fund balance on the growth of state expenditures. Two cases examine the sensitivity of our measured impacts to the effect of real per capita income on expenditures. The expenditure elasticity of real per capita income is the percentage increase in state expenditures resulting from a one percent increase in real per capita income. In the basic rule, the expenditure elasticity of real per capita income was .5; two extreme elasticities were tested: the expenditure elasticity of real per capita income equal to 0 (EL3=0) and equal to 1 (EL3=1). The final rule tested the sensitivity of our results to the removal of the effect of the available general fund balance on expenditures (EX6=0). The major difference in all of the variables examined will result from differences in the expenditure impact.

Table 81 compares the relative OCS impacts of the various expenditure rules. The sensitivity of OCS impact to the expenditure elasticity of real per capita income can be seen by examining the impacts produced by the basic rule, the full income effect rule (EL3=1) and the no-income effect rule (EL3=0). The relative pattern of expenditure impacts can be explained by the pattern of real per capita income growth. The basic pattern of real per capita income growth in the impact case relative to the base case was shown in Chapter IV. Real per capita income increases faster than in the base case as direct OCS employment builds to a peak. After the peak employment is reached, real per capita income increases at a slower rate.

The greatest expenditure impact in 1990, the year of peak OCS employment, occurs in the full income effect case. The impact of $240 million is greater than either the basic case or the no-income effect case. By 2000 the state expenditure impact has decreased in both cases with positive income elasticities. This is because the rate of real per capita income growth after 1990 is lower than in the base case. By 2000 the case with no income effect on expenditures has a slightly larger impact. The impact on population, employment, personal income, and the fund balance is influenced by this expenditure effect.

The final expenditure rule tested removed the influence of the available fund balances from the determination of state expenditures. The impacts of OCS development are higher when the fund balance does not influence

TABLE 81.   THE EFFECT OF ALTERNATE STATE EXPENDITURE
POLICIES ON THE IMPACT OF NORTHERN
GULF OCS DEVELOPMENT
MEAN SCENARIO

|  | 1985 | 1990 | 2000 |
|---|---|---|---|
| **Population Impact** | | | |
| Basic Case | 4,315 | 20,944 | 16,437 |
| EL3=1 | 4,504 | 23,471 | 17,211 |
| EL3=0 | 4,183 | 19,525 | ?6,663 |
| EX6=0 | 4,318 | 21,085 | 18,676 |
| **Employment Impact** | | | |
| Basic Case | 2,811 | 11,423 | 5,775 |
| EL3=1 | 2,941 | 13,020 | 5,836 |
| EL3=0 | 2,726 | 10,560 | 6,068 |
| EX6=0 | 2,812 | 11,503 | 6,975 |
| **Personal Income Impact** **(Millions of Nominal Dollars)** | | | |
| Basic Case | 198 | 1,083 | 938 |
| EL3=1 | 209 | 1,234 | 976 |
| EL3=0 | 191 | 1,003 | 969 |
| EX6=0 | 197 | 1,071 | 1,101 |
| **State Expenditures Impact** **(Millions of Nominal Dollars)** | | | |
| Basic Case | 15 | 157 | 106 |
| EL3=1 | 20 | 240 | 124 |
| EL3'0 | 12 | 117 | 125 |
| EX6=0 | 14 | 153 | 177 |
| **Fund Balance Impact** **(Millions of Nominal Dollars)** | | | |
| Basic Case | -11 | -150 | -286 |
| EL3=1 | -22 | -373 | -1,089 |
| EL3=0 | - 3 | - 18 | - 54 |
| EX6=0 | -11 | -147 | -638 |

SOURCE :    MAP Model

expenditures. This can be seen by comparing the impacts of the no-fund balance effect case (EX6=0) and the basic case. The population, employ-ment, and personal income impacts are greater by 2000. Expenditures are slightly greater in the basic case in 1990, but the no-fund balance case has a greater expenditure impact by 2000. The reason for this differ-ential impact is straightforward. OCS development increases expenditures over the base case. This reduces the fund balance relative to the base case. In the basic rule case, the reduced fund balance relative to the base case exerts a downward relative pressure on expenditures. This reduced fund balance will limit the effect of the other factors increasing expenditures. When the fund balance does not affect expenditures, the relative reduction in the fund balance does not provide pressure to limit growth in expenditures.

A more important issue concerning the choice of the expenditure rule is the assumption implicit in our analysis that the state will choose to respond to changes caused by OCS development as it responded in the base case. If the state should behave differently in the face of OCS activity, the measured impacts may change significantly. To ascertain the impor-tance of this to our results, it may be useful to distinguish that portion of the total impact due to changes in state spending from that which is due to changes in the private sector of the economy.

In order to isolate the component of our measured impact which is due to changes in state expenditures, we examined the impacts of the case in which

the base case level of state expenditures was maintained. OCS development was not assumed to affect state expenditures in this case. Since OCS development increases both population and prices, such a policy would mean a reduction in the level of real per capita expenditures. This case is not presented as a plausible response of the state. However, it does permit us to separate, for purposes of analysis, that portion of impact due to state expenditures.

Table 82 illustrates the state expenditure impact. The proportion of impact due to state expenditures is equal to the proportion of impact not accounted for in the constant expenditure case. State expenditures account for close to 20 percent of the impact on employment, population, and prices. The state expenditure impact is greater in 1990 than in 2000. In 1990, increases in state expenditures account for 24 percent of the population impact, 26 percent of the employment impact, and 23 percent of the personal income impact. By 2000, state expenditure increases account for only 19 percent of the population increase, 18 percent of employment, and 18 percent of personal income. Examining the fund balance impact shows the extra revenues accumulated by the state because of OCS development. By 2000, over $1.5 billion have been accumulated.

TABLE 82.  THE IMPACT OF STATE EXPENDITURES
NORTHERN GULF OCS
MEAN SCENARIO

|  | 1 9 8 5 | 1990 | 2000 |
|---|---|---|---|
| **Population Impact** | | | |
| Basic Rule | 4,315 | 20,944 | 16,437 |
| Constant. Expenditure | 3,745 | 16,024 | 13,258 |
| **Employment Impact** | | | |
| Basic Rule | 2,811 | 11,423 | 5,775 |
| Constant Expenditure | 2,450 | 8,472 | 4,727 |
| Personal Income Impact | | | |
| (Millions of Nominal Dollars) | | | |
| Basic Rule | 198 | 1,083 | 938 |
| Constant Expenditure | 177 | 835 | 767 |

SOURCE :   MAP Model

# VII.  SUMMARY AND CONCLUSIONS

In this report, we have assessed the major impacts that offshore oil and gas development in the Northern Gulf of Alaska will have on the process of Alaska economic growth.  These projected impacts were assessed in terms of both an assumed base case growth without the project and the historical economic growth.

For all of the scenarios, the qualitative nature of the influence of OCS development on the growth process is similar. Development generates direct employment activity in the construction, mining, manufacturing, and transportation industries which builds to a peak during the development phase, then declines to a stable, long-term level as production dominates the activity.  Since a number of fields are developed in each scenario, the various phases of development occur simultaneously. This development activity generates both new private incomes and public revenues which induce impacts.  Expenditure of wages and salaries earned in OCS activity generates further income and employment in the endogenous sector of the economy through the increased demand for the output of these sectors. The increased economic activity also increases public expenditures which affect economic activity by increasing government employment. and construction expenditures.  The private sector has been shown in Chapter VI to have the dominant effect on the Northern Gulf OCS impacts.

The qualitative nature of the impacts is also similar across scenarios. Four major structural changes were observed in the base case and the

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historical period.  First, as the scale of the economy increased, more goods and services were produced locally and the importance of the support sector increased.  Secondly, the population aged and labor force participation increased over time;  this led to an increase in the proportion of the population which is employed.  Thirdly, the role of Anchorage as the administrative and distributive center of Alaska resulted in population growth continuing to center in Anchorage. Finally, state expenditures and revenues were projected to follow a pattern in which expenditures would increase faster than revenues after the major petroleum revenues peaked. This pattern of expenditure and revenue increase would necessitate drawing down the general fund balance.  This results from the declining importance of the petroleum revenues throughout the period.  All of the Northern Gulf OCS development scenarios support these trends.

The qualitative impact of OCS development on individual welfare was also similar across scenarios.  In all scenarios, real per capita incomes increased significantly over the base case levels during the buildup to the peak employment.  After this, increases in population and prices led to no real significant increases in real per capita income. The level of real per capita state expenditures is also reduced relative to the base case by OCS development.  The reduction of real per capita state expenditures is one part of the negative fiscal impact of OCS development. The other part concerns the impact on the fund balance. In all cases, the combined effect of increased prices and expenditures from OCS development reduces the real value of the fund balance below its base case levels.

Quantitatively, the impacts across scenarios differ. The single most important determinant of impact is the size of the field. The 5 percent scenario has larger development activity and so has a larger impact. The 95 percent scenario contains only exploration and has only minimal impact on the major economic variables. Table 83 shows the relative year 2000 impacts across the five OCS scenarios.

The major dimensions of both base case growth and OCS development are uncertain. By examining the three alternate development scenarios, we get some feeling for the range of impacts possible from OCS development in the Northern Gulf. Examination of the assumptions in the base case shows that the major assumptions concerning the base case such as ALCAN do not affect the impact of OCS development significantly, However, the results are importantly affected by the assumptions made about the expenditure policy followed by the state.

TABLE 83.   SUMMARY OF THE LONG-RUN IMPACTS OF
ALTERNATIVE DEVELOPMENT SENARIOS
( IMPACTS IN THE YEAR 2000)

| | Population | Employment | State Expenditures (Millions of Nominal Dollars) | Fund Balance (Millions of Nominal Dollars) |
|---|---|---|---|---|
| Moderate Base Case | | | | |
| Mean OCS Scenario | 16,437 | 5,775 | 106 | -287 |
| 5% OCS Scenario | 34,935 | 11,631 | 151 | 90 |
| 95% OCS Scenario | 163 | 10 | 1 | 46 |
| High Base Case | | | | |
| 5% OCS Scenario | 36,771 | 12,403 | 214 | 559 |
| Low Base Case | | | | |
| 95% OCS Scenario | 164 | 8 | | 42 |

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SOURCE:   MAP Model

APPENDIX A

<u>Historical Growth, 1965-1976</u>

TABLE AI.   GROWTH IN EMPLOYMENT, ALASKA, 1965-1976

| | | Average Monthly Employment | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Industry | 1965 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
| Mining | 1,100 | 3,000 | 2,499 | 2,100 | 2,000 | 3,000 | 3,800 | 4,000 |
| Contract Construction | 6,400 | 6,900 | 7,400 | 7,900 | 7,800 | 14,100 | 25,900 | 30,200 |
| Manufacturing | 6,300 | 7,800 | 7,800 | 8,100 . | 9,400 | 9,600 | 9,600 | 10,300 |
| Food Processing | 3,000 | 3,700 | 3,600 | 3,800 | 4,600 | 4,300 | 4,300 | 5,100 |
| Logging-Lumber and Pulp | 2,300 | 2,800 | 2,800 | 2,800 | 3,200 | 3,600 | 3,400 | 3,200 |
| Other Manufacturing | 1,000 | 1,500 | 1,400 | 1,500 | 1,500 | 1,700 | 1,300 | 2,000 |
| Transportation, Communication and Public Utilities | 7,200 | 9,100 | 9,800 | 10,000 | 10,400 | 12,400 | 16,500 | 15,800 |
| Trucking and Warehousing | 1,200 | 1,700 | 1,500 | 1,600 | 1,500 | 2,200 | 4,000 | 3,206 |
| Water Transportation | 1",000 | 800 | 800 | 800 | 900 | 1,000 | 1,400 | 1,309 |
| Air Transportation | 1,900 | 3,000 | 2,800 | 3,000 | 3,300 | 4,000 | 4,800 | 4,700 |
| Other Transportation | 500 | 900 | 1,000 | 1,000 | 1,100 | 1,300 | 1,800 | 1,900 |
| Communications and Public Utilities | 2,600 | 2,700 | 3,700 | 3,600 | 3,600 | 3,900 | 4,500 | 4,700 |
| Trade | 10,000 | 15,400 | 16,200 | 17,100 | 18,300 | 21,100 | 26,200 | 27,600 |
| Wholesale | 1,900 | 3,200 | 3,200 | 3,300 | 3,400 | 4,000 | 5,900 | 6,100 |
| Retail | 8,100 | 12,200 | 12,900 | 13,800 | 14,900 | 17,100 | 20,300 | 21,500 |
| Finance, Insurance and Real Estate | 2,200 | 3,100 | 3,200 | 3,700 | 4,300 | 4,900 | 6,000 | 7,100 |
| Services | 7,500 | 11,400 | 12,600 | 14,000 | 15,200 | 18,300 | 25,100 | 27,700 |
| Hotels, Motels, etc. | 1,000 | 1,400 | 1,600 | 1,s00 | 1,900 | 2,500 | 3,200 | 3,203 |
| Personal | 700 | 800 | 900 | 900 | 900 | 800 | 900 | 900 |
| Business | 1,400 | 2,000 | 2,100 | 2,100 | 2,100 | 3,000 | 7,300 | 8,700 |
| Medical | 1,400 | 2,200 | 2,600 | 3,000 | 3,3(?0 | 3,800 | 4,300 | 5,000 |
| Other | 3,000 | 5,000 | 5,400" | 6,200 | 7,000 | 8,200 | 9,400 | 9,900 |

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TABLE AI. (continued)

|  | | Average Monthly Employment. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Industry | 1965 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
| Government | 29,000 | 35,600 | 38,000 | 40,500 | 41,600 | 43,800 | 47,200 | 47,200 |
| Federal | 17,400 | 17,100 | 17,300 | 17,200 | 17,100 | 18,000 | 18,300 | 17,900 |
| State | 7,000 | 10,300 | 11,700 | 13,300 | 13,800 | 14,200 | 15,500 | 14,100 |
| Local | 5,300 | 8,100 | 9,000 | 10,000 | 10,700 | 11,600 | 13,400 | 15,200 |
| Agriculture, Forestry and Fisheries | 100 | 800 | 900 | 900 | 1,000 | 1,000 | 1,000 | 1,200 |
| Total Civilian Non-Agricultural Wage and Salary Employment | 70,500 | " 93,100 | 98,300 | 104,200 | 110,000 | 128,200 | 161,300 | 171,100 |
| Total Civilian Basic | 31,300 | 35,600 | 35,800 | 36,200 | 37,300 | 45,700 | 58,600 | 63,600 |
| Military | 33,000 | 31,400 | 30,100- | 26,500 | 27,500 | 27,500 | 25,3'30 | 24,500 |
| Total Basic | 54,300 | 67,000 | 65,900 | 62,700 | 64,800 | 73,200 | 83,900 | 88,100 |
| Total Support Sector | 26,900 | 39,000 | 41,800 | 44,800 | 48,200 | 56,700 | 73,800 | 78,200 |
| Total Employment | 114,000 | 129,900 | 133,900 | 136,500 | 143,200 | 161,500 | 190,200 | 203,200 |

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Basic Employment Includes: Mining; Construction; Manufacturing; Federal Government; Agriculture, Forestry and Fisheries, and Military.

Support Sector Includes: Transportation, Communication and Public Utilities; Trade; Finance, Insurance and Real Estate; and the Services.

SOURCE : "Alaska Department of Labor, Alaska Labor Force Estimates, various years.
Alaska Department of Labor, Estimates of Total Resident Population and Estimates of Total Civilian Population.

TABLE A.2.    ANCHORAGE CIVILIAN EMPLOYMENT GROWTH,
ALASKA,   1965-1976

| Industry | 1965 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|---|---|
| Total | 30,678 | 41,995 | 45,452 | 48,252 | 50,627 | 58,713 | 69,645 | 73,113 |
| Agriculture, Forestry and Fisheries | 33 | 52 | 63 | 76 | 82 | 100 | 110 | 100 |
| Mining | 371 | 958 | 91 6 | 806 | 769 | 1,036 | 1,301 | 1,409 |
| Contract Construction | 3,127 | 3,514 | 3,924 | 4,272 | 4,178 | 5,882 | 7,054 | 7,587 |
| Manufacturing | 791 | 1,018 | 1.,117 | 1,215 | 1,286 | 1,379 | 1,571 | 1,629 |
| Transportation, Communication and Public Utilities | 2,618 | 3,907 | 4,591 | 4,522 | 4,625 | 5,383 | 7,343 | 7,409 |
| Transportation | 1,694 | 2,800 | 2,805 | 2,821 | 3,129 | 3,938 | 5,419 | 5,172 |
| Air | 773 | 1,482 | 1,455 | 1,629 | 1,835 | 2,123 | 2,610 | 2,668. |
| Other | 921 | 1,318 | 1,350 | 1,192 | 1,294 | 1,814 | 2,809 | 2,504 |
| Communication | 674 | 764 | 1,411 | 1,289 | 1,046 | 1,163 | 1,426 | 1,670 |
| Public Utilities | 250 | 343 | 374 | 411 | 451 | 483 | 499 | 568 |
| Trade | 5,280 | 8,617 | 9,334 | 9,948 | 10,663 | 12,298 | 14,928 | 15,958 |
| Wholesale | 1,226 | 2,220 | 2,292 | 2,423 | 2,475 | 2,860 | 4,077 | 4,240 |
| Retail | 4,053 | 6,397 | 7,042 | 7,525 | 8,188 | 9,438 | 10,852 | 11,718 |
| Finance, Insurance and Real Estate | 1,295 | 1,980 | 2,087 | 2,415 | 2,303 | 3,151 | 3,615 | 4,257 |
| Services | 3,767 | 6,403 | 7,027 | 7,725 | 8,319 | 10,119 | 13,455 | 15,450 |
| Hotel S | 460 | 755 | 709 | 732 | 811 | 1,114 | 1,345 | 1,444 |
| Personal | 402 | 535 | 556 | 556 | 567 | 572 | 624 | 607 |
| Business | 789 | 1,188 | 1,194 | 1,120 | 1,190 | 1,680 | 3,795 | 4,914 |
| Medical | 681 | 1,200 | 1,480 | 1,759 | 1,993 | 2,283 | 2,386 | 2,657 |
| Other | 1,444 | 2,725 | 3,088 | 3,459 | 3,758 | 4,471 | 5,410 | 5,828 |
| Federal Government | 9,395 | 9,509 | 9,539 | 9,435 | 9,558 | 9,925 | 10,222 | 9,813 |
| State Government | 1,672 | 2,421 | 3,020 | 3,500 | 3,667 | 3,985 | 4,056 | 4,053 |
| Local Government | 2,329 | 3,615 | 3,846 | 4,349 | 4,677 | 5,257 | 5,979 | 5,413 |

SOURCE: Department of Labor, Statistical uarterly, various issues.

# TABLE A.3. EMPLOYMENT BY INDUSTRY, SOUTHCENTRAL ALASKA
## 1965, 1970-1976

| Industry | 1965 | 1 9 7 0 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|---|---|
| Agriculture, Forestries and Fisheries | 19. | ' 99 | 85 | 356 | 491 | 492 | 543 | 680 |
| Mining | 345 | 762 | 633 | 611 | 640 | 580 | 900 | 827. |
| Contract Construction | 880 | 583 | 895 | 768 | 681 | 1,239 | 3,656 | 6,978 |
| Manufacturing | 1,188 | 1,647 | 1,627 | 1,818 | 2,627 | 2,522 | 2,656 | 3,234 |
| Food | 1,086 | 1,293 | 1,229 | 1,456 | 1,995 | 2,013 | 2,003 | 2,127 |
| Transportation, Communication and Public Utilities | 542 | 760 | 796 | 793 | 896 | 1,329 | 1,576 | 1,472 |
| Transportation | 373 | 521 | 502 | 442 | 497 | 708 | 1,106 | 977 |
| Communications | 26 | | 132 | 175 | 209 | 218 | 239 | 247 |
| Public Utilities | 132 | 1;; | 163 | 176 | 189 | 03 | 23? | 248 |
| Trade | 813 | 1,338 | 1,319 | - 1,383 | 1,460 | 1,611 | 2,337 | 2,533 |
| Wholesale | 102 | 193 | .275 | 162 | 133 | 202 | 344 | 353 |
| Retail | 711 | 1,145 | 1,134 | 1,221 | 1,327 | 1,459 | 1,983 | 2,180 |
| Finance, Insurance and Real Estate | 159 | 211 | 204 | 220 | 239 | 308 | 377 | 480 |
| Services | 738 | 1,027 | 1,099 | 1,228 | 1,440 | 1,709 | 2,128 | 2,597 |
| Hotel | 138 | 154 | 230 | 297 | 300 | 427 | 467 | 462 |
| Personal | | | 29 | 39 | 50 | | 49 | 36 |
| Business | 1;; | 1;: | 94 | 87 | 139 | 1;: | 441 | 756 |
| Medical | 139 | 275 | 286 | 315 | 451 | 400 | 391 | 465 |
| Other | 319 | 456 | 460 | 490 | 500 | 664 | 780 | 878 |
| Government | | | | | | | | |
| Federal | 975 | 822 | 742 | 626 | 602 | 595 | 672 | 637 |
| State and Local | 1,465 | 2,327 | 2,726 | 2,932 | 3,056 | 3,180 | 3,455 | 3,592 |
| Total | 7,124 | 9,582 | 10,127 | 10,735 | 12,131 | 13,645 | 18,300 | 23,030 |

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APPENDIX B

MAP Model Assumptions

A set of assumptions about the level of exogenous variables determines
a development scenario; this section describes the assumptions in the
non-OCS base case scenario.  There are four major types of assumptions
required for a scenario.  First, there are assumptions about the growth
of exogenously determined employment in both the petroleum and nonpetroleum
sectors.  Secondly, assumptions about exogenously determined petroleum
revenues received by the state are needed.  Thirdly, there are assumptions
about national variables.  Finally, an assumption about the way the state
spends its money is needed.  Once these assumptions are set, the set of
projections is determined by the model.

EMPLOYMENT ASSUMPTIONS

Employment assumptions include those associated with special projects
and those associated with industry growth in manufacturing, agriculture-
forestry-fisheries, and federal government.

Special Projects

Special projects include three basic types--petroleum projects, major
construction projects, and operations of the major projects.  Tables B.1
and B.2 show the project employment assumptions.  The methods used to
determine these levels are described below.

## TABLE B.1. MINING EMPLOYMENT

| Year | Prudhoe,[1] Lisburne and Kuparak | N. Gulf[2] and Lower Cook OCS | Upper[3] Cook | Other[4] Mining |
|------|------|------|------|------|
| 1977 | 1,586 | 271 | 575 | 2,082 |
| 1978 | 1,624 | 0 | 575 | 2,082 |
| 1979 | 1,585 | 0 | 575 | 2,082 |
| 1980 | 1,783 | 0 | 575 | 2,082 |
| 1981 | 1,402 | 0 | 575 | 2,082 |
| 1982 | 1,149 | 0 | 575 | 2,082 |
| 1983 | 897 | 0 | 575 | 2,082 |
| 1984 | 904 | 0 | 575 | 2,082 |
| 1985 | 987 | 0 | 575 | 2,082 |
| 1986 | 963 | 0 | 610 | 2,082 |
| 1987 | 985 | 0 | 645 | 2,082 |
| 1988 | 985 | 0 | 680 | 2,082 |
| 1989 | 1,009 | 0 | 715 | 2,082 |
| 1990 | 1,009 | 0 | 750 | 2,082 |
| 1991 | 1,020 | 0 | 300 | 2,082 |
| 1992 | 1,020 | 0 | 300 | 2,082 |
| 1993 | 940 | 0 | 300 | 2,082 |
| 1994 | 886 | 0 | 300 | 2,082 |
| 1995 | 886 | 0 | 300 | 2,082 |
| 1996 | 886 | 0 | 300 | 2,082 |
| 1997 | 886 | 0 | 300 | 2,082 |
| 1998 | 886 | 0 | 300 | 2,082 |
| 1999 | 886 | 0 | 300 | 2,082 |
| 2000 | 886 | 0 | 300 | 2,082 |

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[1]Based on employment scenarios from Alternatives for the Future: Petroleum Development Study, North Slope of Alaska (Department of Natural Resources, 1977). Scenarios for 1 and 5 billion barrel reserves were adjusted to reflect reserves and production schedules of these fields.

[2]Exploration activity drilled 9.6 wells; assumed employment per well equaled 90 man-years from OCS Technical Report No. 17 (Dames and Moore, 1978).

[3]Estimate by the author based on current employment.

[4]Net employment in mining.

# TABLE B.2. CONSTRUCTION EMPLOYMENT

| Year | ECONX 1 TAPS | ECONX 1 ALCAN[3] | ECONX 1 Total | ECONX 2 Pacific[4] |
|------|------|--------|-------|---------|
| 1977 | 5,300' | 0 | 5,300 | o |
| 1978 | 0 | 0 | 0 | 0 |
| 1979 | 90[2] | 0 | 90 | 0 |
| 1980 | 90 | 0 | 90 | 146 |
| 1981 | 90 | 1,425 | 1,515 | 844 |
| 1982 | 90 | 4,763 | 4,853 | 1,323 |
| 1983 | 0 | 4,663 | 4,663 | 420 |
| 1984 | 0 | 265 | 265 | 0 |
| 1985 | 0 | 0 | 0 | 0 |

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[1] Based on estimate of TAPS construction employment by the Alaska State Labor Department.

[2] Assumed construction of four pump stations to increase capacity by 1982. Pump Station construction employment estimate from The Beaufort OCS Petroleum Development Scenarios, Dames and Moore, 1978.

[3] Northwest Energy Company manpower estimate, July 17, 1978.

[4] Based on letter to the Department of Natural Resources from S. California Gas, March 17, 1978, estimating peak construction employment of 1,500. Four-year construction period from E.I.S. for Pacific Alaska LNG Project, November 1974.

- Prudhoe Bay, Lisburne, and Kuparak mining employment was estimated from two sources of information. Employment scenarios were based on the scenarios described in the Alaska Department of Natural Resources, Alternatives for the Future: Petroleum Development Study, North Slope of Alaska (1977). The employment schedules were adjusted based on the estimated reserves, productivity, and the production schedules in Beaufort Sea Region Petroleum Development Scenarios (Technical Report No. 6, Alaska OCS Socioeconomic Studies Program, 1978).

- Northern Gulf OCS employment is an estimate of 1977 exploration employment. This was based on information in Monitoring Petroleum Activities in the Gulf of Alaska (Technical Report No. 17, Alaska OCS Socioeconomic Studies Program, 1978). Total employment associated with exploration was divided by the total wells drilled to obtain a man-years-per-well figure of approximately 90. Approximately 9.6 wells were drilled in 1977. Total exploration employment was adjusted by the percentage of Alaskan resident employment assumed in the report. There is no activity assumed after 1977.

- Upper Cook employment was an estimate of current employment made by the author. Employment was assumed to increase slightly between 1985 and 1990 as the oil fields are shut down. Gas production is assumed to continue after 1990.

- Other mining was assumed to maintain its 1976 level, except in Anchorage and Fairbanks which were adjusted to an estimate of the 1977 mining employment.

Table 6 shows special project construction employment.

- ECONX1 are highly paid construction workers associated with major projects, long hours, and extreme working conditions. Two projects are assumed in this category, the trans-Alaska pipeline and the ALCAN gasline. TAPS is completed in 1977. The 1977 employment is based on an actual estimate made by the Alaska Labor Department. After 1977 the line's capacity is assumed to be increased by the addition of four pump stations. Pump station construction employment estimates made in Technical Report No. 6 (Alaska OCS, 1978) were used to estimate employment. With completion of the TAPS construction in 1977, the line's capacity is assumed to be 1.2 million barrels per day. The capacity must be expanded to deliver the assumed base case North Slope production, which is 1.73 million

barrels per day by 1983. Four additional pump stations were assumed to be needed to deliver this production. This was based on the ratio of capacity to pump stations (.15 million barrels per pump station) with eight pump stations. With this ratio, twelve pump stations would be needed to deliver 1.73 million barrels per day. These additions would also allow the line some additional capacity. The ALCAN gasline is assumed to be built between 1981 and 1984. The estimates are based on the most recent construction manpower estimates made by Northwest Energy Company in a letter to the state (July 1, 1978).

● ECONX2 employment is associated with special construction projects which are assumed to have regular employment schedules and be able to draw on local labor markets. One project of this type is assumed to be built, the Pacific LNG project. Pacific LNG is scheduled to begin construction in 1980 and operations in 1984 (Anchorage Daily News, September 23, 1978). The construction schedule is based on an estimated peak construction employment of 1,500 (letter from S. California Gas to Alaska Department of Natural Resources, May 17, 1978) and the four-year construction period from the 1974 E.I.S. for the Pacific LNG project.

Operations employment for these projects is transportation employment for the pipelines and manufacturing for the petrochemical projects. Alyeska estimated an operations employment of 300 for startup in 1977 and 850 per year for the long-term operations (Alaska Construction and Oil, October 1976). ALCAN operations employment is assumed to be 96 beginning in 1985. This estimate was based on ALCAN's 1976 application to the Federal Power Commission. The difference in operations employment is accounted for because TAPS has more pipeline in Alaska, the Valdez port employment is part of the TAPS employment, and TAPS has substantial Alaska headquarters employment. Operations employment for the Pacific LNG plant is 60 beginning in 1984.

Employment for these special projects is allocated to MAP Regions as follows:

1.  Prudhoe, Lisburne, Kuparak employment to Region 1

2.  Upper Cook N. Gulf OCS, Pacific LNG employment in Region 4

3.  Other mining at its appropriate regional level

4.  ALCAN and TAPS construction based on miles of pipe in region plus 300TAPS headquarters in Anchorage in 1977

5.  ALCAN operations is allocated by the miles of pipeline in each region

6.  TAPS operations employment will be allocated as follows: 300 in" Anchorage, 200-in Valdez, and the remainder based on the regional distribution of the pipeline.

## Industry Growth

The level of employment in federal government and agriculture-forestry-fisheries is set exogenously. Federal government employment is assumed to follow its general historical trend and remain constant at the 1976 level throughout the forecast period. The trend in the historical period reflects increases in civilian employment offsetting decreasing military employment. The regional allocation will also remain constant. Employment in agriculture-forestry-fisheries will be assumed to increase at a rate of 3 percent per year. This reflects an assumption of little growth in agriculture and a modest increase in fisheries. The South-central Water Study estimated approximately a 5 percent annual increase with maximum fisheries development. Employment will be assumed to increase at this rate in each region.

Output in manufacturing must be determined exogenously. It is assumed to increase at an average annual rate of 4 percent which is consistent with both the historical trend and the assumed growth in the fisheries industry. Regional growth will be determined by the mix of industries with food manufacturing growing at the same rate as fisheries, 3 percent; lumber growing at 4 percent; paper growing at 2.5 percent; and other manufacturing bringing the growth rate into line with the overall 4 percent per year.

PETROLEUM REVENUE ASSUMPTIONS

Petroleum revenues to the state consist of royalties, production taxes, property taxes, and the corporate income tax. This section will examine the revenue assumptions chosen for the base case. Where it was possible and did not conflict with other assumptions made in this study, we used revenue estimates made by the state; in other cases, revenues were estimated based on assumptions about the wellhead value and production.

COOK INLET REVENUES

Table 5.3 details the royalty and severance revenues from oil and gas production in Upper Cook Inlet. The overall assumption is that oil production would be over in 1995, while gas production will continue throughout the projection period. The specific assumptions are:

- Oil royalties and production tax are from a Legislative Affairs Agency memo of July 14, 1977. Revenues were estimated through 1985; after that a 15 percent decline was assumed in the value of oil produced. The average production of the well was assumed

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TABLE B.3. COOK INLET REVENUES[1]

| Fiscal Year | Oil Royalties (Millions) | Oil Production Tax (Millions) | Gas Royalties (Millions) | Gas Production Tax (Millions) |
|---|---|---|---|---|
| 1978 | 33.1 | 16.3 | 4.4 | 2.3 |
| 1979 | 31.3 | 14.4 | 5.4 | 2.8 |
| 1980 | 29.5 | 12.7 | 6.9 | 3.6 |
| 1981 | 27.9 | 10.9 | 8.3 | 4.4 |
| 1982 | 26.4 | 9.1 | 9.0 | 4.6 |
| 1983 | 24.6 | 7.3 | 9.1 | 4.7 |
| 1984 | 22.9 | 5.5 | 9.3 | 4.8 |
| 1985 | 21.2 | 3.7 | 9.4 | 4.9 |
| 1986 | 20.1 | 3.0 | 9.4 | 4.9 |
| 1987 | 19.1 | 2.0 | 9.4 | 4.9 |
| 1988 | 18.2 | 1.0 | 9.4 | 4.9 |
| 1989 | 17.3 | 0 | 8.5 | 4.4 |
| 1990 | 16.4 | 0 | 7.7 | 3.9 |
| 1991 | 15.6 | 0 | 6.9 | 3.5 |
| 1992 | 14.8 | 0 | 6.2 | 3.2 |
| 1993 | 14.1 | 0 | 5.6 | 2.9 |
| 1994 | 13.4 | 0 | 5.0 | 2.6 |
| 1995 | 12.7 | 0 | 4.5 | 2.3 |
| 1996 | 0 | 0 | 4.1 | 2.1 |
| 1997 | 0 | 0 | 3.7 | 1.9 |
| 1998 | 0 | 0 | 3.3 | 1.7 |
| 1999 | 0 | 0 | 3.0 | 1.5 |
| 2000 | 0 | 0 | 2.6 | 1.4 |

[1]Same as The Permanent Fund and the Alaskan Economy (Goldsmith, 1977) study except oil royalties which are the same until 1985, then decline at 15 percent to be eliminated in 1996.

to decline below the taxable rate in 1989, and production was assumed to stop in 1995.

● Gas royalties and production tax are based on estimates of production through 1985 made by the Revenue Department in Revenue Journal, Vol. 1, No. 2, October 1976. Decline after 1985 was assumed by the author to be at a rate of 10 percent per year. The 1977 ratio of royalties and production taxes to production was assumed to hold throughout the projection period.


PRUDHOE BAY REVENUES

Prudhoe Bay will produce the major petroleum revenues for the state in the projection period. To arrive at revenue estimates, estimates of production and the wellhead value are needed. These estimates are shown in Table 6.4 and Table B.5.

● Production of oil was assumed to equal estimates made in Technical Report No. 6 (Alaska OCS Socioeconomic Studies Program, 1978).

● The wellhead value per barrel of oil was calculated based on discussion with BLM-OCS. These assumptions reflect those made with respect to N. Gulf oil.

  1. West Coast market price is $12/bbl. This reflects a $1.50 discount from a $13.50/bbl Gulf Coast price. The discount is for transport costs. The rea"l market price stays constant.

  2. Vessel costs equal $1.00/bbl from Valdez to the West Coast and $.75/bbl processing costs. These costs remain· constant in real terms.

  3. The TAPS tariff is $5.25 in 1978. The nominal tariff remains constant until 1990 when it is assumed the increased

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# TABLE 6.4.    PRUDHOE BAY OIL

| Fiscal Year | Production (Million Bbls) | Wellhead Price ($/Bbl) | Wellhead Value (Million$) | Royalties (Million$) | Production Tax (Million$) |
|---|---|---|---|---|---|
| 1978 | 237.3 | 5.00 | 1186.5 | 148.3 | 124.6 |
| 1979 | 474.5 | 5.56 | 2638.2 | 329.8 | 277.0 |
| 1980 | 584.0 | 6.16 | 3597.4 | 449.7 | 377.7 |
| 1981 | 595.7 | 6.79 | 4044.8 | 505.6 | 424.7 |
| 1982 | 607.5 | 7.45 | 4525.9 | 565.7 | 475.2 |
| 1983 | 619.6 | 8.15 | 5049.7 | 631.2 | 530.2 |
| 1984 | 631.5 | 8.88 | 5607.7 | 701.0 | 588.8 |
| 1985 | 641.5 | 9.66 | 6196.9 | 774.6 | 650.7 |
| 1986 | 613.2 | 10.48 | 6426.3 | 803.3 | 674.8 |
| 1987 | 545.7 | 11.35 | 6193.7 | 774.2 | 650.3 |
| 1988 | 511.9 | 12.25 | 6270.8 | 783.9 | 658.4 |
| 1989 | 475.4 | 13.22 | 6284.8 | 785.6 | 659.9 |
| 1990 | 409.7 | 14.24 | 5834.1 | 729.3 | 561.5 |
| 1991 | 367.7 | 15.02 | 5522.9 | 690.4 | 531.6 |
| 1992 | 347.7 | 15.85 | 5511.0 | 688.9 | 530.4 |
| 1993 | 329.4 | 16.72 | 5507.6 | 688.5 | 530.1 |
| 1994 | 299.3 | 17.64 | 5279.7 | 660.0 | 508.2 |
| 1995 | 268.3 | 18.61 | 4993.1 | 624.1 | 480.6 |
| 1996 | 246.4 | 19.63 | 4836.8 | 604.6 | 465.5 |
| 1997 | 228.? | 20.71 | 4724.0 | 590.5 | 454.7 |
| 1998 | 211.7 | 21.85 | 4625.6 | 578.2 | 445.2 |
| 1999 | 197.5 | 23.05 | 4552.4 | 569.1 | 438.2 |
| 2000 | 183.8 | 24.32 | 4470.0 | 558.8 | 430.2 |

## TABLE B.5.  PRUDHOE BAY GAS

| Fiscal Year | Production (Billion C. Ft) | Wellhead Price ($/MCF) | Wellhead Value (Million$) | Royalties (Million$) | Production Tax (Million$) |
|---|---|---|---|---|---|
| 1978 | 3.9 | 1.00 | 3.9 | 5 | 4 |
| 1979 | 5.1 | 1.06 | 5.4 | .7 | 6 |
| 1980 | 5.9 | 1.11 | 6.5 | 8 | .7 |
| 1981 | 28 | 1.17 | 32.8 | 4.1 | 3.4 |
| 1982 | 43 | 1.24 | 53.3 | 6.7 | 5.6 |
| 1983 | 50 | 1.31 | 65.5 | 8.2 | 6.9 |
| 1984 | 780 | 1.38 | 1076.4 | 134.6 | 113.0 |
| 1985 | 830 | 1.45 | 1203.5 | 150.4 | 126.4 |
| 1986 | 870 | 1.53 | 1331.1 | 166.4 | 139.8 |
| 1987 | 912 | 1.62 | 1477.4 | 184.7 | 155.1 |
| 1988 | 912 | 1.71 | 1559.5 | 194.9 | 163.7 |
| 1989 | 912 | 1.80 | 1641.6 | 205.2 | 172.4 |
| 1990 | 912 | 1.90 | 1732.8 | 216.6 | 181.9 |
| 1991 | 912 | 2.07 | 1833.1 | 229.1 | 192.5 |
| 1992 | 912 | 2.12 | 1933.4 | 241.7 | 203.0 |
| 1993 | 912 | 2.23 | 2033.8 | 254.2 | 213.5 |
| 1994 | 912 | 2.36 | 2152.3 | 269.0 | 226.0 |
| 1995 | 912 | 2.48 | 2261.8 | 282.7 | 237.5 |
| 1996 | 912 | 2.62 | 2389.4 | 298.7 | 250.9 |
| 1997 | 912 | 2.77 | 2526.2 | 315.8 | 265.3 |
| 1998 | 912 | 2.92 | 2663.0 | 332.9 | 279.6 |
| 1999 | 912 | 3.08 | 2809.0 | 351.1 | 294.9 |
| 2000 | 912 | 3.25 | 2964.0 | 370.5 | 311.2 |

operating costs dominate the decreasing capital costs. After 1990, the tariff remains constant in real terms.

This assumption reflects only one of a number which could be made concerning oil wellhead values.

- Production of gas at Prudhoe is assumed to increase following the Department of Revenue assumed production until 1987 when the peak production assumed by Dames and Moore (Beaufort OCS Petroleum Scenarios, 1978) is reached. This production level is assumed to remain throughout the period.

- The well head value of gas was calculated assuming the compromise energy bill is adopted so that Prudhoe gas could sell at a wellhead value of $1.45 per MCF. This assumes the ability to roll this gas with other gas. It is assumed that producers pay $.45 processing costs for a net of $1.00 wellhead. A constant real price of gas is assumed.[1]

Revenues from these are determined based upon state laws. Royalties are 12.5 percent 'of the wellhead value of oil and gas. The production tax in each case is a fraction of the nonroyalty value. This fraction depends upon the productivity of the average well in the field. The production tax on oil was assumed to equal 12 percent through 1989 when production declines and the rate falls to 11 percent. The production tax on gas is assumed to equal 12 percent throughout the projection period.

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[1] Base case was selected prior to final adoption of Federal Energy Act of 1978 which set a ceiling for Alaskan gas wellhead price.

MISCELLANEOUS REVENUES

There are three important miscellaneous petroleum revenues: the property tax, the reserves taxes, and the corporate income tax. Table B.6 shows the assumed value of these taxes.

- The property tax taxes all petroleum-related property except oil refining and gas processing property and leases at a rate of twenty mills. We used the property tax revenue series estimated by the Department of Revenue in <u>Alaska Oil and Gas Structure.</u> This assumed construction of the TAPS and ALCAN lines.

- The reserves tax involves the repayment by the state of taxes paid by petroleum producers in 1976 and 1977. Credits of up to 50 percent of the production taxes are given until the $499 million collected is repaid. This tax affects only producers at Prudhoe.

- The Alaskan corporate income tax was changed in the last legislative session so that no state projection of this revenue stream is available. The corporate income tax on petroleum is 9.4 percent of taxable petroleum income. Taxable income is gross income minus capital and operating costs and Alaskan taxes. The figure is not net of federal taxes. The tax was based on estimates of net income determined by the following procedure.

     1. ALCAN and TAPS income was based on an assumption that these lines would be guaranteed a 20 percent after-tax return on their equity by the rate structure. It

# TABLE B.6. OTHER REVENUES

| Fiscal Year | Property Tax[1] (Million$) | Reserves Tax[2] (Million$) | ANCSA[3] (Million$) | Corporate Income Tax[4] (Million$) |
|---|---|---|---|---|
| 1978 | 173.0 | (83.3) | (23.8) | 33.5 |
| 1979 | 185.0 | (166.4) | (52.9) | 127.8 |
| 1980 | 193.2 | (204.8) | (72.1) | 167.3 |
| 1981 | 226.7 | (44.8) | (81.6) | 188.5 |
| 1982 | 251.8 | 0 | (91.6) | 212.8 |
| 1983 | 257.0 | 0 | (102.3) | 265.1 |
| 1984 | 261.4 | 0 | (68.8) | 348.9 |
| 1985 | 295.9 | 0 | 0 | 384.8 |
| 1986 | 281.1 | 0 | 0 | 405.1 |
| 1987 | 267.0 | 0 | 0 | 407.2 |
| 1988 | 253.7 | 0 | 0 | 421.6 |
| 1989 | 241.0 | 0 | 0 | 428.7 |
| 1990 | 229.0 | 0 | 0 | 421.4 |
| 1991 | 217.5 | 0 | 0 | 409.7 |
| 1992 | 206.6 | 0 | 0 | 416.5 |
| 1993 | 196.3 | 0 | 0 | 425.7 |
| 1994 | 186.5 | 0 | 0 | 418.8 |
| 1995 | 177.2 | 0 | 0 | 410.1 |
| 1996 | 168.3 | 0 | 0 | 410.7 |
| 1997 | 159.9 | 0 | 0 | 409.9 |
| 1998 | 151.9 | 0 | 0 | 411.0 |
| 1999 | 144.3 | 0 | 0 | 416.6 |
| 2000 | 137.1 | 0 | 0 | 418.5 |

[1] Based on estimates in Alaska Oil and Gas Tax Structure, Department of Revenue.

[2] 50 percent of Prudhoe production taxes.

[3] 2.0 percent of wellhead value at Prudhoe until $500 million is paid to the fund.

[4] Actual fiscal year 78 value; afterwards estimated as explained in the text.

was assumed that 15 percent of the capital cost of both projects was equity. The TAPS project was assumed to cost $10.5 billion and the Alaskan portion of the ALCAN line was assumed to cost $4.3 billion. The equity portion was depreciated in a straightline return on the remaining equity adjusted for an assumed 48 percent Federal tax rate.

2. Corporate taxable income for Prudhoe Bay gas and oil production was derived by estimating the components of revenues and costs. Revenues are derived above. The cost assumptions were derived from Technical Report No. 6 (Alaska OCS Socioeconomic Studies Program, 1978). The assumptions are shown below:

|  | Prudhoe Oil | Prudhoe Gas |
| --- | --- | --- |
| Total Costs | $9.45 billion | $2.6 billion |
| Debt Proportion | 25 % | 25 % |
| Interest on Debt | 9.0% | 9.0% |
| Project Life | 25 years | 26 years |
| Total Throughput | 10.5 billion bbls | 26 billion MCF |

Capital costs per barrel were found with this information. Per barrel costs were used to account for the flow of investment over the life of the field. Capital costs equalled debt service plus depreciation costs. Operating costs were added for total costs. These costs were:

|  | Prudhoe Oil | Prudhoe Gas |
| --- | --- | --- |
| Capital Costs | $1.24/bbl | $.14/MCF |
| Operating Costs | $1.00/bbl | $.08/MCF |

In addition, $.12 per barrel and $.02 per MCF were allowed for overhead as per the legislation. Taxable income was found by subtracting these costs and allowable Alaska taxes from revenues.

3. The ratio of oil and gas taxable income to severance taxes at Prudhoe Bay was applied to Cook Inlet to estimate taxable income from this production.

4. Estimated corporate income tax was found by applying the .094 rate to this income.

5. A final portion of the tax includes a redistribution of multistate corporate profits. This portion allocates

worldwide corporate profits based on three factors: non-production property in Alaska as a percent of worldwide property, nonproduction payroll in Alaska as a percent of worldwide payroll, and Alaskan sales as a percent of worldwide sales. The average of these was taken as the proportion of worldwide profits which were taxed at 9.4 percent. Conversation with Alaska Department of Revenue led us to the conclusion that this component would be extremely small, so it was ignored in this study.

BEAUFORT OCS REVENUES

Tables B.7 through B.9 show the revenues associated with each of three Beaufort scenarios. Revenues are based on production estimates provided by the Alaska OCS Office of BLM. Wellhead values are determined by the wellhead value at Prudhoe minus transport costs from the Beaufort. These real 1978 transport costs were $.60 per barrel for oil and $.15 per MCF for gas. Other assumptions included:

1. Half of the production and offshore capital facilities would be located in state waters.

2. A conventional scheme of bonus bidding was used with $100 million being bid.

3. Discoveries on state-owned properties will be subject to state royalties and production taxes at current rates.

4. Oil and gas production from the Beaufort is transported via TAPS and ALCAN rather than new pipelines or alternate modes.

## TABLE B.7. BEAUFORT MINIMUM SCENARIO
## DIRECT REVENUE EFFECTS

(Millions of Nominal Dollars)

| | Bonus[1] | Royalties[2] | Production Tax | Property[4] Tax | Corporate[5] Income Tax |
|------|------|------|------|------|------|
| 1979 | 50 " | 0 | 0 | 0 | 0 |
| 1980 | o | 0 | 0 | 0 | 0 |
| | | | | | |
| 1981 | 0 | 0 | 0 | .31 | 0 |
| 1982 | 0 | 0 | 0 | 44 | 0 |
| 1983 | 0 | 0 | 0 | .70 | 0 |
| 1984 | 0 | 0 | 0 | .71 | 0 |
| 1985 | 0 | 0 | 0 | .48 | 0 |
| | | | | | |
| 1986 | 0 | 0 | 0 | 2.01 | 0 |
| 1987 | 0 | 0 | 0 | 4.75 | 0 |
| 1988 | 0 | 0 | 0 | 8.92 | 0 |
| 1989 | 0 | 9.10 | 7.60 | 13.29 | .42 |
| 1990 | 0 | 24.10 | 20.30 | 15.05 | 3.77 |
| | | | | | |
| 1991 | 0 | 33.00 | 27.70 | 16.77 | 5.66 |
| 1992 | 0 | 42.80 | 35.90 | 17.58 | 7.84 |
| 1993 | 0 | 45.10 | 37.90 | 19.04 | 9.27 |
| 1994 | 0 | 44.00 | 40.00 | 20.43 | 9.10 |
| 1995 | 0 | 50.20 | 42.20 | 20.92 | 9.06 |
| | | | | | |
| 1996 | 0 | 50.60 | 42.50 | 20.37 | 9.21 |
| 1997 | 0 | 50.70 | 42.60 | 19.70 | 8.72 |
| 1998 | 0 | 49.40 | 41.50 | 18.89 | 8.18 |
| 1999 | 0 | 46.30 | 38.90 | 17.94 | 7.14 |
| 2000 | 0 | 42.80 | 35.90 | 16.82 | 5.81 |

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[1]BLM-Alaska OCS Office.

[2]Royalties estimated at 12.5 percent of total wellhead value.

[3]Production tax equals 12 percent of the nonroyalty portion of total wellhead value.

[4]Tax at 20 mills of petroleum property value.

[5]Corporate income tax at 9.4 percent of taxable petroleum income.

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(Millions of Nominal Dollars)

| | Bonus[1] | Royalties[2] | Production Tax | Property[4] Tax | Corporate[5] Income Tax |
|------|------|------|------|------|------|
| 1979 | 50 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 31 | 0 |
| 1982 | 0 | 0 | 0 | 44 | 0 |
| 1983 | 0 | 0 | 0 | 70 | 0 |
| 1984 | 0 | 0 | 0 | .71 | 0 |
| 1985 | o ' | 0 | 0 | 82 | 0 |
| 1986 | 0 | 0 | 0 | 3.03 | 0 |
| 1987 | 0 | 0 | 0 | 6.21 | 0 |
| 1988 | 0 | 0 | 0 | 11.01 | 0 |
| 1989 | 0 | 12.50 | 10.50 | 16.22 | .43 |
| 1990 | 0 | 33.10 | 30.10 | 18.49 | 7.12 |
| 1991 | 0 | 51.00 | 42.90 | 20.69 | 10.41 |
| 1992 | 0 | 54.70 | 46.00 | 22.06 | 11.13 |
| 1993 | 0 | 57.80 | 48.50 | 24.18 | 11.96 |
| 1994 | 0 | 61.00 | 51.20 | 26.37 | 12.74 |
| 1995 | 0 | 63.20 | 53.00 | 27.60 | 11.29 |
| 1996 | 0 | 65.40 | 55.00 | 28.03 | 12.41 |
| 1997 | 0 | 67.70 | 56.80 | 28.00 | 12.77 |
| 1998 | 0 | 65.90 | 55.40 | 27.81 | 11.79 |
| 1999 | 0 | 62.20 | 52.30 | 27.50 | 9.87 |
| 2000 | 0 | 58.10 | 48.80 | 27.08 | 7.63 |

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[1]BLM-Alaska OCS Office.

'Royalties estimated at 12.5 percent of total wellhead value.

[3]Production tax equals 12 percent of the nonroyalty portion of total wellhead value.

[4]Tax at 20 mills of petroleum property value.

[5]Corporate income tax at 9.4 percent of taxable petroleum income.

TABLE B.9.   BEAUFORT HIGH SCENARIO
DIRECT REVENUE EFFECTS

(Millions of Nominal Dollars)

| | Bonus[1] | Royalties[2] | Production Tax | Property[4] Tax | Corporate[5] Income Tax |
|---|---|---|---|---|---|
| 1979 | 50 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 | 0 |
| | | | | | |
| 1981 | 0 | 0 | 0 | 31 | 0 |
| 1982 | 0 | 0 | 0 | 44 | 0 |
| 1983 | 0 | 0 | 0 | 70 | 0 |
| 1984 | 0 | 0 | 0 | .71 | 0 |
| 1985 | 0 | 0 | 0 | .82 | 0 |
| | | | | | |
| 1986 | 0 | 0 | 0 | 3.78 | 0 |
| 1987 | 0 | 0 | 0 | 9.21 | 0 |
| 1988 | 0 | 0 | 0 | 16.71 | 0 |
| 1989 | 0 | 37.50 | 31.40 | 24.88 | 4.51 |
| 1990 | 0 | 67.10 | 56.40 | 28.60 | 15.54 |
| | | | | | |
| 1991 | 0 | 85.10 | 71.40 | 32.35 | 19.48 |
| 1992 | 0 | 90.70 | 76.20 | 34.72 | 20.43 |
| 1993 | 0 | 95.60 | 80.30 | 38.43 | 21.95 |
| 1994 | 0 | 100.80 | 84.70 | 42.18 | 23.09 |
| 1995 | 0 | 106.40 | 89.30 | 44.34 | 21.97 |
| | | | | | |
| 1996 | 0 | 112.20 | 94.30 | 45.13 | 23.18 |
| 1997 | 0 | 115.90 | 97.30 | 45.23 | 23.90 |
| 1998 | 0 | 112.70 | 94.60 | 45.21 | 20.42 |
| 1999 | 0 | 101.50 | 85.20 | 45.04 | 17.62 |
| 2000 | 0 | 91.70 | 77.00 | 44.73 | 13.19 |

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[1]BLM-Alaska OCS Office.

[2]Royalties estimated at 12.5 percent of total wellhead value.

[3]Production tax equals 12 percent of the nonroyalty portion of total wellhead value.

[4]Tax at 20 mills of petroleum property value.

[5]Corporate income tax at 9.4 percent of taxable petroleum income.

APPENDIX C

A Procedure to Determine the Share of
<u>OCS Employment to Alaskan Residents</u>

The direct total employment estimates made by Dames and Moore in the
Northern Gulf OCS petroleum scenarios (Dames and Moore, 1978) have been
refined to reflect resident/nonresident composition of this employment.
Resident, in the context of these refinements, refers to an individual
that resides in Alaska for the duration of employment (including offsite).
Resident employees do not need to live in Alaska before the project begins.
Resident employment is assumed to have full impact on the Alaska economy,
while the impact of nonresident employees is assumed to be negligible.
To assist in the determination of the share of employment to Alaska resi-
dents (SEAR), a cross section of information regarding the classification,
structure, duration, and impact of OCS petroleum development-related
employment is presented in Table CI, "Characteristics of OCS Employment
by Task," which accompanies this appendix.

A brief outline of the table's format and information content will pre-
cede a discussion of the assumptions used to provide consistency and
accuracy in the interpretation of this information.

TABLE FORMAT
Columns one and two categorize employment by sector (or task) and by phase
of development, respectively.  Column three lists the rotation factor

# TABLE C.1. CHARACTERISTICS OF OCS EMPLOYMENT BY TASK

| 1 Employment Sectors For Petroleum Operations[1] | 2 Phase of Development[2] | 3 Rotation Factor[3] | 4 Duration[4] | 5 Potential AK Resident Share from Industry[5] | 6 Employment Multiplier[6] | 7 Payments Allocation Coefficients Share to AK Residents[8] In Years: 1 | 5 | 10 | 8 Estimate Share of Employment To Alaskan Residents (SEAR) 1979-84 | 1985-89 | 1990 * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Service Base | Exploration | 1 | | .15[a] | | 7 | | | 1.0 | 1.0 | 1.0 |
| | Development | 1 | P | .2 | .5 | | NA | | 1.0 | 1.0 | 1.0 |
| | Production | 1 | | .0 | | | | | 1.0 | 1.0 | 1.0 |
| 2. Helicopter Service | Exploration | 2 | | = .3 | | | | | .5 | .525 | .578 |
| | Development | 1.5[a] | P | | .5 | | NA | | .5 | .525 | .578 |
| | Production | 1 | | | | | | | .0 | .0 | .0 |
| 3. Service Base Const. | | 1.11 | T | .5 | 1.5 | | | | .5 | .525 | .578 |
| 4. Pipe Coating | | 1.11 | T | .2 | 1.1 | 2 | | | .2 | .21 | .231 |
| 5. Onshore Pipeline Const. | Development | 1.11 | T | .2 | 1.1 | 2 | .25 .25 .25 | | | .2 | .21 | .231 |
| 6. Oil Terminal Const. | | 1.11 | T | .5 | 1.1 | .2 | | | .5 | .525 | .578 |
| 7. LNG Plant Const. | | 1.11 | T | NA | 1.1 | .2 | | | .5 | .525 | .578 |
| 8. Concrete Platform Const.[10] | | NA | NA | NA | NA | NA | | | NA | NA | NA |
| 9. Oil Terminal Operations | Production | 1 | P | 1.0 | .5 | 1 | .75 .75 .75[9] | | | 1.0 | 0 | 1.0 |
| 10. LNG Plant Operations | | 1 | P | 1.0 | .5 | 1 | | | 1.0 | 0 | 1.0 |
| OFFSHORE | | | | | | | | | | | |
| 11. Surveys | Exploration | 1 | T | = | 1.1 | .2 | .5 .55 .55 | | | .2 | .21 | .231 |
| 12. Rigs | | 2 | T | | 1.1 | .2 | | | .2 | .2 | .23 |
| 13. Platforms | Development | 2 | | (.3[b] | 1.2[c] | .4 | .75 .75 .75[9] | | | | .3 | .33 |
| | Production | | P | 1.0 | .4[d] | .8 | | | .0 | .0 | 1.0 |
| 14. Platform Installation | Development | 2 | T | | | 2 | .25 .25 .25 | | | .1 | .05 | .116 |
| 15. Offshore Pipeline Const. | | 2 | T | | | 2 | .25 .25 .25 | | | | .05 | .116 |
| 16. Supply-Anchor-Tugboats | Exploration | 1.5 | | .5 | 1.2[c] | 4 | | | .4 | .42 | .462 |
| | Development | 1.5 | T | .5 | 1.4[d] | 8 | NA | | .8 | .88 | .968 |
| | Production | 1.5 | | | 1.4[d] | 8 | | | .8 | .83 | .968 |

[a] Approximation [b] Numbers in parentheses indicate second 5-year period
[c] First three years [d] Thereafter NA = not applicable

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TABLE NOTES

## Characteristics of OCS Employment by Task

1. These are the employment sectors (or tasks) requested by Tom Smythe of Alaska Consultants in his November 21 correspondence with Richard Schmidt of Peat, Marwick, Mitchell and Co.

2. Dames and Moore, "Alaska OCS Socioeconomic Studies Program, Northern Gulf of Alaska, Petroleum Development Scenarios," Draft Report, Task 9BA, October 24, 1978, Table 5-4, pages 119-122.

3. **Ibid.**

4. Based on discussions found in Planning for Offshore Oil Development, Gulf of Alaska OCS Handbook, Division of Community Planning, ADCRA, 1978, pages 40-41 and 223-224. Note: P = permanent; T = temporary.

5. Interview: Max Beazley, Staff Engineer at Mobil Oil Corporation, Exploration and Producing. Mr. Beazley is currently working in the Prudhoe Unit, a planning team for future development in Prudhoe Bay.

6. "Planning for Offshore Oil Development," Division of Community Planning, ADCRA, October 1977, Table 12, pages 17-18.

7. The factors to the right of the multipliers are the ratios of respective task-specific multiplier increments (multiplier - 1) to the statewide basic sector employment multiplier (1.5 - 1 = .5). (See note 6, above. )

8. "A Social and Economic Impact Study of Offshore Petroleum and Natural Gas Development in Alaska: Phase II," Mathematics Science Northwest, Inc., and Alaska Consultants, Inc., for BLM, October 1976, page 19.

9. Amendments suggested by Ed Phillips, Alaska DNR.

10. Concrete Platform Construction is not considered feasible in the Gulf of Alaska.

associated with each task.   The rotation factors are taken from Dames and

Moore (see table note 2) and are calculated as follows:[1]

$$, + \frac{\text{Number of days off duty}}{\text{Number of days on duty}}$$

They are used to determine the on- and offsite employment for a given task.

Employment duration (permanent or temporary) by task is listed in column

four.   The information in columns one through four characterize employment

by task.   They are intended to provide qualitative limits for the SEAR

estimates.


Columns five through seven provide alternative implicit and explicit esti-

mates of the SEAR. Column five includes an industry perspective on the

resident potential of Alaska OCS employment.   Column six provides estimates

of the impact multipliers of employment in each task. The multipliers

are implicit indicators of in-state residence.   The factors to the right

of the employment multipliers are the implicit SEARS assumed in these

multipliers, given an employment multiplier of 1.5 for Alaska. The payment

allocation coefficients found in column seven were developed for use in

a regional input-output analysis designed to capture the socioeconomic

impacts of OCS petroleum development in the Yakutat area.    (See table

note 8.) The values associated with table note 9 are adjustments sug-

gested to compensate for a bias toward higher payment allocation to Alaska

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[1]The assignment of a unitary rotation factor for offshore platforms
Production (task 13) suggests that an operations crew is never granted
off-duty leave from the-platform.   Although this assumption appears to be
questionable, Gordon Harrison of Dames and Moore attributes categorical
data problems to its existence and notes that potential inconsistencies
implied by its use are insignificant and are balanced elsewhere in employ-
ment assumptions for that task.

residents that was introduced to facilitate interregional effects. An

even distribution of skills across resident and nonresident groups is

required in order to reinterpret the payment. allocation coefficients in

the context of employment and residency. This assumption is, perhaps,

unrealistic during exploration and petroleum field development. Under

this interpretation, the payment allocation coefficients will overstate

the SEAR for tasks relevant to those phases of development.


METHODOLOGY AND ASSUMPTIONS

The task-specific information just outlined has been mapped into a final

SEAR estimate (in column eight) for each task using the following

methodology:

1.  The SEAR estimates contained in columns five, six, and
    seven are used to bracket a reasonable SEAR range for
    each task. For example, the SEAR range for offshore
    platform installation (task 14) extends from .1 to .25.

2.  In the interest of consistency, an additional set of
    general, phase-specific SEAR guidelines are developed.
    Here, a given employment task is examined in the con-
    text of its phase of development.


Tasks subsumed under exploration (Onshore: service base, helicopter service;

Offshore: surveys, rigs, supply-anchor-tugboats) are temporary, require

"extreme specialization," and usually embrace a reparatory work crew

having "international character."[2] These conditions imply a low SEAR

(of approximately .1 to .2) for exploration employment. Of course,

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[2] Dames and Moore, "Alaska OCS Socioeconomic Studies Program, North-
ern Gulf of Alaska, Petroleum Development Scenarios," Draft Report,
Task 9BA, October 24, 1978, pp. 106-107.

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exceptions to these guidelines occur. For example, helicopter service during exploration may be contracted through Anchorage-based firms.[3]

The offshore development phase, including platform installation (14) and operation (13) offshore pipeline construction (15), and supply-anchor-tug boats (16), is assumed to retain the descriptive and structural character- istics mentioned above for the case of exploration.

Onshore development includes various types of construction employment. Although the work force is generally seasonal (not unusual in the Alaska construction industry), the potential for civil construction work by Alaska-based contractors is more likely than that of offshore development or of exploration, particularly as the overall sphere of OCS development broadens. It is assumed that a SEAR of about .4 to .5 is consistent with these conditions.

During production, employment is generally permanent and oriented toward less specialized, more routine entry-level positions. These employment characteristics appear to be compatible with Alaska residency. Overall, we attach a SEAR of 1.0 to tasks subsumed under the production phase.

Table C.2 summarizes the general SEAR guidlines outlined above.

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[3]Dames" and Moore, "Alaska OCS Socioeconomic Studies Program, Monitor- ing Petroleum Activities in the Gulf of Alaska and the Lower Cook Inlet Between April 1975 and June 1978," Technical Report #17, August 1978, p. 38.

TABLE C.2.   PHASE-SPECIFIC SEAR GUIDELINE

|  | Onshore | Offshore |
|---|---|---|
| Exploration | .1 - .2 | .1 - .2 |
| Development | .4 - .5 | .1 - .2 |
| Production | 1.0 | 1.0 |

Additionally, there are two principal relationships which influence the trend in the share of OCS employment to Alaska residents (SEAR). First, the internal supply of labor that is qualified to perform the variety of tasks delineated in column one of Table C.1 is assumed to increase in response to earlier "layers" of OCS petroleum development, as a function of other mining activity, and to more general growth in the Alaska economy. Second, for those OCS employees that initially accept nonresident status, it is likely that a certain percentage shift to Alaska residency over time. We consolidate the combined effects of these employment dynamics into an assumption calling for a one percent annual average rate of growth in the SEAR for all tasks having an initial SEAR of less than one. For simplicity, the continuous compounding of growth per period is replaced by a five per-cent increase between 1985 and 1989 and a ten percent increase thereafter. This assumption corresponds to the figures in the three subcolumns under column eight.

## Selected Model Output

## Variable Definitions

POP         Population ($10^3$ persons)
MIGNET      Net migration ($10^3$ persons)
NI NCTOT    Natural increase (103 persons)

EM99        Total  employment  ($10^3$ persons)
EMSPP       Proportion of employment in the support sector
EMG9P       Proportion of employment in the government sector
EMNSP       Proportion of employment in the basic sector
EMA9        Employment in agricul ture-forestry-fisheries ($10^3$ persons)

EMGF        Employment in federal government (103 persons)
EMP9        Employment in mining ($10^3$ persons)
EMT9        Employment in transportation ($10^3$ persons)
EMS9        Employment in services ($10^3$ persons)
EMPU        Employment in utilities ($10^3$ persons)

EMM9        Employment in manufacturing ($10^3$ persons)
EMFI        Employment in finance-insurance-real  estate ($10^3$ persons)
EMD9        Employment in trade ($10^3$ persons)
EMCN        Employment in construction (103 persons)
EMCN1       Employment in local construction ($10^3$ persons)

EMGA        Employment in state and local government ($10^3$ persons)
EMOT        Other employment ($10^3$ persons)

PI          Personal income (millions of nominal dollars)
PIRPC       Real per capita personal income
RPI         Relative price index ($\$1957$ US = 100)

E99S        Total state expenditures (millions of nominal dollars)
EXOPS       Total state operating expenditures (millions of nominal dollars)
EXCAP       Total state capital expenditures (millions of nominal dollars)
E99SRPC     Real per capita state expenditures

REVGF       Total  general fund revenue (millions of nominal dollars)
RP9S        Total  petroleum revenues (millions of nominal dollars)
RT98        Total  nonpetroleum tax revenues (millions of nominal dollars)
RENS        Total endogenous revenues (millions of nominal dollars)

GFBAL       General fund balance (millions of nominal dollars)
PFBAL       Permanent fund balance (millions of nominal dollars)
RINS        Fund balance interest (millions of nominal dollars)

FUND        Total fund balance (millions of nominal dollars)
FUND77      Real fund balance (millions of real 1977 dollars)

SIMP        General fund revenue minus general fund expenditure
            (millions of nominal dollars)

EXBITES     State total expenditure as a percentage of personal income
VIABL2      Nonpetroleum revenues as a percentage of general fund
            expenditures
RENSRAT     Endogenous revenues as a percentage of personal income

MODERATE BASE CASE

|      | POP     | NJS?TC?T? NINCTOT | | EX99    | EMSPP | EMG9P | FMNS P | EMA9 |
|------|---------|---------|---------|---------|-------|-------|--------|------|
| 1977 | 410.66  | -24.935 | 6.343   | 185.508 | 0.363 | 0.378 | 0.259  | 1.1  |
| 1978 | 406.667 | -11.241 | 7.202   | 178.526 | 0.373 | 0.386 | 0.242  | 1.2  |
| 1979 | 418.656 | 5.268   | 6.(>9-7 | 185.225 | 0.383 | 0.374 | 0.243  | 1.2  |
| 1980 | 434.173 | 8.65    | 6.87    | 194.054 | 0.395 | 0.36  | 0.245  | 1.2  |
| 1981 | 455.563 | 14.253  | 7.144   | 276.479 | 0.408 | 0.342 | 0.251  | 1.3  |
| 1982 | 486.359 | 23.18   | 7.63.3  | 224.(37 | 0.422 | 0.319 | 0.258  | 1.3  |
| 1983 | 512.802 | 8.014   | 8.46    | 230.228 | 0.423 | 0.324 | 0.253  | 1.4  |
| 1984 | 501.479 | -9.943  | 8.626   | 223.159 | 0.42  | 0.339 | 0.241  | 1.4  |
| 1985 | 509.057 | -0.528  | 8.082   | 224.%31 | 0.427 | 0.331 | 0.242  | 1.4  |
| 1986 | 5?3.983 | 6.046   | 7.971   | 231.906 | 0.434 | 0.322 | 0.244  | 1.5  |
| 1987 | 539.029 | 7.828   | 8.12    | 240.132 | 0.442 | 0.315 | 0.244  | 1.5  |
| 1988 | 556.942 | 9.545   | 8.332   | 249.55  | 0.449 | 0.307 | 0.244  | 1.6  |
| 1989 | 575.352 | 9.$3'32 | 8.614   | 259.033 | 0.457 | 0.3   | 0.243  | 1.6  |
| 1990 | 591.58  | 7.336   | f{.9    | 266.632 | 0.462 | 0.296 | 0.242  | 1.7  |
| 1991 | 606.771 | 6.111   | 9.082   | 273.502 | 0.469 | 0.291 | 0.24   | 1.7  |
| 1992 | 622.686 | 6.694   | 9.22    | 280.902 | 0.475 | 0.285 | 0.24   | 1.8  |
| 1993 | 640.335 | 8.264   | 9.386   | 289.58  | 0.483 | 0.278 | 0.239  | 1.8  |
| 1994 | 658.298 | 8.349   | 9.616   | 298.329 | 0.489 | 0.272 | 0.239  | 1.8  |
| 1995 | 677.649 | 9.508   | 9.845   | 308.016 | 0.496 | 0.265 | 0.238  | 1.9  |
| 1996 | 698.466 | 10.791  | 10.12   | 318.616 | 0.503 | 0.258 | 0.239  | 2.   |
| 1997 | 719.126 | 10.228  | 10.438  | 328.881 | 0.51  | 0.252 | 0.238  | 2.1  |
| 1998 | 740.455 | 10.603  | 10.729  | 339.495 | 0.516 | 0.245 | 0.238  | 2.1  |
| 1999 | 763.593 | 13.11   | 11.031  | 352.046 | 0.524 | 0.238 | 0.238  | 2.2  |
| 2000 | 789.287 | 13.274  | 11.429  | 364.721 | 0.531 | 0.231 | 0.238  | 2.2  |

|      | EMGF   | EMP9  | EMT9    | EMS9    | EMPU  | EMOT    | EMM9    | EMFI   |
|------|--------|-------|---------|---------|-------|---------|---------|--------|
| 1977 | 42.921 | 4.514 | 9.842   | 22.649  | 1.184 | ?4.55   | 11.356  | 5.779  |
| 1978 | 42.921 | 4.351 | 10.294  | 21.9    | 1.194 | 14.269  | 11.906  | 5.738  |
| 1979 | 42.921 | 4.563 | 10.774  | 23.693  | 1.249 | 14.538  | 12.4"11 | 6.176  |
| 1980 | 42.921 | 5.104 | 11.3')3 | 25.945  | 1.321 | 14.886  | 12.896  | 6.758  |
| 1981 | 42.921 | 4.93  | 12.173  | 29.022  | 1.403 | 15.363  | 13.37   | 7.49?  |
| 1982 | 42.921 | 4.576 | 13.232  | 33.543  | 1.507 | 16.033  | 13.843  | 8.524  |
| 1983 | 42.921 | 4.275 | 1.3.5.36| 34.395  | 1.541 | 16.234  | 14.32   | 8.839  |
| 1984 | 42.921 | 4.415 | 13.237  | 32.47   | 1.526 | 15.979  | 14.867  | 8.578  |
| 1985 | 42.921 | 4.315 | 13.551  | 33.276, | 1.551 | 16.044  | 15.364  | 8.808  |
| 1986 | 42.921 | 4.312 | 14.02   | 35.194  | 1.602 | 16.293  | 15.877  | 9.295  |
| 1987 | 42.921 | 4.399 | 14.557  | 37.406  | 1.66  | 16.583  | 16.403  | 9.865  |
| 1988 | 42.921 | 4.643 | 15.139  | 39.868  | 1.722 | 16.909  | 16.947  | 10.494 |
| 1989 | 42.921 | 4.839 | 15.735  | 42.424  | 1.786 | 17.23   | 17.507  | 11.152 |
| 1990 | 42.921 | 4.853 | 16.207  | 44.432  | 1.837 | 17.484  | 18.085  | 11.686 |
| 1991 | 42.921 | 4.343 | 16.684  | 46.543  | 1.887 | 17.71   | 18.68   | 12.229 |
| 1992 | 42.'321| 4.322 | 17.166  | 48."701 | 1.938 | 17.95   | 19.297  | 12.788 |
| 1993 | 42.921 | 4.171 | 17.743  | 51.354  | 1.998 | 18.227  | 19.933  | 13.464 |
| 1994 | 42.921 | 4.12  | 18.302  | 53.952  | 2.055 | 18.503  | 20.59   | 14.129 |
| 1995 | 42.921 | 4.123 | 18.923  | 56.901  | 2.12  | 18.803  | 21.269  | 14.888 |
| 1996 | 42.921 | 4.125 | 19.589  | 60.114  | 2.187 | 19.126  | 21.971  | 15.701 |
| 1997 | 42.921 | 4.102 | 20.235  | 63.243  | 2.253 | 19.434  | 22.696  | 16.513 |
| 1998 | 42.921 | 4.078 | 23.393  | 66.526  | 2.319 | 19.746  | 2.3.445 | 17.35. |
| 1999 | 42.921 | 4.078 | 21.668  | 70.464  | 2.397 | 20.11   | 24.219  | 19.352 |
| 2000 | 42.921 | 4.079 | 22.429  | 74.399  | 2.472 | 20.4-/1 | 25.019  | 19.352 |

| | EM09 | EMCN | EMCH1 | EMGA | PI | PIRPC | RPI | EXOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.139 | 27.256 | 4072.38 | 3924.32 | 252.71 | 810. |
| 1978 | 24.766 | 11.434 | 11.307 | 25.941 | 4236.48 | 3723.81 | 272.75 | 944. |
| 1979 | 26.405 | 12.277 | 11.972 | 26.373 | 471.$3.19 | 3862.07 | 293.358 | 1019. |
| 1980 | 28.562 | 13.526 | 13.001 | 26.862 | 5395.29 | 4029.44 | 308.4 | 1120.35 |
| 1981 | 31.235 | 16.775 | 14.132 | 27.645 | 6400.84 | 4317.09 | 325.469 | 1247.59 |
| 1982 | 34.862 | 22.3'37 | 15.768 | 28.811 | 7916.37 | 4711.11 | 345.513 | 1432.16 |
| 1983 | 35.993 | 21.97 | 16.513 | 31.619 | 8570.5 | $720.22 | 361.121 | 1696.62 |
| 1984 | 35.159 | 17.124 | 16.485 | 32.662 | 8276.16 | 4431.22 | 372.435 | 1848.08 |
| 1985 | 35.389 | 17.362 | 17.136 | 31.551 | 8809.96 | 4462.8 | 307.793 | 1905.99 |
| 1986 | 37.713 | 18.643 | 18.212 | 31.692 | 9763.24 | 4598.26" | 405.915 | 2071.54 |
| 1987 | 39.723 | 19.627 | 19.167 | 32.61 | 10854. | 4732.11 | 425.528 | 2310.95 |
| 1988 | 41.913 | 20.821 | 20.229 | 33.642 | 12145.5 | 4885.77 | 446.354 | 2584.19 |
| 1989 | 44.205 | 21.865 | 21.311 | 34.807 | 33531.3 | 5024.07 | 460.12 | 2895.41 |
| 1990 | 46.052 | 22.415 | 22.213 | 35.998 | 14835.5. | 5118.93 | 489.906 | 3227.[)6 |
| 1991 | 47.913 | 23.159 | 22.956 | 36.741 | 16226,4 | 5221.23 | 512.107 | 3541.88 |
| 1992 | 49.819 | 23.931 | 23.805 | 37.255 | 17780.9 | 5330.92 | 535.75 | 3864.63 |
| 1993 | 52.108 | 25.089 | 24.884 | 37.715 | 19613. | 5461.63 | 560.815 | 4214.64 |
| 1994 | 54.347 | 26.175 | 25.969 | 38.341 | 21601.7 | 5590.01 | 587.026 | 4608.74 |
| 1995 | 56.80-7 | 27.329 | 27.2 | 38.822 | 23S29.1 | 5719.94 | 614.776 | 5024.26 |
| 1996 | 59.583 | 28.788 | 28.515 | 39.329 | 26434. | 5875.33 | 644.155 | 5475.53 |
| 1997 | 62.266 | 29.971 | 29.917 | 39.946 | 29094.7 | 5997.29 | 674.618 | 5980.63 |
| 1998 | 65.01 | 31.451 | 31.396 | 40.411 | 32115.7 | 6139.43 | 796.475 | 6502.43 |
| 1999 | 68.273 | 33.231 | 33.175 | 40.838 | 35660.7 | 6297.37 | 74(3.639 | 7079.38 |
| 2000 | 71.508 | 35.03 | 34.972 | 41.496 | 39558.7 | 6355.75 | 776.366 | 7743.56 |

| | EXCAP | E99S | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.8'2 | 1118.56 | 796.27 | 197.201 | 214.301 | 270.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.49 | 1053.8 | 471.4 | 206.916 | 240.272 | 617.2(?9 |
| 1979 | 290. | 1414.71 | 1151.9 | 1440.77 | 860.7 | 274.373 | 222.549 | 814.761 |
| 1980 | 331.395 | 1566.76 | 1170.1 | 1624.51 | 996.3 | 312.909 | 230.856 | 1054.02 |
| 1981 | 372.128 | 1743.59 | 1175.94 | 1987.98 | 127s.41 | 355.308 | 264.013 | 1500.3 |
| 1982 | 443.634 | 2014.83 | 1198.99 | 2328.56 | 1475.74 | 437.17 | 336.947 | 2055.96 |
| 1983 | 521.473 | 2371.39 | 1306.03 | 2650.63 | 1642.7 | 551.719 | 419.177 | 2630.09 |
| 1984 | 561.826 | 2580.05 | 1381.42 | 3224.12 | 2121.71 | 650.162 | 447.095 | 3558.47 |
| 1985 | 654.205 | 2747.94 | 1392.01 | 3628.91 | 2422.22 | 682.227 | 450.247 | 4748.43 |
| 1986 | 780.546 | 3061.89 | 1442.06 | 3811.33 | 2432.93 | 737.268 | 497.794 | 5871.61 |
| 1987 | 833.027 | 3382.48 | 1474.67 | 4058. | 2480.11 | 792.758 | 570.019 | 6983.04 |
| 1988 | 905.618 | 3750.11 | 1508.53 | 4312.45 | 2520.71 | 871.591 | 656.675 | 8044.19 |
| 1989 | 960.565 | 4144.94 | 1538.96 | 4583.19 | 2563.12 | 954.926 | 758.599 | 9044.13 |
| 1990 | 1009.75 | 4556.67 | 1572.25 | 4712.29 | 2459.19 | 1035.29 | 868.514 | 9836.55 |
| 1991 | 1010.06 | 4903.72 | 1577.87 | 4879.65 | 2406.19 | 1108.34 | 979.432 | 10503.9 |
| 1992 | 1034.08 | 5283.61 | 1583.8 | 5129.42 | 2430.36 | 1207.55 | 1101.96 | 11095.5 |
| 1993 | 1076.94 | 5704.91 | 1588.62 | 5401.93 | 2459.28 | 1324.32 | 1243.75 | 11604.2 |
| 1994 | 1126.46 | 6178.99 | 1568.96 | 5637.3 | 2427.37 | 1445.31 | 1411.72 | 11955.7 |
| 1995 | 1163.79 | 6667.18 | 1600.37 | 5864.25 | 2373.6 | 1578.32 | 1600.18 | 12128.3 |
| 1996 | 1208.79 | 7201.25 | 1600.56 | 6161.67 | 2365.73 | 1749.55 | 1821.53 | 12149.5 |
| 1997 | 1275.43 | 7809.19 | 1609.69 | 6494.16 | 2367. | 1943.9 | 2075.96 | 11995.7 |
| 1998 | 1376.16 | 8472.7 | 1619.67 | 6840.48 | 2364.7? | 2158.6? | 2355.52 | 11641.7 |
| 1999 | 1490.43 | 9197.66 | 1624.2 | 7234.21 | 2379.5 | 2415.22 | 2681.24 | 11086.3 |
| 2000 | 1622.01 | 10029.1 | 1636.66 | 7678.43 | 2371.88 | 2718.09 | 3070.67 | 10292.8 |

| | | PLWS | POPD | POPD77 | EXBIRTH | R??L | P??L | SIZE |
|---|---|---|---|---|---|---|---|---|
| 1977 | 2.4 | 35.343 | 670.6 | 671.369 | 0.131 | 531.912 | 557.16 | -137.452 |
| 1978 | 48.975 | 46.954 | 666.194 | 602.483 | 0.134 | 568.508 | 595.271 | -4.416 |
| 1979 | 153.275 | 46.878 | 968.037 | 834.862 | 0.131 | 622.523 | 650.896 | 301.853 |
| 1980 | 275. | 68.529 | 1329.02 | 1090.28 | 0.133 | 718.529 | 748.6 | 360.987 |
| 1981 | 411.475 | 94.407 | 1911.78 | 1406.1 | 0.126 | 806.159 | 838.034 | 582.755 |
| 1982 | 563.425 | 135.832 | 2619.38 | 1918.02 | 0.115 | 910.708 | 944.496 | 707.604 |
| 1983 | 731.699 | 186.174 | 3361.79 | 2355.26 | 0.121 | 1040.8 | 1076.61 | 742.415 |
| 1984 | 948.649 | 238.984 | 4507.12 | 3061.74 | 0.136 | 1123.95 | 1161.92 | 1145.33 |
| 1985 | 1187.55 | 320.241 | 5935.98 | 3872.69 | 0.133 | 1168.37 | 1209.61 | 1428.86 |
| 1986 | 1437.35 | 421.456 | 7302.96 | 4555.55 | 0.128 | 1250.29 | 1292.95 | 1372.99 |
| 1987 | 1684.2 | 518.814 | 8667.24 | 5153.15 | 0.126 | 1363.94 | 1409.16 | 1358.28 |
| 1988 | 1935.8 | 615.127 | 9979.99 | 5656.8 | 0.123 | 1497.99 | 1545.92 | 1312.75 |
| 1989 | 2193.07 | 708.278 | 11237.2 | 6073.25 | 0.122 | 1647.03 | 1697.83 | 1257.22 |
| 1990 | 2444.52 | 797.57 | 12291.1 | 6342.26 | 0.122 | 1811.37 | 1865.23 | 1043.87 |
| 1991 | 2688.87 | 871.898 | 13192.8 | 6516.69 | 0.121 | 1971.43 | 2028.51 | 911.687 |
| 1992 | 2936.75 | 936.937 | 14032.3 | 6626.54 | 0.12 | 2138.22 | 2198.73 | 839.52 |
| 1993 | 3188.27 | 996.943 | 14792.5 | 6673.33 | 0.118 | 2320.88 | 2385.01 | 760.234 |
| 1994 | 3437.02 | 1051.42 | 15392.8 | 6634.06 | 0.117 | 2531.44 | 2599.43 | 600.242 |
| 1995 | 3680.52 | 1094.68 | 15808.8 | 6505.81 | 0.116 | 2756.47 | 2828.53 | 416.027 |
| 1996 | 3923.72 | 1125.02 | 16073.2 | 6312.95 | 0.114 | 3012.15 | 3088.54 | 264.418 |
| 1997 | 4168.14 | 1144.74 | 16163.8 | 6061.87 | 0.113 | 3294.18 | 3375.16 | 90.633 |
| 1998 | 4413.22 | 1152.31 | 16054.9 | 5749.53 | 0.112 | 3597.7 | 3683.53 | -108.895 |
| 1999 | 4659.57 | 1145.91 | 15745.8 | 5378.73 | 0.11 | 3926.52 | 4017.51 | -309.109 |
| 2000 | 4907.07 | 1125.51 | 15199.9 | 4953.28 | 0.109 | 4310.08 | 4406.52 | -545.977 |

| | EXBITES | VIABL2 | RENSRAT |
|---|---|---|---|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.24 | 0.468 | 0.047 |
| 1980 | 0.234 | 0.443 | 0.043 |
| 1981 | 0.22 | 0.438 | 0.041 |
| 1982 | 0.205 | 0.442 | 0.043 |
| 1983 | 0.223 | 0.431 | 0.049 |
| 1984 | 0.251 | 0.415 | 0.054 |
| 1985 | 0.25 | 0.403 | 0.051 |
| 1986 | 0.25 | 0.393 | 0.051 |
| 1987 | 0.249 | 0.392 | 0.053 |
| 1988 | 0.247 | 0.392 | 0.054 |
| 1989 | 0.246 | 0.394 | 0.056 |
| 1990 | 0.247 | 0.397 | 0.059 |
| 1991 | 0.245 | 0.404 | 0.06 |
| 1992 | 0.241 | 0.411 | 0.062 |
| 1993 | 0.237 | 0.419 | 0.063 |
| 1994 | 0.233 | 0.429 | 0.065 |
| 1995 | 0.229 | 0.44 | 0.067 |
| 1996 | 0.223 | 0.453 | 0.069 |
| 1997 | 0.22 | 0.466 | 0.071 |
| 1998 | 0.216 | 0.478 | 0.073 |
| 1999 | 0.212 | 0.493 | 0.075 |
| 2000 | 0.208 | 0.508 | 0.078 |

MEAN NORTHERN GULF DEVELOPMENT SCENARIO

(Levels and Differences from the Moderate Base Case)

| | POP | MIGNET | NINCTOT | EM99 | EMSPP | EMG9P | EMNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 41`.66 | -24.935 | 6.383 | 185.s08 | 3.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.667 | -11.241 | 7.202 | 178.526 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 418.656 | 5.268 | 6.697 | 185.225 | 0.383 | 0.374 | 0.243 | 1.2 |
| 1980 | 434.173 | 8.65 | 6.87 | 194.054 | 0.395 | 0.36 | 0.245 | 1.2 |
| 1981 | 456.`37? | 14.768 | 7.144 | 206.859 | 0.408 | 0.341 | 0.251 | 1.3 |
| 1982 | 487.441 | 23.727 | 7.s54 | 2?25.394 | 0.423 | 0.318 | 0.259 | 1.3 |
| 1983 | 504.694 | 8.784 | ●fi.50i | 231.506 | 0.425 | 0.322 | 0.253 | 1.4 |
| 1984 | 503.802 | -9.582 | 8.697 | 22$.632 | 0.421 | 0.337 | 0.242 | 1.4 |
| 1985 | 513.372 | 1.383 | 8.163 | 227.742 | 0.429 | 0.327 | 0.243 | 1.4 |
| 1986 | 530.903 | 9.4 | 8.127 | 236.983 | 0.439 | 0.316 | 0.245 | 1.5 |
| 1987 | 551.736 | 12.437 | 8.4?3 | 248.235 | 0.449 | 0.306 | 0.245 | 1.5 |
| 1988 | 573.044 | 12.5.31 | 8.788 | 259.246 | 0.456 | 0.299 | 0.245 | 1.6 |
| 1989 | 593.59 | 11.392 | 9.165 | 269.355 | 0.463 | 0.293 | 0.245 | 1.6 |
| 1990 | 612.523 | 9.453 | 9.491 | 278.055 | 0.468 | 0.288 | 0.244 | 1.7 |
| 1991 | 626.14 | 3.888 | 9.735 | 282.828 | 0.472 | 0.287 | 0.241 | 1.7 |
| 1992 | 639.242 | 3".344 | 9.754 | 287.596 | 0.4"?7 | 0.282 | 0.241 | 1.8 |
| 1993 | 655.575 | 6.561 | 9.767 | 295.033 | 0.484 | 0.275 | O*24 | 1.8 |
| 1994 | 672.781 | 7.288 | 9.918 | 303.0$?3 | 0.491 | 0.269 | 0.24 | 1.8 |
| 1995 | 692.017 | 9.14 | l*?.`797 | 312.619 | 0.498 | 0.262 | 0.24 | 1.9 |
| 1996 | 713.324 | 10.959 | 10.351 | 323.534 | 0.505 | 0.255 | 0.24 | 2. |
| 1997 | 734.418 | 10.423 | 10.676 | 334.057 | 0.511 | 0.249 | 0.24 | 2.1 |
| 1998 | 756.137 | 10.801 | 10.972 | 344.923 | 0.518 | 0.242 | 0.24 | 2.1 |
| 1999 | 780.692 | 13.23 | 11.28 | 357.663 | 0.525 | 0.235 | 0.24 | 2.2 |
| 2000 | /305.725 | 13.357 | 11,682 | 370.496 | 0.532 | 0.229 | 0.24 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMFI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.0$2 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.351 | 10.294 | 21.9 | 1.194 | 14.269 | 11.906 | 5.738 |
| 1979 | 42.921 | 4.563 | 10.774 | 23.693 | 1.249 | 14.538 | 12.411 | 6.176 |
| 1980 | 42.921 | 5.104 | 11.393 | 25.945 | 1.321 | 14.886 | 12.896 | 6.758 |
| 1981 | 42.921 | 5.036 | 12.26 | 29.095 | 1.405 | 15.377 | 13.37 | 7.515 |
| 1982 | 42.921 | 4.747 | 1.3.358 | 33.696 | 1.511 | 16.06 | 13.843 | 8.563 |
| 1983 | 42.921 | 4.546 | 1.3.747 | 34.655 | 1.548 | 16.279 | 14.32 | 8.906 |
| 1984 | 42.921 | 4.699 | 13.464 | 32.756 | 1.534 | 16.033 | 14.867 | 8.652 |
| 1985 | 42.921 | 4.63 | 13.89 | 33.9.39 | 1.57 | 16.145 | 15.364 | 8.98 |
| 1986 | 4?.921 | 4.5'10 | 14.614 | 36.442 | i.635 | 16.473 | 15.877 | 9.617 |
| 1987 | 42.921 | 4.704 | 15.297 | 39.471' | 1.713 | 16.364 | 16.403 | 10.397 |
| 1988 | 42.921 | 5.219 | ?5.956 | 42.25 | 1.781 | 17.238 | 16.947 | 11.107 |
| 1989 | 42.921 | 5.618 | 16.636 | 44.921 | 1.846 | 17.574 | 17.542 | 11.794 |
| 1990 | 42.921 | 5.967 | 17.126 | 47-229 | 1.903 | 17./358 | 18.12 | 12.404 |
| 1991 | 42.921 | 5.541 | 17.51 | 48.628 | 1.936 | 18.012 | 18.744 | 12.764 |
| 1992 | 42.921 | 5.356 | 17.683 | 50.188 | 1.972 | 18.164 | ?9.367 | 13.169 |
| 1993 | 42.921 | 5.11 | 18.226 | 52.596 | 2.026 | 18.4 | 20.003 | 13.782 |
| 1994 | 4?.921 | 14.96 | 18.751 | 55.055 | 2.08 | 18.651 | 20.66 | 14.411 |
| 1995 | 42.921 | 4.988 | 19.369 | 57.989 | 2.143 | 76.'344 | 21.339 | 15.166 |
| 1996 | 42.921 | 5.09 | 20.047 | 61.3 | 2.212 | 19.274 | 22.041 | 16.004 |
| 1997 | 42.921 | 5.091 | 20.704 | 64.505 | 2.279 | 19.587 | 22.766 | 16.834" |
| 1998 | 42.921 | 5.093 | 21.374 | 67.868 | 2.346 | 19.905 | 23.515 | 17.691 |
| 1999 | 42.921 | 5.093 | 22.157 | 71.873 | 2.424 | 20.271 | 24.289 | 18.71 |
| 2000 | 42.921 | 5.094 | 2'2.924 | 75.869 | 2.5 | 20.633 | 25.089 | 19.725 |

| | EI J9 | EMC | EMCN1 | EMGA | PI | PIRPC | RPI | E_OPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924.32 | 252.71 | 810. |
| 1978 | 24.766 | 11.434 | 11.307 | 25.941 | 4236.48 | 3723..91 | 2")9.7'5 | 944. |
| 1979 | 26.405 | .12.277 | 11.472 | 26.373 | 4743.19 | 3862,)7 | 293.358 | 1019. |
| 1980 | 28.562 | 13.526 | 13.001 | 26.862 | 5395.29 | 4029.44 | 308.4 | 1120.35 |
| 1981 | 31.305 | 16.804 | 14.161 | 27.623 | 6419.62 | 4322.83 | 325.623 | 1247.59 |
| 1982 | 35.003 | 22.374 | 15.835 | 22.837 | 7958.32 | 4721.45 | "345.874 | 1435.16 |
| 1983 | 36.231 | 22* 083 | 16.626 | 31.681 | 8644.94 | 4736.66 | 361.631 | 1703.05 |
| 1984 | 35.424 | 17.253 | 16.614 | 32-803 | 8360.41 | 4443.3 | 373.054 | 1859.66 |
| 1985 | 36.6 | 17.871 | 17.391 | 31.625 | 9008.04 | 4510.79 | 380.998 | 1918.4 |
| 1986 | 38.851 | 19.663 | 18.699 | 31.93 | 10154.8 | 4686.78 | 498.122 | 2101.17 |
| 1987 | 41.586 | 21.354 | 19.979 | 33.116 | 115.35.2 | 4872.56 | 429.085 | 2370.06 |
| 1988 | 44.047 | 22.57/3 | 21.208 | 34.642 | 12978.7 | 5025.95 | 450.642 | 2686.92 |
| 1989 | 46.415, | 23.525 | 22.344 | 35.964 | 144'52.9 | 5150.7 | 472.727 | 3020.64 |
| 1990 | 48.511 | 24.2 | 23.376 | 37.116 | 15918.8 | 5249.5 | 495.03 | 3364.35 |
| 1991 | 49.736 | 24.187 | 23.896 | 38.13 | 17081.8 | 5281.79 | 516.516 | 3701.41 |
| 1992 | 51.112 | 24.59 | 24.464 | 38.241 | 18420.4 | 5346.79 | 530.943 | 3985.63 |
| 1993 | 53.179 | 25.638 | 25.433 | 38.28 | 20170.9 | 5460.54 | 563.47 | 4293.68 |
| 1994 | 55.293 | 26.674 | 26.463 | 38.721 | 22121.4 | 5578.84 | 589.385 | 4667.79 |
| 1995 | 57.813 | 27.826 | 27.697 | 39.08 | 24366.6 | 5705,439 | 617.095 | 5070.57 |
| 1996 | 60.583 | 29 *335 | 29.062 | 39.531 | 27050.8 | 5864.31 | 646.663 | 5519,27 |
| 1997 | 63.322 | 39.56 | 30.507 | 40.169 | 29784.8 | 5987.96 | 677.294 | 6030.96 |
| 1998 | 66.124 | 32.079 | 32.024 | 40.645 | 32888.1 | 6131.6 | 709.319 | 6558.54 |
| 1999 | 69.434 | 33.893 | 3.3.837 | 41.087 | 36514.4 | 6289.92 | 743.612 | 714?.71 |
| 2000 | 72.709 | 35.721 | 35.663 | 41.748 | 40496.4 | 6448.28 | 779.458 | 7810.61 |

| | EXCAP | E99S | E99SBPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.82 | 1118.56 | 7'-36.27 | 197.201 | 21$.301 | 278.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.49 | 1053.8 | 471.4 | 206.916 | 240.272 | 617.209 |
| 1979 | 290. | 1414.71 | 1151.9 | 1440.77 | 860.7 | 274.373. | 222.549 | 814.761 |
| 1980 | 331.335 | 1566.76 | 1170.1 | 1624.51 | 996.3 | 312.909 | 230.856 | 1054.02 |
| 1981 | 372.128 | 1743.59 | 1174.06 | 1988.55 | 1278.41 | 355.609 | 264.3?4 | 1500.87 |
| 1982 | 444.685 | 2018.89 | 1197.69 | 2330.77 | 1475.74 | 438.457 | 338.533 | 2055.49 |
| 1983 | 523.263 | 2379.64 | 1303.82 | 26S5.01 | 1642.7 | 554.402 | 422.537 | 2627.34 |
| 1984 | 564.766 | 2554.65 | 1380.53 | 3230.48 | 2121.71 | 654.15 | 452.3C2 | 3550.23 |
| 1985 | 656.147 | 2762.4'6 | 1383.3 | 3638.62 | 2422.22 | 688.497 | 457.94 | 4727.79 |
| 1986 | 787.626 | 3090.91 | 1430.18 | 3832.81 | 2430.98 | 751.246 | 515.097 | 5852.35 |
| 1987 | 850.323 | 3454.3 | 1459.1 | 4100.44 | 2482.07 | 819.668 | 693.624 | 6947.33. |
| 1988 | 925.417 | 3873.39 | 1499.93 | 4377.35 | 2523.13 | 913.609 | 710.544 | 7971.75 |
| 1989 | 977.05 | 4287.93 | 1523.1 | 4664.6 | 2570.9 | 1206.07 | 824.565 | 8933.78 |
| 1990 | 1')23.17 | 4713.48 | 1554.33 | 4803.72 | 2467. | 1094.69 | 944.659 | 9686.79 |
| 1991 | 1036.81 | 5092.2 | 1574.53 | 4975.19 | 2414.02 | 1171.84 | 1062.99 | 10293.7 |
| 1992 | 1045.73 | 5419.18 | 1572.99 | 5202.18 | 2438.13 | 1257.98 | 1168.59 | 19843.6 |
| 1993 | 1086.45 | 5796.66 | 1569.22 | 5456.95 | 2467.08 | 1364.31 | 1296.13 | 11329..9 |
| 1994 | 1139.32 | 6254.34 | 1577.28 | 5685.61" | 2435.11 | 1481.71 | 1459.13 | 11667.1 |
| 1995 | 1178.86 | 6732.74 | 1576.6 | 591?.88 | 2381.26 | 1614.27 | 1646.58 | 11832.6 |
| 1996 | 1227.64 | 7268.04 | 1575.62 | 6212.'30 | 23?3.27 | 1789.26 | 1872.21 | 11851.2 |
| 1997 | 1299.15 | 7887.97 | 1585.79' | 6555.09 | 2374.39 | 1990.75 | 2135.58 | 11695.3 |
| 1998 | 1402.94 | 8560.98 | 1596.07 | 6?1?.39 | 2371.9 | 2213.05 | 2424.36 | 11341.6 |
| 1999 | 1519.83 | 9295.53 | ?651.21 | 7316.43 | 2377.55 | 2478.33 | 2760.51 | 10790. |
| 2000 | 1653.84 | 10134.9 | 1613.77 | 7772.99 | 2378.55 | 2790.07 | 3161.16 | 10006.3 |

| | PPBAL | PINS | FUND | FUND77 | EXBITEL | R99L | E99L | SIMP |
|---|---|---|---|---|---|---|---|---|
| 1977 | 2.4 | 35.343 | 670.6 | 671.369 | 0.131 | 531.912 | 557.16 | -137.452 |
| 1978 | 49.975 | 46.954 | 666.184 | 602.483 | 0.134 | 568.508 | 595.271 | -4.416 |
| 1979 | 153.275 | 46.878 | 968.237 | 834.862 | 0.131 | 622.528 | 659./396 | 301.853 |
| 1980 | 275. | 68.529 | 1329.02 | 1090.28 | 0.133 | 718.529 | 748.6 | 360.987 |
| 1981 | 411.475 | 94.407 | 1912.34 | 1485.84 | 0.126 | 806.186 | 838.061 | 583.318 |
| 1982 | 563.425 | 135.921 | 2618.92 | 1916.02 | 0.115 | 912.631 | 946.418 | 796.579 |
| 1983 | 731.699 | 186.141 | 3359.04 | 2350.01 | 0.121 | 1045. | 1080.82 | 740.128 |
| 1984 | 948.649 | 238.792 | 4498.88 | 3051.08 | 0.135 | 1131.33 | 1169.3 " | 1139.84 |
| 1985 | --- 11$37.55.. | 319.665 | 5925.34 | 3853.77 | 0.131 | 1176.98 | 1217.22 | 1426.47 |
| 1986 | 1437.35 | 429.712 | 7289.7 | 4518.98 | 0.125 | 1270.34 | 1312.99 | 1364.36 |
| 1987 | 1634.2 | 517.466 | 8631.53 | 5089.38 | 0.122 | 1403.26 | 1448.48 | 1341.83 |
| 1988 | 1935.8 | 612.628 | 9907.55 | 5562.31 | 0.121 | 1565.81 | 7673.73 | 1276.02 |
| 1989 | 2193.07 | 703.207 | 11126.9 | 5955.01 | 0.12 | 1729.57 | 1780.37 | 1219.31 |
| 1990 | 2444.52 | 789.845 | 12131.3 | 6199.44 | 0.119 | 1902.28 | 1956.13 | 1004.46 |
| 1991 | 2688.87 | 861.414 | 12982.6 | 6359.14 | 0.122 | 2077.4 | 1134.49 | 851.285 |
| 1992 | 2936.75 | 922.226 | 13780.4 | 6469.01 | 0.121 | 2221.62 | 2282.13 | 797.754 |
| 1993 | 3188.27 | 979.308 | 14518.2 | 6518.7 | 0.118 | 2382.65 | 2446.79 | 737.8 05 |
| 1994 | 3$?7.02 | 1032.21 | 15104.1 | 6483.62 | 0.117 | 2584.36 | 2652.85 | 585.992 |
| 1995 | 3689.52 | 1074.48 | 15513.1 | 6360.15 | 0.115 | 2805.93 | 2877.99 | 406'.973 |
| 1996 | 3923.72 | 1104.32 | 15775., | 6171.79 | 0.113 | 3063.2 | 3139.59 | 261.844 |
| 1997 | 4168.14 | 1123.87 | 15863.5 | 5925.71 | 0.113 | 3352.5 | 3433.47 | 88.488 |
| 1998 | 4413.22 | 1131.28 | 15754.8 | 5619.4.3 | 0.111 | 3662.82 | 3748.65 | -103.613 |
| 1999 | 4659.57 | 1124.9 | 15449.6 | 5256.42 | 0.11 | 3999.05 | 4090.04 | -305.27 |
| 2000 | 4937.07 | 1104.77 | 14913.3 | 4840.63 | 0.108 | 4389.32 | 4486.36 | -536.238 |

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| | EXBITES | VIABL2 | RENSRAT |
|---|---|---|---|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.24 | 0.468 | 0.047 |
| 1980 | 0.234 | 0.443 | 0.043 |
| 1981 | 0.219 | 0.438 | 0.041 |
| 1982 | 0.204 | 0.443 | 0.043 |
| 1983 | 0.222 | 0.431 | 0.049 |
| 1984 | 9.25 | 0.416 | 0.054 |
| 1985 | 0.246 | 0.405 | 0.051 |
| 1986 | 0.243 | 0.397 | 0.051 |
| 1987 | 0.239 | 0.399 | 0.052 |
| 1988 | 0.239 | 0.4 | 0.055 |
| 1989 | 0.238 | 0.404 | 0.057 |
| 1990 | 0.239 | 0.407 | 0.059 |
| 1991 | 0.241 | 0.412 | 0.062 |
| 1992 | 0.239 | 0.418 | 0.063 |
| 1993 | 0.234 | 0.426 | 0.064 |
| 1994 | 0.231 | 0.435 | 0.066 |
| 1995 | 9.226 | 0.446 | 0.068 |
| 1996 | 0.22 | 0.46 | 0.069 |
| 1997 | 0.217 | 0.473 | 0.072 |
| 1998 | 0.213 | 0.485 | 0.074 |
| 1999 | 0.209 | 0.5 | 0.076 |
| 2000 | 0.205 | 0.516 | 0.078 |

| | EOT | HIGHS? | NINCIOT | EM99 | EMAY | EMGF | EMP9 | EMT9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.515 | 0.515 | 0. | 0.38 | 0. | 0. | 0.106 | 0.087 |
| 1982 | 1.082 | 0.547 | 0.021 | 0.757 | 0. | 0. | 0.171 | 0.125 |
| 1983 | 1.893 | 0.77 | '?. )42 | 1.278 | 0. | 0. | 0.271 | 0.211 |
| 1984 | 2.323 | 0.361 | 0.071 | 1.472 | 0. | 0. | 0.284 | 0.227 |
| 1985 | 4.315 | 1.91 | 0.082 | 2.811 | 0. | 0. | 0.315 | 0.338 |
| 1986 | 7.82 | 3.354 | 0.156 | 5.078 | 0. | 0. | 0.286 | 0.594 |
| 1987 | 12.7(37 | 4.609 | 0.284 | 8.103 | 0. | 0. | 0.305 | 0.74 |
| 1988 | 16.102 | '2.946 | 0.456 | 9.696 | 0. | 0. | 0.576 | 0.817 |
| 1989 | 18.238 | 1.589 | 0.552 | 10.322 | 0. | 0. | 0.779 | 0.902 |
| 1990 | 20.944 | 2.117 | 0.591 | 11.423 | 0. | 0. | 1.114 | 0.919 |
| 1991 | 19.369 | -2. .?24 | 0.653 | 9.326 | 0. | 0. | 1.198 | 0.827 |
| 1992 | 16.556 | -3.35 | 0.534 | 6.695 | 0. | 0. | 1.034 | 0.517 |
| 1993 | 15.24 | -1.704 | 0.381 | 5.454 | 0. | o* | 0.939 | 0.483 |
| 1994 | 14.483 | -1.761 | 0.302 | 4.755 | 0. | 0. | 0.84 | 0.449 |
| 1995 | 14.368 | -0.368 | 0.252 | 4.603 | 0. | 0. | 0.865 | 0.442 |
| 1996 | 14.858 | 0.258 | 0.231 | 4.919 | 0. | 0. | 0.965 | 0.458 |
| 1997 | 15.232 | 0.195 | 0.238 | 5.176 | 0. | 0. | 0.989 | 0.469 |
| 1998 | 15.732 | 0.198 | 0.243 | 5.428 | 0. | 0. | 1.015 | 0.481 |
| 1999 | 16.1 | 0.119 | 0.249 | 5.618 | 0. | 0. | 1.015 | 0.4s9 |
| 2000 | 16.437 | 0.083 | 0.253 | 5.775 | 0. | 0. | 1.015 | 0.495 |

| | EMS9 | EMPU | EMCT | EMM9 | EMFI | EMD9 | EMCM | EMCN |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 9. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0" | 0. | 0. | 0.' | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.073 | 0.002 | 0.014 | 0. | 0.019 | 0.069 | 0.001 | 0.03 |
| 1982 | 0.153 | 0.004 | 0.02? | 0. | 0.04 | 0.141 | 0.002 | C. 067 |
| 1983 | 0.26 | 0.007 | 0.046 | 0. | 0.067 | 0.239 | 0.004 | 0.113 |
| 1984 | 0.287 | 0.008 | 0.053 | 0. | 0.'074 | 0.265 | 0.004 | 0.129 |
| 1985 | 0.663 | 0.018 | 0.101 | B. | 0.172 | 0.611 | 0.01 | 0.51 |
| 1986 | 1.248 | 0.033 | 0.18 | 0. | 0.322 | 1.138 | 0.018 | 1.02 |
| 1987 | 2.065 | 0.053 | 0.281 | 0. | 0.532 | 1.863 | 0.03 | 1.727 |
| 1988 | 2.382 | 0.059 | 0.329 | 0. | 0.613 | 2.128 | 0.034 | 1.758 |
| 1989 | 2.49/3 | 0.06 | 0.343 | 0.035 | 0.642 | 2.21 | 0.035 | 1.66 |
| 1990 | 2.797 | 0.066 | 0.374 | 0.035 | 0.718 | 2.459 | 0.039 | 1.785 |
| 1991 | 2.085 | 0.048 | 0.302 | 0.064 | 0.535 | 1.822 | 0.029 | 1.028 |
| 1992 | 1.487 | 0.034 | 0.214 | 0.07 | 0.381 | 1.293 | 0.02 | 0.658 |
| 1993 | 1.242 | 0.028 | 0.172 | 0.07 | 0.318 | 1.071 | 0.017 | 0.55 |
| 1994 | 1.103 | 0.024 | 0.148 | 0.07 | 0.282 | 0.945 | 0.015 | 0.499 |
| 1995 | 1.089 | 0.023 | 0.141 | 0.07 | 0.278 | 0.925 | 0.014 | 0.498 |
| 1996 | 1.186 | 0.025 | 0.148 | 0.07 | 0.302 | 1. | 0.016 | 0.547 |
| 1997 | 1.262 | 0.026 | 0.153 | 0.07 | 0.321 | 1.056 | 0.016 | 0.589 |
| 1998 | 1.342 | 0.027 | 0.158 | 0.07 | 0.341 | 1.114 | 0.017 | 0.628 |
| 1999 | 1.41 | 0.027 | 0.161 | 0.07 | 0.358 | 1.161 | 0.018 | 0.662 |
| 2000 | 1.47 | 0.028 | '0.162 | 0.07 | 0.373 | 1.201 | 0.018 | 0.691 |

| | EXCN 1 | EMGA | PI | PIRPC | RPI " | EXOPS | EXCA? | E99S |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | o. | 0. | 0. | 0. | 0. | o* |
| 1978 | 0. | 0. | 0. | 0. | o. | 0. | 0. | o. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | f). | 0. | d. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.03 | -().22 | 18.781 | 5.738 | 0.154 | 0. | o. | 0. |
| 1982 | 13.067 | 0.026 | 41.945 | 10.34 | 0.301 | 3.007 | 1.051 | 4.058 |
| 1983 | 0.113 | 0.061 | 74.434 | 16.441 | 0.51 | 6.432 | 1.79 | 8.251 |
| 1984 | 0.129 | 0.14 | 04.25 | 17.086 | 0.619 | 1.1.577 | 2.94 | 14.596 |
| 1985 | 0.256 | 0.074 | 198.078 | 47.992 | 1.205 | 12.415 | 1.942 | 14.518 |
| 1986 | 0.487 | 0.238 | 391.609 | 88.523 | 2.207 | 29.631 | 7.081 | 36.924 |
| 1987 | 0.812 | 0.506 | 681.16 | 140.453 | 3.5.57 | 59.112. | 12.295 | 71.814 |
| 1988 | 0.981 | 1. | 833.140 | 140.184 | 4.287 | 102.'736 | 19.8 | 123.278 |
| 1989 | 1.(?.33 | 1.156 | 921.532 | 126.625 | 4.607 | 125.227 | 16.4.85 | 14.?.988 |
| 1990 | 1.163 | 1.118 | 1083.34 | 130.57 | 5.174 | 136.684 | 18.418 | 156.812 |
| 1991 | 0.94 | 1.388 | 855.41 | 60.566 | 4.329 | 159.532 | 26.754 | 188.48 |
| 1992 | 0.658 | 0.986 | 639.52 | 16.773 | 3.193 | 121.003 | 11.651 | 135.57 |
| 1993 | 0.5s | 0.565 | 557.859 | -1.094 | 2.654 | 79.039 | 9.505 | 91.746 |
| 1994 | 0.499 | 0.38 | 519.699 | -11.168 | 2.36 . | 59.)47 | 12.868 | 75.355 |
| 1995 | 0.498 | 0.258 | 537.473 | -13.953 | 2.319 | 46.707 | 15.066 | 65.562 |
| 1996 | 0.547 | 0.202 | 616.762 | -71.02 | 2.508 | 43.738 | 18.854 | 66.793 |
| 1997 | 0.589 | 0.224 | 699.055 | -9.332 | 2.676 | 50.328 | 23.723 | 78.777 . |
| 1998 | 0.628 | 0.235 | 772.414 | -7.828 | 2.844 | 56.109 | 26.776 | 88.277 |
| 1999 | 0.662 | 0.248 | 853.707 | -7.453 | 2.974 | 62.324 | 29.401 | 97.867 |
| 2000 | 0.691 | 0.251 | 937.633 | -7.473 | 3.092 | 67.047 | 31.836 | 1 0 5 . 852 |

| | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL | PFBAL | RI NS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | o. | o. | 0, | 0. | o. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | o. | 0. |
| 1979 | n. | 0. | 0. | 0, | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | -1.884 | 0.569 | 0. | 0.301 | 0.301 | 0.562 | 0'. | 0. |
| 1982 | -1.296 | -2.21 | 0. | 1.286 | 1.587 | '-0.462 | o. | 0.039 |
| 1983 | -2.214 | 4.327 | 0. | 2.684 | 3.36 | '2.747 | 0. | -0.032 |
| 1984 | -0.883 | 6.359 | 0. | 3.988 | 5.206 | -8.236 | 0. | -0.192 |
| 1985 | -.9.704 | 9.707 | o . | 6.27 | 7.693 | -10.633 | 0. | -0.5'77 |
| 1986 | -11.884 | 21.48 | 0.05 | 13.958 | 7-7.303 | -19.258 | o. | -0.744 |
| 1987 | '-15.571 | 42.434 | 1.96 | 26.911 | 33.605 | -35.707 | 0. | -1.348, |
| 1988 | -8.598 | 64.605 | 2.42 | 42.01[! | 53.869 | -72.437 | 0. | -2.5 |
| 1989 | -10.864 | 81.41 | 7.78 | 51.147 | 65.965 | -110.352 | 0. | -5.071 |
| 1990 | -17.918 | 91.434 | 7.81 | 59.406 | 76.145 | .-149.766 | 0. | -7.725 |
| 1991 | -3.345 | 95.535 | 7.83 | 63.504 | 83.56 | -210.164 | 0. | -10.484 |
| 1992 | -10.81 | 72.758 | 7.92 | 50.434 | 66.63 | -251*93 | o. | -14.711 |
| 1993 | -19.402 | 55.023 | 7.8 | 39.992 | 52.378 | -27$.359 . | 0. | -17.635 |
| 1994 | -21.682 | 48.305 | 7.74 | '36.295 | 47.41 | -288.609 | 0. | -19.205 |
| 1995 | -23.764 | 46.629 | 7.66 | 35.94.5 | 46.394 | -295.664 | 0. | -20.2 03 |
| 1996 | -24.937 | 51.312 | 7.54 | 39.707 | 50.68 | -298.238 | 0. | -20.697 . |
| 1997 | -23.906 | 60.93 | 7".39 | 46.85 | 59.612 | -330.383 | 0. | -20.6?7 |
| 1998 | -23.599 | 70.906 | 7.19 | 54.352 | 68.841 | -300.102 | 0. | -21.027 |
| 1999 | -22,998 | 82.215 | 6.95 | 52.802 | 79.272 | -296.262 | 0. | -21.007 |
| 2000 | -22.894 | 94.555 | 5,67 | 7?,975 | 90.?88 | -286.5?3 | o.' | -20.738 |

|      | FUND     | FUND77   | R99L    | E99L    |
|------|----------|----------|---------|---------|
| 1977 | 0.       | 0.       | 0.      | 0.      |
| 1978 | 0.       | 0.       | 0.      | 0.      |
| 1979 | 0.       | 0.       | 0.      | 0.      |
| 1980 | 0.       | 0.       | 0.      | 0.      |
| 1981 | 0.562    | -0.267   | 0.026   | 0.026   |
| 1982 | -0.462   | -2.008   | 1.923   | 1.923   |
| 1983 | -2.747   | -5.247   | 4.206   | 4.206   |
| 1984 | -8.238   | -10.666  | 7.382   | 7.382   |
| 1985 | -10.633  | -18.91   | 8.614   | 8.614   |
| 1986 | -19.258  | -36.57   | 20.043  | 20.043  |
| 1987 | -35.707  | -63.77   | 39.32   | 39.32   |
| 1988 | -72.437  | -94.488  | 67.817  | 67.817  |
| 1989 | -110.352 | -118.242 | 82.536  | 82.536  |
| 1990 | -149.766 | -142.616 | 90.905  | 90.905  |
| 1991 | -217.164 | -157.555 | 105.98  | 105.98  |
| 1992 | -251.93  | -157.527 | 83.398  | 83.398  |
| 1993 | -274.359 | -154.625 | 61.771  | 61.771  |
| 1994 | -288.609 | -150.445 | 53.425  | 53.425  |
| 1995 | -295.664 | -145.664 | 49.458  | 49.458  |
| 1996 | -298.238 | -141.164 | 51.049  | 51.049  |
| 1997 | -300.383 | -136.156 | 58.315  | 58.315  |
| 1998 | -300.102 | -130.098 | 65.12   | 65.12   |
| 1999 | -296.262 | -122.305 | 72.531  | 72.531  |
| 2000 | -286.523 | -112.648 | 79.844  | 79.844  |

5% NORTHERN GULF OCS DEVELOPMENT SCENARIO -
MODERATE BASE CASE

(Levels and Differences from the Base Case)

| | POP | MIGNET | NINCTOT | EM99 | EMSPP | EMG9P | EMNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 410.66 | -24.935 | 6.383 | 185.508 | 0.363 | O. 378 | 0.259 | 1.1 |
| 1978 | 406.667 | -11.241 | 7.202 | 178.526 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 418.656 | 5.268 | 6.697 | 185.225 | 0.383 | 0.374 | 0.243 | 1.2 |
| 1980 | 434.173. | 8.65 | 6.87 | 194.054 | 9.395 | 0. 36 | 0.245 | 1.2 |
| 1981 | 456.3 | 14.991 | 7.144. | 207.724 | 0.408 | 0.341 | 0.251 . | 1.3 |
| 1982 | 488.036 | 24.091 | 7.663 | 225.814 | C.423 | 0.318 | 0.259 | 1.3 |
| 1983 | 505" 349 | 8.821 | 8.524 | 231.927 | 0.425 | 0.322 | 0.253 | 1.4 |
| 1984 | 509.263 | -4.799 | 8.72 | 228.618 | 0.426 | 0.331 | 0.244 | 1.4 |
| 1985 | 528.7 | 11.041 | 8.381 | 230.432 | 0.441 | 0.312 | 0.247 | 1.4 |
| 1986 | 551.177 | 13.766 | 8.722 | 249.856 | 0.449 | 0.305 | 0.247 | 1.5 |
| 1987 | 573.345 | 13.043 | 9. 14 | 260.596 | 0.457 | 0.298 | 0.246 | 1.5 |
| 1988 | 595.911 | 13.763 | 9.515 | 271.304 | 0.464 | 0.291 | 0.246 | 1.6 |
| 1989 | 614. ?58 | 8.274 | 9.886 | 278.573 | 0.467 | 0.288 | 0.245 | 1.6 |
| 1990 | 629.269 | 5.16 | 10.055 | 2f' 3.9 43 | 0.47 | 0..285 | 0.246 | 1.7 |
| 1991 | 645.384 | 6.007 | 10.107 | 290.443 | 0.477 | 0.279 | 0.244 | 1.7 |
| 1992 | 658.982 | 3.394 | 10.204 | 295. 186 | 0.48 | 0.276 | 0.243 | 1.8 |
| 1993 | 674.401 | 5.215 | 10.199 | 301. 643 | 0.486 | 0.271 | 0.243 | 1.8 |
| 1994 | 691.353 | 6.668 | 10.282 | 309. 31$2 | 0.493 | 0.265 | 0.243 | 1.8 |
| 1995 | 710.099 | 8.318 | 10.428 | 318. 397 | .0.5 | 0.258 | 0.242 | 1.9 |
| 1996 | ?31 .073 | 10.332 | 10.643 | 329. 002 | 0.507 | 0.251 | 0.242 | 2. |
| 1997 | 7'52. 424 | 10. 414 | 10.94 | 339. 682 | 0.513 | 0.245 | 0.242 | 2 . 1 |
| 1998 | 774.426 | 10.771 | 11.236 | 350.684 | 0.52 | 0.238 | 0.242 | 2.1 |
| 1999 | 799.184 | 13.218 | 11.544 | 363. 564 | 0.527 | 0..231 | 0.242 | 2.2 |
| 2000 | 824.222 | 13.098 | 11.948 | 376. 353 | 0.534 | 0.225 | 0.241 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EM OT | EMM9 | EMFI |
|---|---|---|---|---|---|---|---|---|
| 1977 | %2.921 | 4 .514 | 9.842 | 22.649 | 1. 184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42. 921 | 4.351 | 10.294 | 21.9 | 1.194 | 14.269 | 11.906 | 5.738 |
| 1979 | 42.921 | 4.S63 | 10.774 | 23.693 | 1.249 | = 14.538 | 12.411 | 6.176 |
| 1980 | 42.921 | 5.104 | 11.393 | 25.945 | 1.321 | 14.886 | 12.896 | 6.758 |
| 1981 | 42.921 | 5.096 | 12.203 | 29.127 | 1.406 | 15.383 | 13.37 | 7.524 |
| 1982 | 42.921 | 4.842 | 13. 436 | 33.781 | 1.513 | 16.075 | 13.843 | 8.585 |
| 1983 | 42.921 | 4.615 | 13.807 | 34.74 | .1.55 | 16.294 | 14.32 | 8.928 |
| 1984 | 42.921 | 4.833 | 13.893 | 33.824 | 1.563 | 16.176 | 14.867 | 8.928 |
| 1985 | 42.921 | 4.706 | 14.851 | 36.814 | 1.646 | 16.524 | 15.364 | 9.723 |
| 1986 | 42.921 | 4.632 | 15.452 | 39.738 | 1.72 | 16.919 | 15.877 | 1 0 . 4 6 7 |
| 1987 | 42.921 | 4.798 | 16.136 | 42.573 | 1.79 | 17.283 | 16.488 | 11.195 |
| 1988 | 42.921 | 5.441 | 17.014 | 45.283 | 1.855 | 17.638 | 17.032 | 11.886 |
| 1989 | 42.921 | 6.378 | 17.326 | 47.076 | 1.89'7 | 17.875 | 17.677 | 12.34'7 |
| 1990 | 42.921 | 7.153 | 17.748 | 48.413 | 1.931 | 18. 048 | 18.255 | 12.708 |
| 1991 | 42.921 | 6.804 | 18.224 | 50.536 | 1.979 | 18 .255 | 18.85 | 13.253 |
| 1992 | 4?. 521 | 6.601 | 18.399 | 51.98 | 2.012 | 18.404 | 19.467 | 13.628 |
| 1993 | 42.92! | 6.419 | 18.836 | 54.11 | 2.059 | ·18.606 | 20.103 | 14.169 |
| 1994 | 42.921 | 6.274 | 19.368 | 56.514 | 2.111 | 18.844 | 20.76 | 14.784 |
| 1995 | 42.92?. | 6.137 | 19.963 | 59.358 | 2.172 | 19.119 | 21 .439 | 15.516 |
| 1996 | 42.921 | 6.169 | 20.625 | 62.618 | 2.239 | 19.437 | 22.141 | 16.339 |
| 1997 | 42.921 | 6.246 | 21.289 | 65.89 | 2.306 | 19.752 | 22.866 | 17.184 |
| 1998 | 42.921 | 6.272 | 21.964 | 69.294 | ·2.374 | 20.07? | 23.615 | 18. 053 |
| 1999 | 42.921 | 6.272 | 22.753 | 73.357 | 2.452 | 20.438 | 24.389 | 19.087' |
| 2000 | 42.921 | 6.235 | 23.505 | 77.362 | 2.528 | 20.796 | 25.189 | 20.104 |

| Year | | | | | | | | |
|------|--------|--------|--------|--------|----------|---------|----------|-----------|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4972.33  | 3924.32 | 252.71   | 810. |
| 1978 | 24.766 | 11.434 | 11.307 | 25.941 | .4236.48 | 3723.81 | 279.75   | 944. |
| 1979 | 26.405 | 12.277 | 11.972 | 26.373 | 4743.19  | 3862.07 | 293.358  | 1019. |
| 1980 | 28.562 | 13.526 | 13.001 | 26.862 | 5395.29  | 4029.44 | 308.4    | 1120.35 |
| 1981 | 31.335 | 16.817 | 14.174 | 27.614 | 6427.87  | 4325.38 | 325.69   | 1 2 4 7 . 5 9 |
| 1982 | 35.082 | 22.41  | 15.871 | 28.843 | 7981.73  | 4727.28 | 345.982  | 1436.47 |
| 1983 | 36.309 | 22.121 | 16.664 | 31.732 | 8669.31  | 4741.62 | 361.802  | 1706.64 . |
| 1984 | 36.408 | 18.405 | 17.001 | 32.648 | 8663 .22 | 4540.84 | 374.626  | 1863.4 |
| 1985 | 39.228 | 20.828 | 18.501 | 31.577 | 9861.73  | 4741.44 | 393.406  | 1935.94 |
| 1986 | 41.828 | 22.722 | 20.083 | 33.171 | 11194.9  | 4912.34 | 413.476  | 2200.79 |
| 1987 | 44.357 | 23.952 | 21.27  | 34.65  | 12569.9  | 5048.93 | 434.237  | 2495.24 |
| 1988 | 46.73  | 24.946 | 22.465 | 35.955 | 14045.6  | 5172.48 | .455.689 | 2806.05 |
| 1989 | 48.308 | 24.85  | 23.298 | 37.291 | 15253.8  | 5212.0? | 476.609  | 3138.17 |
| 1990 | 49.546 | 24.573 | 23.927 | 37.931 | 16386.8  | 5233.65 | 4'37 .573 | 3435*3U |
| 1991 | 51.393 | 25.355 | 24.703 | 38.126 | 17952.1  | 5321.2  | 519.836  | 3715.72 |
| 1992 | 52.662 | 25.571 | 25.396 | 38.682 | 19183.9  | 5367.5  | 542.336  | 4035.74 |
| 1993 | 54.48  | 26.354 | 26.149 | 38.691 | 20848.4  | 5457.35 | 566.469  | 4344.19 |
| 1994 | 56.538 | 27.361 | 27.155 | 38.94  | 22805.7  | 5569.65 | 592.269  | 4698.93 |
| 1995 | 58.972 | 28.482 | 28.353 | 39.26  | 25038.   | 5689.11 | 619.785  | 5095 .91 |
| 1996 | 61.69  | 29.968 | 29.695 | 39.641 | 27730.1  | 5842.51 | 649.227  | 5533.99 |
| 1997 | 64.469 | '31.22 | 31.166 | 40.213 | 30528.9  | 5967.14 | 679.960  | 6037.48 ,. |
| 1998 | 67.334 | 32.748 | 32.693 | 40.687 | 33700.5  | 6111.18 | .712. 093 | 6564.05 |
| 1999 | 70.652 | 34.589 | 34.533 | 41.123 | 37403.3  | 6269.73 | 746.482  | 7?45.34 |
| 2000 | 73.924 | 36.425 | 36.367 | 41.7s4 | 41437.7  | 6426.39 | 782.332  | "7811.52 |

| Year | EXCAP | E99S | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|------|---------|---------|---------|---------|-----------|-----------|---------|---------|
| 1977 | 270.326 | 1?60.82 | 1118.56 | 796.27  | 1'37.201  | 214.301   | 278.522 | 668.165 |
| 1978 | 280.    | 1311.13 | 1152.49 | 1053. R | 471.4     | 206.9 16  | 240.272 | 617.209 |
| 1979 | 290.    | 1414.71 | 1151.9  | 1440.77 | 860.7     | 274.3?3   | 222.549 | 014.761 |
| 1980 | 331.395 | 1566.76 | 1170.1  | 1524.51 | 996.3     | 312.909   | 230.056 | 1054.02 |
| 1981 | 372.128 | 1743.59 | 1173.25 | 1988.8  | 1278.41   | 355.741   | 264.446 | 1501.11 |
| 1982 | 445.148 | 2020.66 | 1196.7  | 2331.89 | 1475.74   | 439, 107  | '339 .315 | 2955.45 |
| 1983 | 524.322 | 2384.29 | 1304.06 | 2656. 96 | 1642.7   | 555. 607  | 424.119 | 2625.5 |
| 1984 | 555.499 | 2599.16 | 1362.36 | 3239.97 | 2121 .71  | 660.2     | 458.752 | 3554.   08 |
| 1985 | 671.594 | 2795.42 | 1343.99 | 3678.83 | 2422.22   | 714-249   | 488.676 | 4756.97 |
| 1986 | 829.749 | 3241.05 | 1422.15 | 3? 12.1 | 2431.43   | 301. 702  | 579.963 | 5838.68 |
| 1987 | 879.132 | 3610.01 | 1449.99 | 41 ?)9,35 | 2480.62 | 879. 1133 | 680.967 | 6895.05 |
| 1988 | 948.996 | 4018.55 | 1479.86 | 4467.46 | 2521.84   | 975.25    | 790.535 | 7889.87 |
| 1989 | 1004.7  | 4436.2  | 151,5.79 | 4745.85 | 2'560"66 | 1'365 .69 | 903.409 | 8811.47 |
| 1990 | 1041.21 | 4801.35 | 1533:45 | 4875.16 | 2477.     | 1137.63   | 1002.5  | 9562.27 |
| 1991 | 1050.16 | 5124.03 | 1527.31 | 5034.73` | 2424.1   | 1206. 43  | 1106.64 | 10203.2 |
| 1992 | 1084.28 | 5516.36 | 1543.51 | 5285.35 | 2442.33   | 1307.05   | 1232.43 | 10761.1 |
| 1993 | 1116.77 | 5883.12 | 1539.97 | 5539.92. | 24'77.26 | 1412.59   | 1359.28 | 11262. |
| 1994 | 1168.01 | 6320.64 | 1543 .62 | 5765.88 | 2445.3   | 1527.25   | 1518.12 | 11627.9 |
| 1995 | 1211.66. | 6797.75 | 1544.56 | 5995.05 | 2391.44  | 1661. 13  | 1707.23 | 11827.9 |
| 1996 | 1260.99 | 7324.32 | 1543.16 | 63(-)0.99 | 2383.39 | 1837.24   | 1933.96 | 11892.4 |
| 1997 | 1334.29 | 7938.78 | 1551.68 | 6651.   | 23s4 .42  | 2042.16   | 2201.14 | 11795.1 |
| 1998 | 1430.96· | 8604.66 | ,? 560. 33 | 70 21.5 | 2382.58 | "2271.32  | 2498.37 | 11518.3 |
| 1999 | 1549.84 | 9340.12 | 1565.62 | 7441.45 | 2387.3    | 2543. 96  | 2843.89 | 11058. |
| 2000 | 1686.03 | 10179.8 | 1578.71 | 79? 5.35 | 2388.07  | 2264. 35  | 3254.85 | 10382.9 |

| | PFBAL | RINS | FUND | FUND77 | EXBITEL | :?99L | E99L | SIMP |
|------|--------|---------|---------|---------|---------|----------|---------|-----------|
| 1977 | 2.4 | 35.343 | 670.6 | 671.369 | 0.131 | 531.912 | 557.16 | -137.452 |
| 1978 | 42.975 | 46.954 | 666.184 | 602.483 | 0.134 | 568.508 | 595.271 | -4.416 |
| 1979 | 153.275 | 46.8 -[8 | 968.337 | 834.862 | 0.131 | 622.528 | 650.896 | 301.853 |
| 1980 | 275. | 68.529 | 1329.02 | 1090.28 | 0.133 | 718.329 | 748.6 | 360.987 |
| 1981 | 411.475 | 94.407 | 19? 2.59 | 1485.72 | 0.125 | 806.197 | 838.072 | 583.563 |
| 1982 | 563.4.25 | 135.938 | 2618.87 | 1915.05 | 0.114 | 913.483 | 947.271 | 706.283 |
| 1983 | 731.699 | 186.13? | 3357.2 | 2347.61 | 0.121 | ?047.32 | 1083.14 | 738.329 |
| 1984 | 948.649 | 238.662' | 4502.73 | 3040.87 | 0.131 | 1134.)3 | 1172. | 1145.54 |
| 1985 | ?187.55 | 319.%34 | 5944.52 | 3822.92 | 0.122 | 1207.57 | 1247.81 | 1441.79. |
| 1986 | 1437.35 | 422.054 | 7276.04 | 4452.1 | 0.121 | 1356.12 | 1398.78 | 1331.52 |
| 1987 | 1684.2 | 516.509 | 8579.25 | 4998.54 | 0.12 | 1507.41 | 1552.62 | 1303.22 |
| 1988 | 1935.8 | 608.969 | 9825.67 | 5455.24 | 0.119 | 1668.95 | 1716.88 | 1246.42 |
| 1989 | 2193.07. | 697.476 | 11004.5 | 5841.53 | 0.12 | 1834.65 | 1885.45 | 1178.88 |
| 1990 | 24 44.52 | 701. 283 | 12006.8 | '6105.G7 | 0.121 | 1980.82 | 2034.67 | 1 0 0 2 . 2 5 |
| 1991 | 2688.87 | 852.692 | 12892.1 | 6274.48 | 0.119 | 2123.21 | 2180.29 | 885.312 |
| 1992 | 2936.75 | 915.892 | 1369"7.9 | 6390.05 | 0.12 | 2296.21 | 2356.52 | 805.766 |
| 1993 | 3188 .27 | 973.534 | 14450.3 | 6453.87 | 0.118 | 2456.42 | 2529.56 | 752.426 |
| 1994 | 3437.02 | 1027.46 | 15064.9 | 6435.29 | 0.116 | 2650.04 | 2718.03 | 614.633 |
| 1995 | 3680.52 | 1071.73 | 15508.5 | 6330.64 | 0.115 | 2871.21 | 2943.28 | 443.523 |
| 1996 | 3923.72 | 1103.99 | 15816.1 | 6163.45 | 0.113 | 3127.94 | 3203.43 | 307.66 |
| 1997 | 4168.14 | 1126.75 | 1'5963.2 | 5939.55 | 0.112 | 3416.65 | 3497.63 | 1 4 7 . 1 3 7 |
| 1998 | 4413.22 | 1138.27 | 15931.5 | 5660.32 | 0.111 | 3732.86 | 3818.7 | -31.734 |
| 1999 | 4659.57 | 1137.27 | 15717.5 | 5327.03 | 0.109 | 4075.1 | 4166.08 | -233.973 |
| 2000 | %937.07 | 1123.53 | 15290. | 4944.66 | 0.108 | %472.79 | 4569.23 | -427.535 |

| | EXBITES | VIABL2 | RENSRAT |
|------|---------|--------|---------|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.24 | 0.468 | 0.047 |
| 1980 | 0.234 | 0.443 | 0.043 |
| 1981 | 0.219 | 0.438 | 0.041 |
| 1982 | 0.204 | 0.443 | 0.043 |
| 1983 | 0.221 | 0.432 | 0.049 |
| 1984 | 0.242 | 0.42 | 0.053 |
| 1985 | G. 227 | 0.419 | 0.05 |
| 1986 | 0.231 | 0.41 | 0.052 |
| 1987 | '.23 | 0.413 | 0.054 |
| 1988 | 0.229 | 0.415 | 0.056 |
| 1989 | 0.234 | 0.416 | 0.059 |
| 1990 | '?.236 | 0.417 | 0.061 |
| 1991 | 0.232 | 0.424 | 0.062 |
| 1992 | 0.234 | 0.429 | 0.064 |
| 1993 | 0.23 | 0.436 | 0.065 |
| 1994 | 0.226 | 0.445 | 0.067 |
| 1995 | 0.222 | 0.456 | 0.068 |
| 1996 | 0.216 | 0.469 | 0.07 |
| 1997 | 0.213 | 0.483 | 0.072 |
| 1998 | 0.209 | 0.496 | 0.074 |
| 1999 | 0.205 | 0.512 | 0.076 |
| 2000 | 0.201 | 0.528 | 0.079 |

| | POP | MIGNET | NINCTOT | EM99 | EMA9 | EMGF | EMP9 | EMT9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | ?. | ?. | ?. | 0. | 0. | 0. | 0. | 0. |
| 1930 | 0. | 0. | ?. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.737 | 0.738 | 0. | 0.545 | 0. | 0. | 0.166 | 0.11 |
| 1982 | 1.677 | 0.911 | 0.03 | 1.177 | 0. | 0. | 0.266 | 0 . 2 0 4 |
| 1983 | 2.547 | 0.807 | 0.065 | 1.699 | 0. | 0. | 0.34 | 0.271 |
| 1984 | 7.783 | 5.143 | 0.094 | 5.458 | '). | 0. | 0.418 | 0.566 |
| 1985 | 19.643 | 11.568 | 0.299 | 13.501 | 0. | 0. | 0.391 | 1.3 |
| 1986 | 28.094 | 7.72 | 0.751 | 17.951 | 0. | 0. | 0.32 | 1.432 |
| 1987 | .34.316 | 5.215 | 1.02 | 20.464 | 0. | 0. | 0.399 | 1.579 |
| 1988 | - 38.969 | 3.478 | 1.183 | 21.754 | 0. | 0. | 0.798 | 1.876 |
| 1989 | 38.706 | −1.528 | 1.272 | 19.539 | 0. | 0. | 1.539 | 1.59 |
| 1990 | 37.689 | -2.176 | 1.156 | 17.311 | 0. | 0. | 2.3 | 1.541 |
| 1991 | 38.613 | -0.105 | 1.025 | 16.941 | 0. | 0. | 2.461 | 1.541 |
| 1992 | 36.296 | -3.3 | 0.984 | 14.284 | 0. | 0. | 2 . 2 7 9 | 1.233 |
| 1993 | 34.066 | −3.049 | 0.813 | 12.063 | 0. | 0. | 2.248 | 1.092 |
| 1994 | 33.055 | -1.681 | 0.666 | 11.013 | 0. | 0. | 2.154 | 1.066 |
| 1995 | 32.45 | -1.19 | 0.582 | 10.381 | 0" | 0. | 2.014 | 1.035 |
| 1996 | 32.606 | -0.369 | 0.523 | 10.387 | 0. | 0. | 2.044 | 1.036 |
| 1997 | 33.297 | 0.187 | (-').503 | 10.802 | 0. | 0. | 2.144 | 1.054 |
| 1998 | 33.971 | 0.167 | 9.597 | 11.188 | 0. | o* | 2.194 | 1.071 |
| 1999 | 34.591 | 0.107 | 0.513 | 11.519 | 0. | 0. | 2.194 | 1.085 |
| 2000 | 34.935 | -0.176 | 0.519 | 11.631 | 0. | 0. | 2.156 | 1.076 |

| | EMS9 | EMPU | EMOT | EMM9 | EMFI | EMD9 | EMCM | EMCN |
|---|---|---|---|---|---|---|---|---|
| 1977 | c. | 0, | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. , | 0. |
| 1979 | ". | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.105 | 0.003 | 0.021 | 0. | 0.027 | 0.1 | 0.002 | 0.043 |
| 1982 | 0.238 | 0.007 | 0.042 | 0. | 0.052 | 0.22 | 0.003 | 0.103 |
| 1983 | 0.345 | 0.009 | 0.061 | 0. | 0.089 | 0.316 | 0.005 | 0.152 |
| 1984 | 1.354 | 0.037 | 0.197 | 0. | 0"35 | 1.249 | 0.021 | ?.231 |
| 1985 | 3.538 | 0.095 | 0.48 | 0. | 0.915 | 3.239 | 0.052 | 3.467 |
| 1986 | 4.544 | 0.118 | 0.626 | 0. | 1.172 | 4.116 | 0.066 | 4.078 |
| 1987 | 5.167 | 0.13 | 0.7 | 0.085 | .1.33 | 4.634 | 0.075 | 4.324 |
| 1988 | 5.415 | 0.133 | 0.729 | 0.085 | 1.392 | 4.811 | 0.078 | 4.126 |
| 1989 | 4.653 | 0.111 | 0.644 | 0.17 | 1.194 | 4.103 | 0.066 | 2.985 |
| 1990 | 3.982 | 0.094 | 0.554 | 0.17 | 1.022 | 3.493 | 0.055 | 2.158 |
| 1991 | 3.993 | 0.092 | 0.545 | 0.17 | 1.024 | 3.48 | 0.055 | 2.196 |
| 1992 | 3.279 | 0.074 | 0.454 | 0.17 | 0.84 | 2.842 | 0.045 | 1.64 |
| 1993 | 2.756 | 0.061 | ').179 | 0.17 | 0.705 | 2.373 | 0.037 | 1.266 |
| 1994 | 2.563 | 0.056 | 0.341 | 0.17 | 0.655 | 2.191 | 0.034 | 1.186 |
| 1995 | ?.457 | 0.052 | 0.316 | 0.17 | 0.627 | 2.085 | 0.033 | 1.153 |
| 1996 | 2.504 | 0.052 | 0.311 | 0.17 | 0.638 | 2.107 | 0.033 | 1.18 |
| 1997 | 2.637 | 0.053 | 0.318 | 0.17 | 0.671 | 2.203 | 0.034 | 1.249 |
| 1998 | 2.768 | 0.0s5 | 0.324 | 0.17 | 0.704 | 2.295 | 0.035 | 1.297 |
| 1999 | 2.894 | 0.056 | 0.329 | 0.17 | 0.735 | 2.379 | 0.037 | 1.358 |
| 2000 | 2.962 | 0.056 | 0.325 | 0.17 | 0.751 | 2.416 | '0.037 | 1.394 |

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| | EMCNT | EMGA | PI | PIRPC | RPI | EXOPS | EXCAP | E99S |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | | 0. | 0. |
| 1981 | 0.043 | -0.031 | 27.035 | 8.285 | 0.221 | .:: | 0. | 0. |
| 1982 | 0.103 | 0.032 | 65.355 | 16.172 | 0.469 | 4.319 | 1.514 | 5.832 |
| 1983 | 0.152 | 0.112 | 98.805 | 21.402 | 0.681 | 10.013 | 2.848 | 12.904 |
| 1984 | 0.516 | -2.015 | 387.062 | 109.617 | 2.192 | 15.315 | 3.673 | 19.109 |
| 1985 | 1.366 | 0.026 | 1051.77 | 278.641 | 5.613 | 29.952 | 17.299 | 47.474 |
| 1986 | 1.87 | 1.478 | 1431.69 | 314.0(16 | 7.561 | 129.252 | 49.203 | 179.162 |
| 1987 | 2.102 | 2.04 | 1715.93 | 316.82 | 9.709 | 184.287 | 41.155 | 227.529 |
| 1988 | 2.238 | "2.313 | 1900.05 | 286.711 | 9.334 | 221.857 | 43.378 | 268.437 |
| 1989 | 1.987 | 2.404 | 1722.48 | 187.996 | 8.489 | 242.759 | 44.136 | 291.258 |
| 1990 | 1.714 | 1.933 | 1551.34 | 114.715 | 7.666 | 207.68 | 31.462 | 244.684 |
| 1991 | 1.747 | 1.385 | 1625.74 | 99.973 | 7.649 | 173.845 | 40.104 | 220.309 |
| 1992 | 1.501 | 1.427 | 1402.98 | 37.789 | 6.586 | 175.107 | 50.201 | 232.75 |
| 1993 | 1.266 | 0.976 | 1235.4 | -4.285 | 5.654 | 129.551 | 39.833 | 178.207 |
| 1994 | 1.186 | 0.599 | 1204. | -20.359, | 5.243 | 90.187 | 41.552 | 141.652 |
| 1995 | 1.153 | 0.438 | 1208.86 | -30.836" | 5.009 | 71.645 | 47.869 | 130.574 |
| 1996 | 1.18 | 0 *312 | 1295.1 | -32.824 | 5.072 | 58.461 | 52.206 | 123.07 |
| 1997 | 1.249 | 0.267 | 1434.16 | -30.156 | 5.349 | 56.948 | 58.862 | 1 2 9 . 5 8 6 |
| 1998 | 1.297 | 0.276 | 1584.79 | -28.242 | 5.618 | 61.625 | 54.796 | 131.965 |
| 1999 | 1.358 | 0.284 | 1742.6 | -27.641 | 5.844 | 65.957 | 59.411 | 142.453 |
| 2000 | 1.394 | 0.238 | 1879.01 | -29.359 | 5.966 | 67.961 | 64.022 | 150.73 |

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| | E99SRPC | REVGF | RP9S | RT98 | RENS | GFD AL | PFBAL | RINS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0, | 0. | 0. | 0. | 0. | 0 . | 0 . |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. , | 0. | 0. |
| 1980 | 0. | 0. . | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | -2.698 | 0.818 | 0. | 0. 433 | 0.433 | 0.808 | 0." | 0. |
| 1982 | -2.285 | 3.3.? | 0. | 1.936 | 2.369 | -0.51 | 0. | 0.057 |
| 1983 | -1.973 | 6.331 | 0. " | 3.888 | 4.?42 | -4.596 | 0. | -0.036 |
| 1984 | -19.055 | 15.846 | 0. | 10.038 | 11.657 | -4.387 | 0. | -0.322 |
| 1985 | -48.016 | 49.917 | 0. | 32.021 | 38.428 | 8.543 | 0. | -0.307 |
| 1986 | -19.914 | 100.77 | 0.5 | 64.414 | 82.169 | -32.926 | 0. | 0.598 |
| 1987 | -24.679 | 131.348 | 0.51 | 86.275, | 110.948 | -87.90,4 | 0. | -2.305 |
| 1988 | -29.(,74 | 155.008 | 1.13 | 103.659 | 133.861 | -154.316 | 0. . | -6.159 |
| 1989 | -23.17 | 162.656 | 1.54 | 110.759 | 1.44.89. | -232.66 | 0. | -10.802 |
| 1990 | -38.793 | 162.871 | 17.81 | 102.34 | 133.984 | -274.295 | 0. | -16.286 |
| 1991 | -50.563 | 155.082 | 17.91 | 98.094 | 127.212 | -390.656 | 0. | -1 9 . 2 |
| 1992 | -47.284 | 155.93 | 17.97 | 99.5 | 130.467 | -334.41 | 0. " | -21.046 |
| 1993 | -48.654 | 137.996 | 17.98 | 88.274 | 115.53 | -342.219 | 0. | -23.409 |
| 1994 | -55.335 | 128.578 | 77.93 | 81.932 | 106.4 | -327.828 | 0. | -23.955 |
| 1995 | -55.808 | 130.801 | 17.84 | 82.81 | 107.045 | "-390.332 | 0. | -22.940 |
| 1996 | -57.402 | 139.32 | 17.66 | 87.691 | 112.429 | '-257.39 | 0. | -21.023 . |
| 1997 | -58.01 | 156.836 | 17.42 | 98.264 | 125.174 | -200.586 | 0. | -17.996. |
| 1998 | -59.338 | 181.02 | 17.87 | 112.629 | 142.851 | -123.426 | 0. | -14.041 |
| 1999 | -58.586 | 207.238 | 16.7 | 128.74 | 162.651 | -28.289 | 0. | -8.64 |
| 2000 | -s7.947 | 236.93 | 16.19' | 146.262 | 184.376 | 90.152 | 0. | -1.98 |

|      | FUN?     | FUND77    | R99L     | E99L      |
|------|----------|-----------|----------|-----------|
| 1977 | 0.       | 0.        | 0.       | 0.        |
| 1978 | 0.       | 0.        | 0.       | 0.        |
| 1979 | 0.       | 0.        | 0.       | 0.        |
| 1980 | 0.       | 0.        | 0.       | 0.        |
| 1981 | 0.808    | −0.382    | 0.038    | 0.038     |
| 1982 | −0.51    | −2.971    | 2.775    | 2.775     |
| 1983 | −4.596   | −7.649    | 6.527    | 6.527     |
| 1984 | −4.387   | −20.875   | 10.082   | 10.042    |
| 1985 | 8.543    | −49.761   | 39.206   | 39.206    |
| 1986 | −32.926  | −103.453  | 105.83   | 105.83    |
| 1987 | −87.984  | −154.609  | 143.465  | 143.465.  |
| 1988 | −154.316 | −201.555  | 170.959  | 170.959   |
| 1989 | −232.66  | −231.676  | 187.615  | 187.615   |
| 1990 | −274.285 | −237.184  | 169.448  | 169.448   |
| 1991 | −300.656 | −242.215  | 151.785  | 151.785   |
| 1992 | −334.41  | −236.48   | 157.79   | 157.79    |
| 1993 | −342.219 | −219.453  | 135.545  | 135.545   |
| 1994 | −327.828 | −198.77   | 118.603  | 118.603   |
| 1995 | −300.332 | −175.172  | 114.742  | 114.742   |
| 1996 | −257.09  | −149.504  | 114.887  | 114.887   |
| 1997 | −200.586 | −122.32   | 122.473  | 122.473   |
| 1998 | −123.426 | −89.215   | 135.163  | 135.163   |
| 1999 | −28.289  | −51.695   | 148.573  | 148.573   |
| 2000 | 90.152   | −8.617    | 162.711  | 162.711   |

95% NORTHERN GULF OCS DEVELOPMENT SCENARIO -
MODERATE BASE CASE

(Levels and Differences from the Base Case)

| | POP | MIGNET | NINCTOT | EM99 | EMSPP | EMG9P | E MNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 410.66 | -24.935 | 6.3?.3 | 1P5.508 | 0.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.667 | -11.241 | 7.202 | 178.526 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 416.656 | 5.268 | 6.697 | 185.225 | 0.383 | 0.374 | 0.243 | 1.2 |
| 1980 | 434.173 | 8.65 | 6.87 | 194.054 | 0.395 | 0.36 | 0.245 | 1.2 |
| 1981 | 456.248 | 14.939 | 7.144 | 206.985 | 0.408 | 0.341 | 0.251 | 1.3 |
| 1982 | 487.443 | 23.552 | 7.661 | 225.38 | 0.423 | 0.318 | 0.259 | ?.3 |
| 1983 | 503.935 | 8.023 | 8.501 | 230.934 | 0.424 | 0.323 | 0.253 | 1.4 |
| 1984 | 502.222 | -10.373 | 8.666 | 223.513 | 0.42 | 0.339 | 0.241 | 1.4 |
| 1985 | 509.593 | -0.756 | 8.102 | ?25.109 | 0.427 | 0.331 | 0.242 | 1.4 |
| 1986 | 5?3.51 | 5.927 | 7.932 | 232.031 | 0.434 | 0.322 | 0.244 | 1.5 |
| 1987 | 539.406 | 7.771 | 8.126 | 240.196 | 0.442 | 0.315 | 0.244 | 1.5 |
| 1988 | 557.285 | 9.548 | 8.336 | 24?.598 | 0.449 | 0.307 | 0.244 | 1.6 |
| 1989 | 575.669 | 9.775 | 8.616 | 259.072 | 0.457 | 0..3 | 0.243 | 1.6 |
| 1990 | 591● P-f5 | 7.312 | 8.9 | 266.663 | 0.462 | 0.296 | 0.242 | 1.7 |
| 1991 | 607.046 | 6.291 | 9.?82 | 273.529 | 0.469 | 0.291 | 0.24 | 1.7 |
| 1992 | 622.948 | 6.681 | 9.22 | 280.927 | 0.475 | 0.285 | 0.24 | Y*8 |
| 1993 | 640.579 | 8.247 | 9.385 | 289.6 | 0.483 | 0.278 | 0.239 | 1.8 |
| 1994 | 658.517 | 8.326 | 9.615 | 298.341 | 0.489 | 0.272 | 0.239 | 1.8 |
| 1995 | 677.855 | 9.496 | 9.844 | 308.027 | 0.496 | 0.265 | 0.238 | 1.9 |
| 1996 | 6'38.668 | 10.697 | 10.119 | 318.63 | 0.503 | 0.253 | 0.239 | 2. |
| 1997 | -/19.316 | 10.216 | 10.437 | 328.892 | 0.51 | 0.252 | 0.238 | 2.1 |
| 1998 | 740.638 | 10.598 | 10.728 | 339.507 | 0.516 | 0.245 | 0.238 | 2.1 |
| 1999 | 764.758 | 13.093 | 11.03 | 352.052 | 0.524 | 0.238 | 0.238 | 2 |
| 2000 | 789.45 | 13.273 | 11.428 | 364.731 | 0.531 | 0.231 | 0.238 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMPI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.842 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.351 | 10.294 | 21.9 | 1.194 | 14.269 | 11.906 | 5 . 7 3 a |
| 1979 | 42.921 | 4.563 | 10.774 | 23.693 | 1.249 | -- 14.538 | 12.411 | 6.176 |
| 1980 | 42.921 | 5.104 | 11.393 | 25.945 | 1.321 | 14.886 | 12.896 | 6.758 |
| 1981 | 42.921 | 5.079 | 12.281 | 29.119 | 1.406 | 15.382 | 13.37 | 7.522 |
| 1982 | 42.921 | 4.725 | 13.352 | 33.692 | 1.511 | 16.06 | 13.843 | 8.562 |
| 1983 | 42.921 | 4.389 | 13.634 | 34.537 | 1.545 | 16.259 | 14.32 | 8.876 |
| 1984 | 42.921 | 4.436 | 13.271 | 32.538 | 1.528 | 15.992 | ?4.867 | 8.596 |
| 1985 | 42.921 | 4.315 | 13.56 | 33.31 | 1.552 | 16.05 | 15.364 | 8.817 |
| 1986 | 42.921 | 4.3?2 | 14.024 | 35.212 | 1.692 | 16.297 | 15.877 | 9.3 |
| 1987 | 42.921 | 4.399 | 14.56 | 37.419 | 1.66 | 16.585 | 16.403 | 9.869 |
| 1988 | 42.921 | 4.643 | 15.141 | 39.878 | 1.722 | 16.911 | 16.547 | 10.496 |
| 1989 | 42.921 | 4.839 | 15.737 | 42.$32 | 1.786 | 17.232 | 17.507 | 11.155 |
| 1990 | 42.921 | 4.853 | 16.209 | 44.%39, | 1.837 | 17.485 | 18.085 | 11.68S |
| 1991 | 42.921 | 4.343 | 16.685 | 46.55 | 1.887 | 17.771 | 18.68 | 12.231 |
| 1992 | 42.921 | 4.322 | 17.168 | 48.707 | 1.938 | 17.951 | 19.297 | 12.789 |
| 1993 | 42.921 | %.171 | 17.744 | 51.359 | 1.998 | 18.228 | 19.933 | 13.465 |
| 1994 | 42.921 | 4.12 | 18.302 | 53.955 | 2.056 | 18.503 | 20.59 | 1 4 . 1 3 |
| 1995 | 42.921 | 4.123 | 18.928 | 56.904 | 2.12 | 18.803 | 21.269 | 14.889 |
| 1996 | 42.921 | 4.125 | 19.59 | 6'3.119 | 2.187 | 19.126 | 21.971 | 15.702 |
| 1997 | 42.921 | 4.102 | 20.236 | 63.246 | 2.253 | 19.434 | 22.696 | 16.5?4' |
| 1998 | 42.921 | 4.078 | 20.894 | 66.53 | 2.319 | 19.747 | 23.445 | 17.351 |
| 1999 | 42.921 | 4.078 | 21.669 | 70.466 | 2.397 | 20.11 | 24.219 | 18.352 |
| 2000 | 42.921 | 4.079 | 22.429 | 74.403 | 2.472 | 20.471 | 25.019 | 19.353 |

| | _409 | EM_N | EMCN. | EMGA | PI | PIRPC | RPI | _XOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.810 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924..32 | 252.71 | 810. |
| 1978 | 24.766 | 11.434 | 11.307 | 25.941 | '4236.48 | 3723.81 | 279.75 | 944. |
| 1979 | 26.405 | 12.277 | 11.972 | 26.373 | 4743.19 | 3862.07 | 293.358 | 1019. |
| 1980 | 27.562 | 13.526 | 1.3.091 | 26.862 | 539.5.29 | 4029.44 | 308.4 | 1120.35 |
| 1981 | 31.328 | 16.814 | 14.171 | 27.616 | 6425.92 | 4324.77 | 325.674 | 1247.59 |
| 1982 | 35. | 22.374 | 15.835 | 28.861 | 7957.32 | 4720.92 | 345.808 | 1436.17 |
| 1983 | 36.123 | 22.034 | 16.577 | 31.711 | 8611.12 | 4728.18 | 361.496 | 1702.93 |
| 1984 | 35.222 | 17.157 | 16.518 | 32.763 | '329$.34 | 4$33.49 | 372.599 | 1854.33 |
| 1985 | 36.021 | 17.374 | 17.148 | 31.627 | 8820.69 | 4462.45 | 387.889 | 1911.75 |
| 1986 | 37.73 | 18.645 | 18.214 | 31.737 | 9769.54 | 4596.78 | 405.976 | 2075.46 |
| 1987 | 39.735 | 19.628 | 19.168 | 32.638 | 10858.7 | 4730.33 | 425.576 | 2313.94 |
| 1988 | 41.928 | 20.821 | 20.228 | 33.664 | 12149.5 | 4883.9 | 446.397 | 2586.74 |
| 1989 | 44.213 | 21.865 | 21.311 | 34.824 | 13534.9 | 5922.23 | 468.159 | 2397.06 |
| 1990 | 46.059 | 22.415 | 22.213 | 36.011 | 14938.8 | 5117.13 | 489.944 | 3229.68 |
| 1991 | 47.919 | 23.159 | 22.956 | 36.752 | 16229.6 | 5219.52 | 512.224 | 3543.67 |
| 1992 | 49.825 | 23.932 | 23.806 | 37.253 | 17784.4, | 5328.41 | 535.788 | 3866.23 |
| 1993 | 52*112 | 25.089 | 24.284 | 37.722 | 19616.2 | 5460.07 | 569.853 | 4216.1 |
| 1994 | 54.35 | 26.175 | 25.969 | 38.346 | 21694.1 | 5588.47 | 587.059 | 4610. |
| 1995 | 56.89 | 27.329 | 27.2 | 38.824 | 23831.7 | 5718.5 | 614.811 | 5025.25 |
| 1996 | 59.587 | 28.789 | 28.516 | 39.33 | 26437.4 | 5874.92 | 644.193 | 5476.39 |
| 1997 | 62.269 | 29.972 | 29.918 | 39.947 | 29098. | 5996.06 | 674.656 | 5981.48 |
| 1998 | 65.013 | 31.453 | 31.398 | 40.411 | 32115.4 | 6138.27 | 706.516 | 6503.24 |
| 1999 | 68.275 | 33.232 | 3.3.176 | 49,839 | 35663.8 | 6296.25 | 743.677 | 7080.22 |
| 2000 | 71.511 | 35.032 | 34.974 | 41.495 | 39562.7 | 6454.72 | 776.409 | 7744.24 |

| | EXCAP | E99S | E99SRPC | REVGF | RP9S | RT98 | REHS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.82 | 1118.56 | 796.27 | 197.201 | 214.301 | 278.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.49 | 1053.8 | 471.4 | 206.916 | 240.272 | 617.239 |
| 1979 | 290, | 1414.71 | 1151.9 | 1440.77 | 860.7 | 274.373 | 222.549 | 814.761 |
| 1980 | 331.395 | 1566.76 | 1170.1 | 1624.51 | 996.3 | 312.909 | 230.856 | 1054.02 |
| 1981 | 372.128 | 1743.59 | 1173.43 | 1988.74 | 1278.41 | 355.799 | 264.415 | 1501.05 |
| 1982 | 445.039 | 2020.25 | 1198.52 | 2331.07 | 1475.74 | 438.634 | 338.012 | 2054.9 |
| 1983 | 523.046 | 2379.3 | 1306.41 | 2653,92 | 1642.7 | 553."793 | 421.913 | 2625.9 |
| 1984 | 562.985 | 2587.53 | 1382.77 | 3226.67 | 2121.71 | 651.909 | 449.51 | 3550.65 |
| 1985 | 653.797 | 2753.42 | 1392.97 | 3629.9 | 2422.22 | 683.093 | 451.462 | 4136.78 |
| 1986 | 779.093 | 3064.46 | 1441.88 | 3811.45 | 2430.93 | 737.752 | 498.456 | 5857.48 |
| 1987 | 836.837 | 3384.34 | 1474.28 | 4057.66 | 2480.11 | 793.042 | 573.424 | 6966.66 |
| 1988 | 904.428 | 3751.49 | 1508.01 | 4311.85 | 2520.71 | 871.811 | 656.959 | 8025.72 |
| 1989 | 959.943 | 4146.05 | 1538.4 | 4582.4 | 2563,12 | 955.121 | 758.878 | 9023.63 |
| 1990 | 1008.7 | 4557.58 | 1571.66 | 4711.32 | 2459,19 | 1035.47 | 868.77 | 9814.04 |
| 1991 | 1009.18 | 499?.55 | 1577.31 | 4878.53 | 2406,19 | 1108.51 | 979.676 | 10479.3 |
| 1992 | 1? 3.3.28 | 5284.31 | 1583,23 | 5128.16 | 2430,36 | 1207.73 | 1102.22 | 11068.9 |
| 1993 | 1076.23 | 5705.53 | 1588.09 | 5400.54 | 2459.28 | 1324.51 | 1244.03 | 11575.5 |
| 1994 | 1125.81 | 6179.45 | 1598.46 | 5635.73 | 2427.37 | 1445.49 | 1411.97 | 11924.9 |
| 1995 | 1163.24 | 6667.44 | 1599.85 | 5862.48 | 2373.6 | 1578.47 | 1600.39 | 12095.3 |
| 1996 | 12??.4 | 7201.54 | 1600.07 | 615?.79 | 2365.73 | 1749.73 | 1821.'77 | 12114.3' |
| 1997 | 1275.19 | 7809.61 | 1609.26 | 6492.2 | 2367. | 1944.14 | 2076.28 | 1195s.2 |
| 1998 | 1376.4 | 8473.54 | 1619.33 | 6838.35 | 236%.71 | 2158.94 | 2355.83 | 11601.4 |
| 1999 | 1490.69 | 9198.56 | 1623.93 | 7231.91 | 2370.6 | 2415.49 | 2681.59 | 11043. |
| 2000 | 1622.23 | 10029.8 | 1636.35 | 7675.91 | 2371,88 | 271%.34 | 3070.99 | 10246.5 |

| 1977 | 2.4 | 35.343 | 670.6 | 671.369 | 0.131 | 531.912 | 557.16 | -137.452 |
|------|------|------|------|------|------|------|------|------|
| 1978 | 48.975 | 46.954 | 666.184 | 602.483 | 0.134 | 568.508 | 595.271 | -4.416 |
| 1979 | 153.275 | 46.878 | 968.037 | 834.862 | 0.131 | 622.528 | 650.896 | 301.853 |
| 1980 | 275. | 68.529 | 1329.02 | 1090.28 | 0.133 | 718.529 | 748.6 | 360.987 |
| 1981 | 411.475 | 94.497 | 1912.53 | 1485.75 | 0.125 | 806.194 | 838.069 | 583.505 |
| 1982 | 563.425 | 135.434 | 2618.32 | 1915.61 | 0.115 | 913.258 | 947.046 | 705.793 |
| 1983 | 731.699 | 186.1 | 3357.59 | 2350.46 | 0.121 | 1044.37 | 1080.69 | 739.275 |
| 1984 | 948.649 | 238.69 | 4499.3 | 3055.09 | 0.136 | 1127.96 | 1165.92 | 1141.71 |
| 1985 | 1187.55 | 319.694 | 5924.33 | 3864.14 | 0.133 | 1170.41 | 1210.65 | 1425.03 |
| 1986 | 1437.35 | 420.641 | 7294.83 | 4546.06 | 0.128 | 1251.35 | 1294.01 | 1370.51 |
| 1987 | 1684.2 | 517.025 | 8660.86 | 5142.83 | 0.126 | 1364.55 | 1409.77 | 1356.04 |
| 1988 | 1935.8 | 613.981 | 9961.52 | 5645.79 | 0.123 | 1498.44 | 1546.37 | 1310.66 |
| 1989 | 2193.07 | 706.985 | 11216.7 | 6061.66 | 0.122 | 1647.41 | 1698.22 | 1255.19 |
| 1990 | 2444.52 | 796.134 | 12258.6 | 6330.14 | 0.122 | 1811.72 | 1865.57 | 1041.86 |
| 1991 | 2688.87 | 870.322 | 13168.2 | 6504.09 | 0.121 | 1971.74 | 2028.83 | 909.632 |
| 1992 | 2936.75 | 935.218 | 14005.7 | 6613.5 | 0.12 | 2138.53 | 2199.04 | 837.469 |
| 1993 | 3188.27 | 995.08 | 14763.8 | 6659.93 | 0.118 | 2321.21 | 2385.35 | 756.145 |
| 1994 | 3437.02 | 1049.41 | 15361.9 | 6620.39 | 0.117 | 2531.73 | 2599.72 | 598.117 |
| 1995 | 3680.52 | 1092.52 | 15775.8 | 6491.89 | 0.116 | 2756.67 | 2828.74 | 413.906 |
| 1996 | 3923.72 | 1122.71 | 16038. | 6298.77 | 0.114 | 3012.38 | 3088.77 | 262.215 |
| 1997 | 4168.14 | 1142.28 | 16126.3 | 6047.45 | 0.113 | 3294.49 | 3375.47 | 88.266 |
| 1998 | 4413.22 | 1149.68 | 16014.6 | 5734.77 | 0.112 | 3597.97 | 3683.8 | -111.66 |
| 1999 | 4659.57 | 1143.09 | 15702.6 | 5363.66 | 0.11 | 3926.83 | 4017.82 | -312.094 |
| 2000 | 4907.07 | 1122.48 | 15153.5 | 4937.91 | 0.109 | 4310.29 | 4406.73 | -549.035 |

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| | EXBITES | VIABL2 | RENSRAT |
|------|------|------|------|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.24 | 0.468 | 0.047 |
| 1980 | 0.234 | 0.443 | 0.043 |
| 1981 | 0.219 | 0.438 | 0.041 |
| 1982 | 0.204 | 0.443 | 0.043 |
| 1983 | 0.222 | 0.431 | 0.049 |
| 1984 | 0.251 | 0.415 | 0.054 |
| 1985 | 0.25 | 0.403 | 0.051 |
| 1986 | 0.25 | 0.393 | 0.051 |
| 1987 | 0.249 | 0.392 | 0.053 |
| 1988 | 0.247 | 0.392 | 0.054 |
| 1989 | 0.246 | 0.394 | 0.056 |
| 1990 | 0.247 | 0.397 | 0.059 |
| 1991 | 0.245 | 0.404 | 0.06 |
| 1992 | 0.241 | 0.411 | 0.062 |
| 1993 | 0.237 | 0.419 | 0.063 |
| 1994 | 0.233 | 0.429 | 0.065 |
| 1995 | 0.229 | 0.44 | 0.067 |
| 1996 | 0.223 | 0.453 | 0.069 |
| 1997 | 0.22 | 0.466 | 0.071 |
| 1998 | 0.216 | 0.478 | 0.073 |
| 1999 | 0.212 | 0.493 | 0.075 |

| | POP | MAGNET | NEUTOT | EM99 | EMA9 | EMGF | EMP9 | EMT9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.686 | 0.686 | 0. | 0.507 | 0. | 0. | 0.149 | 0.103 |
| 1982 | 1.084 | 0.371 | 0.028 | 0.743 | 0. | 0. | 0.149 | 0.12 |
| 1983 | 1.133 | 0.009 | 0.041 | 0.706 | 0. | 0. | 0.114 | 0.097 |
| 1984 | 0.742 | -0.43 | 0.039 | 0.353 | 0. | 0. | 0.021 | 0.034 |
| 1985 | 0.536 | -0.228 | 0.02 | 0.178 | 0. | 0. | 0. | 0.009 |
| 1986 | 0.427 | -0.119 | 0.011 | 0.096 | 0. | 0. | 0. | 0.005 |
| 1987 | 0.376 | -0.057 | 0.006 | 0.064 | 0. | 0. | 0. | .003 |
| 1988 | 0.343 | -0.036 | 0.003 | 0.048 | 0. | 0. | 0. | .002 |
| 1989 | 0.318 | -0.028 | 0.002 | 0.038 | 0. | 0. | 0. | .002 |
| 1990 | 0.295 | -0.024 | 0.001 | 0.031 | 0. | 0. | 0. | .002 |
| 1991 | 0.275 | -0.02 | 0. | 0.027 | 0. | 0. | 0. | .002 |
| 1992 | 0.262 | -0.013 | -0. | 0.025 | 0. | 0. | 0. | .002 |
| 1993 | 0.243 | -0.018 | -0.001 | 0.02 | 0. | 0. | 0. | .001 |
| 1994 | 0.219 | -0.024 | -0.001 | 0.012 | 0. | 0. | 0. | .001 |
| 1995 | 0.207 | -0.012 | -0.001 | 0.011 | 0. | 0. | 0. | .001 |
| 1996 | 0.202 | -0.004 | -0.001 | 0.014 | 0. | 0. | 0. | .001 |
| 1997 | 0.189 | -0.011 | -0.001 | 0.011 | 0. | 0. | 0. | .001 |
| 1998 | 0.183 | -0.005 | -0.001 | 0.012 | 0. | 0. | 0. | .001 |
| 1999 | 0.165 | -0.017 | -0.001 | 0.006 | 0. | 0. | 0. | . |
| 2000 | 0.163 | -0.002 | -0.001 | 0.01 | 0. | 0. | 0. | 0.01 |

| | EMS9 | EMPU | EMOT | EMM9 | EMFI | EMD9 | EMCM | EMCN |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.098 | 0.003 | 0.019 | 0. | 0.025 | 0.093 | 0.001 | 0.04 |
| 1982 | 0.149 | 0.004 | 0.027 | 0. | 0.039 | 0.138 | 0.002 | 0.067 |
| 1983 | 0.142 | 0.004 | 0.025 | 0. | 0.037 | 0.13 | 0.002 | 0.064 |
| 1984 | 0.068 | 0.002 | 0.013 | 0. | 0.018 | 0.063 | 0.001 | 0.033 |
| 1985 | 0.034 | 0.001 | 0.006 | 0. | 0.009 | 0.031 | 0. | 0.012 |
| 1986 | 0.019 | 0. | 0.003 | 0. | 0.005 | 0.017 | 0. | 0.002 |
| 1987 | 0.013 | 0. | 0.002 | 0. | 0.003 | 0.012 | 0. | 0.001 |
| 1988 | 0.01 | 0. | 0.002 | 0. | 0.003 | 0.009 | 0. | 0. |
| 1989 | 0.009 | 0. | 0.001 | 0. | 0.002 | 0.008 | 0. | 0. |
| 1990 | 0.007 | 0. | 0.001 | 0. | 0.002 | 0.006 | 0. | -0. |
| 1991 | 0.007 | 0. | 0.001 | 0. | 0.002 | 0.006 | 0. | 0. |
| 1992 | 0.007 | 0. | 0.001 | 0. | 0.002 | 0.006 | 0. | 0.001 |
| 1993 | 0.005 | 0. | 0.001 | 0. | 0.001 | 0.004 | 0. | 0. |
| 1994 | 0.003 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | -0. |
| 1995 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0. |
| 1996 | 0.005 | 0. | 0. | 0. | 0.001 | 0.004 | 0. | 0.001 |
| 1997 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.001 |
| 1998 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.002 |
| 1999 | 0.002 | 0. | 0. | 0. | 0. | 0.002 | 0. | 0.001 |
| 2000 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.002 |

| | ENCN1 | EMGA | PI | PIRPC | RPI | EXOPS | EXCAP | E99S |
|------|-------|-------|--------|--------|-------|-------|--------|-------|
| 1977 | o* | 0. | 0. | 0. | 0. | 0. | 0. | o. |
| 1978 | o. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | c. | n. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | o. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.04 | -0.029 | 25.086 | 7.68 | 0.206 | 0. | 0. | 0. |
| 1982 | 0.067 | 0.049 | 40.949 | 9.812 | 0.295 | 4.012 | 1.405 | 5.417 |
| 1983 | 0.064 | 0.091 | 40.621 | 7.961 | 0.286 | 6.307 | 1.573 | 7.919 |
| 1984 | 0.033 | 0.101 | 23.18 | 2.27 | 0.164 | 6.242 | 1.159 | 7.484 |
| 1985 | 0.012 | 0.076 | 10.73 | -0.352 | 0.095 | 5.765 | -0.408 | 5.471 |
| 1986 | 0.002 | 0.044 | 6.301 | -1.477 | 0.061 | 3.921 | -1.453 | 2.569 |
| 1987 | 0.001 | 0.028 | 4.719 | -1.777 | 0.048 | 2.994 | -1.19 | 1.86 |
| 1988 | 0. | 0.021 | 3.988 | -1.[367 | 0.042 | 2.549 | -1.19 | 1.381 |
| 1989 | n. | 0.016 | 3.621 | -1.848 | 0.039 | 2.253 | -1.122 | 1.113 |
| 1990 | -n. | 0.013 | 3.324 | -1.801 | 0.038 | 2.013 | -1.054 | 0.91 |
| 1991 | f). | 0.01 | 3.219 | -1.711 | 0.037 | 1.79 | -0.851 | 0.828 |
| 1992 | 0.001 | 0.008 | 3.449 | -1.609 | 0.038 | 1.5'38 | -0.795 | 0.695 |
| 1993 | 0. | 0.007 | 3.168 | -1.559 | 0.037 | 1.461 | -0.706 | 0.621 |
| 1994 | -0. | 0.005 | 2.422 | -1.539 | 0.034 | 1.262 | -0.646 | 0.465 |
| 1995 | n. | 0.002 | 2.613 | -1.441 | 0.035 | 0.984 | -0.552 | 0.262 |
| 1996 | 0.001 | 0.001 | 3.383 | -1.309 | 0.038 | 0.863 | -0.388 | 0.289 |
| 1997 | 0.001 | 0.001 | 3.277 | -1.234 | 0.038 | 0.855 | '0.232 | 0.422 |
| 1998 | 0.002 | 0. | 3.777 | -1.152 | 0.041 | 0.809 | 0.232 | 0.836 |
| 1999 | 0.001 | 0.001 | 3.086 | -1.121 | 0.039 | 0.836 | 0.256 | 0.895 |
| 2000 | 0.002 | -0.001 | 3.973 | -1.031 | 0.042 | 0.68 | 0.223 | 0.711 |

| | E99SPPC | REVGF | RP9S | RT98 | RENS | GFBAL | PFBAL | RINS |
|------|---------|--------|------|--------|-------|----------|-------|--------|
| 1977 | n. | 0. | o* | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | (). | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | o* | 0. | 0. | 0. | G. |
| 1981 | -2.509 | (j.759 | 0. | 0.402 | 0.402 | 0.75 | 0.' | 0. |
| 1982 | -42.473 | 2.503 | 0. | 1.463 | 1.865 | -1.06 | 0. | 0.053 |
| 1983 | 0.381 | 3.296 | 0, | 2,075 | 2.736 | -4.197 | 0. | -"0.074 |
| 1984 | 1.351 | 2.552 | c. | 1.746 | 2.415 | -7.816 | o. | -0.294 |
| 1985 | 0.963 | 0.99 | 0. | 0.866" | 1.215 | -11.648 | 0. | -0.547 |
| 1986 | -0.183 | 0.113 | 0. | 0.465 | 0.662 | -14.129 | 0. | -0.815 |
| 1987 | -0.385 | -0.34 | 0. | 0.284 | 0.406 | -16.375 | 0. | -0.989 |
| 1988 | -0.517 | -0.602 | 0. | 0.221 | 0.314 | -18.469 | 0. | -1.146 |
| 1989 | -0.566 | -0.793 | 0. | t).194 | 0.279 | -20.504 | 0. | -1.293 |
| 1990 | -0.591 | -0.965 | 0. | 0.181 | 0.256 | -22.51(5 | 0. | -1.435 |
| 1991 | -0.561 | -1.12s | 0. | 0.174 | 0.244 | -24.57 | 0. | -1.576 |
| 1992 | -0.569 | -1.258 | 0. | 0.184 | 0.255 | -26.621 | 0. | -1.72 |
| 1993 | -?.536 | -1.387 | 0. | 0.199 | 0.278 | -28.711 | 0. | '1.864 |
| 1994 | -0.504 | -1.57P | 0. | 0.176 | 0.244 | -30.836 | 0. | -2.01 |
| 1995 | -0.515 | -1.77 | 0. | 0.147 | 0.206 | -32.357 | 0. | -2.159 |
| 1996 | -?.493 | -1.875 | 0. | 0.132 | 0.241 | -35.16 | 0. | -2.307 |
| 1997 | -0.428 | -1.965 | 0. | 0.242 | 0.317 | -37.527 | 0. | -2.461 |
| 1998 | -0.335 | -2.133 | 0. | 0.242 | 0.311 | -40.293 | 0. | -2.627 |
| 1999 | -0.277 | -2.301 | 0. | 0.262 | 0.348 | -43.2?7 | 0. | -2.821 |
| 2000 | -0.312 | -2.527 | 0. | 0.252 | 0.32? | -46.336 | 0. | -3.029 |

|      | FUND    | FUND7    | R99L  | E99L  |
|------|---------|----------|-------|-------|
| 1977 | 0.      | 0.       | 0.    | 0.    |
| 1978 | 0.      | 0.       | 0.    | 0.    |
| 1979 | 0.      | 0.       | 0.    | 0.    |
| 1980 | 0.      | 0.       | 0.    | 0.    |
| 1981 | 0.75    | -0.355   | 0.035 | 0.035 |
| 1982 | -1.06   | -2.411   | 2.55  | 2.55  |
| 1983 | -4.197  | -4.801   | 4.074 | 4.074 |
| 1984 | -7.816  | -6.652   | 4.008 | 4.008 |
| 1985 | -11.649 | -8.548   | 2.04  | 2.04  |
| 1986 | -14.129 | -9.488   | 1.059 | 1.059 |
| 1987 | -16.375 | -10.32   | 0.61  | 0.61  |
| 1988 | -18.469 | -11.004  | 0.454 | 0.454 |
| 1989 | -20.504 | -11.594  | 0.381 | 0.381 |
| 1990 | -22.516 | -12.113  | 0.347 | 0.347 |
| 1991 | -24.57  | -12.602  | 0.319 | 0.319 |
| 1992 | -26.621 | -13.039  | 0.307 | 0.307 |
| 1993 | -28.711 | -13.395  | 0.334 | 0.334 |
| 1994 | -30.836 | -13.668  | 0.292 | 0.292 |
| 1995 | -32.957 | -13.926  | 0.204 | 0.204 |
| 1996 | -35.16  | -14.18   | 0.23  | 0.23  |
| 1997 | -37.527 | -14.418  | 0.311 | 0.311 |
| 1998 | -40.293 | -14.762  | 0.271 | 0.271 |
| 1999 | -43.277 | -15.062  | 0.31  | 0.31  |
| 2000 | -46.336 | -15.371  | 0.215 | 0.215 |

HIGH BASE CASE

| | P | MIGNET | NINCTOT | EM99 | EMSPP | EMG9P | EMNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 410.66 | -24.935 | 6.383 | 185.508 | 0.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.709 | -11.199 | 7.202 | 178.557 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 417.661 | 4.23 | 6.699 | 184.486 | 0.382 | 0.376 | 0.242 | 1.2 |
| 1980 | 431.495 | 7.905 | 6.829 | 192.187 | 0.394 | 0.363 | 0.244 | 1.2 |
| 1981 | 453.534 | 15.005 | 7.24 | 205.348 | 0.408 | 0.342 | 0.25 | 1.3 |
| 1982 | 484.46 | 23.379 | 7.565 | 223.675 | 0.422 | 0.32 | 0.258 | 1.3 |
| 1983 | 507.184 | 14.354 | 8.401 | 233.949 | 0.426 | 0.317 | 0.256 | 1.4 |
| 1984 | 512.16 | -3.836 | 8.828 | 231. | 0.426 | 0.329 | 0.245 | 1.4 |
| 1985 | 519.471 | -1.219 | 8.516 | 231.56 | 0.43 | 0.325 | 0.245 | 1.4 |
| 1986 | 531.137 | 3.306 | 8.351 | 236.106 | 0.435 | 0.319 | 0.246 | 1.5 |
| 1987 | 546.488 | 6.971 | 8.376 | 243.56 | 0.443 | 0.311 | 0.246 | 1.5 |
| 1988 | 564.654 | 9.622 | 8.547 | 252.89 | 0.451 | 0.303 | 0.246 | 1.6 |
| 1989 | 583.731 | 10.261 | 8.822 | 262.615 | 0.458 | 0.296 | 0.246 | 1.6 |
| 1990 | 600.285 | 7.445 | 9.117 | 270.213 | 0.463 | 0.292 | 0.244 | 1.7 |
| 1991 | 616.303 | 6.725 | 9.295 | 277.51 | 0.47 | 0.287 | 0.243 | 1.7 |
| 1992 | 632.719 | 6.967 | 9.45 | 285.074 | 0.476 | 0.282 | 0.242 | 1.8 |
| 1993 | 651.22 | 8.884 | 9.618 | 294.189 | 0.484 | 0.275 | 0.241 | 1.8 |
| 1994 | 669.835 | 8.752 | 9.866 | 303.2 | 0.49 | 0.269 | 0.241 | 1.8 |
| 1995 | 689.377 | 9.441 | 10.104 | 312.806 | 0.497 | 0.262 | 0.24 | 1.9 |
| 1996 | 708.66 | 8.918 | 10.369 | 322.086 | 0.503 | 0.257 | 0.24 | 2. |
| 1997 | 729.94 | 10.673 | 10.609 | 332.789 | 0.511 | 0.249 | 0.24 | 2.1 |
| 1998 | 751.675 | 10.82 | 10.919 | 343.616 | 0.517 | 0.243 | 0.24 | 2.1 |
| 1999 | 776.143 | 13.246 | 11.227 | 356.32 | 0.525 | 0.236 | 0.24 | 2.2 |
| 2000 | 801.117 | 13.354 | 11.628 | 369.105 | 0.531 | 0.229 | 0.239 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMFI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.842 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.365 | 10.296 | 21.905 | 1.194 | 14.27 | 11.906 | 5.739 |
| 1979 | 42.921 | 4.368 | 10.728 | 23.533 | 1.244 | 14.509 | 12.411 | 6.133 |
| 1980 | 42.921 | 4.692 | 11.224 | 25.552 | 1.308 | 14.813 | 12.896 | 6.654 |
| 1981 | 42.921 | 4.612 | 12.125 | 28.84 | 1.397 | 15.32 | 13.37 | 7.449 |
| 1982 | 42.921 | 4.059 | 13.193 | 33.39 | 1.502 | 15.998 | 13.843 | 8.483 |
| 1983 | 42.921 | 5.037 | 13.766 | 35.328 | 1.566 | 16.366 | 14.32 | 9.077 |
| 1984 | 42.921 | 5.383 | 13.706 | 34.347 | 1.577 | 16.261 | 14.867 | 9.063 |
| 1985 | 42.921 | 5.259 | 13.909 | 34.718 | 1.591 | 16.281 | 15.424 | 9.181 |
| 1986 | 42.921 | 5.072 | 14.229 | 36.064 | 1.624 | 16.442 | 15.937 | 9.514 |
| 1987 | 42.921 | 4.999 | 14.737 | 38.202 | 1.678 | 16.703 | 16.463 | 10.055 |
| 1988 | 42.921 | 5.207 | 15.317 | 40.678 | 1.74 | 17.023 | 17.007 | 10.685 |
| 1989 | 42.921 | 5.528 | 15.925 | 43.296 | 1.805 | 17.35 | 17.567 | 11.361 |
| 1990 | 42.921 | 5.69 | 16.39 | 45.258 | 1.856 | 17.602 | 18.145 | 11.893 |
| 1991 | 42.921 | 5.299 | 16.889 | 47.48 | 1.908 | 17.84 | 18.74 | 12.464 |
| 1992 | 42.921 | 5.289 | 17.377 | 49.668 | 1.96 | 18.084 | 19.357 | 13.033 |
| 1993 | 42.921 | 5.142 | 17.978 | 52.459 | 2.022 | 18.373 | 19.993 | 13.741 |
| 1994 | 42.921 | 5.054 | 18.549 | 55.133 | 2.081 | 18.654 | 20.65 | 14.426 |
| 1995 | 42.921 | 5.023 | 19.167 | 58.058 | 2.144 | 18.95 | 21.329 | 15.181 |
| 1996 | 42.921 | 4.979 | 19.748 | 60.856 | 2.204 | 19.231 | 22.031 | 15.901 |
| 1997 | 42.921 | 4.958 | 20.428 | 64.199 | 2.273 | 19.549 | 22.756 | 16.756 |
| 1998 | 42.921 | 4.954 | 21.095 | 67.544 | 2.34 | 19.867 | 23.505 | 17.608 |
| 1999 | 42.921 | 4.955 | 21.876 | 71.535 | 2.417 | 20.232 | 24.279 | 18.624 |
| 2000 | 42.921 | 4.949 | 22.641 | 75.514 | 2.493 | 20.594 | 25.079 | 19.635 |

| | E.D9 | EMCN | EMCN1 | EMGA | PI | PIRPC | RPI | EOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924.32 | 252.71 | 810. |
| 1978 | 24.771 | 11.436 | 11.309 | 25.941 | 4237.42 | 3724.25 | 279.75 | 944. |
| 1979 | 26.247 | 12.129 | 11.912 | 26.421 | 4707. | 3845.78 | 293.049 | 1019. |
| 1980 | 28.19 | 13.203 | 12.84 | 26.81 | 5301.84 | 3994.15 | 307.633 | 1114.32 |
| 1981 | 31.063 | 16.779 | 14.031 | 27.328 | 6353.44 | 4310.39 | 325.009 | 1232.22 |
| 1982 | 34.717 | 22.411 | 15.697 | 28.68 | 7873.63 | 4709.21 | 345.135 | 1423.47 |
| 1983 | 36.838 | 22.87 | 16.87 | 31.257 | 8831.95 | 4802.91 | 362.572 | 1688.94 |
| 1984 | 36.888 | 18.753 | 17.256 | 32.984 | 8814.48 | 4582.21 | 375.594 | 1886.72 |
| 1985 | 37.315 | 18.326 | 17.783 | 32.417 | 9244.78 | 4556.73 | 390.557 | 1960.57 |
| 1986 | 38.487 | 19.117 | 18.587 | 32.334 | 10042.1 | 4637.71 | 407.677 | 2110.47 |
| 1987 | 40.381 | 20.222 | 19.453 | 32.784 | 11124.6 | 4767.74 | 426.97 | 2321.92 |
| 1988 | 42.575 | 21.468 | 20.531 | 33.703 | 12435.5 | 4918.55 | 447.767 | 2589.34 |
| 1989 | 44.918 | 22.535 | 21.656 | 34.839 | 13857.4 | 5054.72 | 469.652 | 2900.26 |
| 1990 | 46.76 | 22.927 | 22.626 | 36.089 | 15155.5 | 5137.21 | 491.461 | 3238.47 |
| 1991 | 48.713 | 23.723 | 23.421 | 36.819 | 16606.9 | 5242.79 | 513.966 | 3554.01 |
| 1992 | 50.65 | 24.482 | 24.306 | 37.423 | 18192.3 | 5348.03 | 537.636 | 3888.59 |
| 1993 | 53.039 | 25.735 | 25.431 | 37.905 | 20107.7 | 5485.07 | 562.936 | 4246.08 |
| 1994 | 55.338 | 26.861 | 26.556 | 38.617 | 22157.7 | 5613.37 | 589.303 | 4655.47 |
| 1995 | 57.86 | 27.965 | 27.786 | 39.163 | 24399.3 | 5736.03 | 617.043 | 5083.16 |
| 1996 | 60.249 | 29.059 | 28.97 | 39.734 | 26810.3 | 5858.41 | 645.787 | 5539.29 |
| 1997 | 63.067 | 30.462 | 30.408 | 40.106 | 29611.2 | 5996.68 | 676.492 | 6017.27 |
| 1998 | 65.855 | 31.927 | 31.872 | 40.644 | 32694.4 | 6139.33 | 708.481 | 6555.05 |
| 1999 | 69.155 | 33.733 | 33.677 | 41.084 | 36301.6 | 6297.3 | 742.741 | 7138.16 |
| 2000 | 72.419 | 35.554 | 35.496 | 41.748 | 40260.8 | 6455.19 | 778.545 | 7807.52 |

| | EXCAP | E99S | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.82 | 1118.56 | 796.27 | 197.201 | 214.301 | 278.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.37 | 1053.84 | 471.4 | 206.933 | 240.288 | 617.245 |
| 1979 | 290. | 1418.71 | 1155.86 | 1439.75 | 860.7 | 273.822 | 222.013 | 813.789 |
| 1980 | 329.271 | 1558.6 | 1174.16 | 1620. | 996.3 | 310.38 | 227.772 | 1055.05 |
| 1981 | 367.356 | 1723.39 | 1169.17 | 1981.98 | 1278.41 | 351.759 | 258.996 | 1511.52 |
| 1982 | 443.134 | 2005.45 | 1199.4 | 2325.41 | 1475.74 | 435.053 | 334.032 | 2072.03 |
| 1983 | 520.739 | 2362.76 | 1284.87 | 2656.71 | 1642.7 | 554.983 | 421.687 | 2659.46 |
| 1984 | 577.095 | 2633.73 | 1369.14 | 3255.09 | 2121.71 | 668.801 | 469.82 | 3576.47 |
| 1985 | 675.87 | 2824.41 | 1392.14 | 3672.12 | 2422.22 | 708.99 | 485.935 | 4748.96 |
| 1986 | 790.822 | 3111.91 | 1437.16 | 3845.12 | 2431.68 | 757.866 | 525.775 | 5864.93 |
| 1987 | 843.872 | 3400.38 | 1457.3 | 4085.13 | 2483.11 | 807.901 | 589.791 | 6988.94 |
| 1988 | 917.577 | 3768.46 | 1490.49 | 4343.36 | 2526.41 | 887.26 | 676.291 | 8067.69 |
| 1989 | 975.06 | 4165.87 | 1519.55 | 4671.14 | 2621.78 | 976.621 | 780.387 | 9134.33 |
| 1990 | 1041.28 | 4600.99 | 1559.57 | 4825.84 | 2535.3 | 1063.02 | 892.852 | 10001.7 |
| 1991 | 1044.98 | 4953.68 | 1563.86 | 5009.16 | 2489.55 | 1138.13 | 1005.77 | 10755. |
| 1992 | 1075.02 | 5352.44 | 1573.45 | 5276.09 | 2518.52 | 1241.36 | 1133.31 | 11434.5 |
| 1993 | 1 .6 | 5784.12 | 1577.79 | 5566.89 | 2553.13 | 1362.7 | 1279.86 | 12040.3 |
| 1994 | 1173.67 | 6279.28 | 1590.75 | 5824.02 | 2526.88 | 1490.27 | 1455.48 | 12493. |
| 1995 | 1212.24 | 6782.23 | 1594.41 | 6073.05 | 2481.04 | 1628. | 1649.68 | 12775.3 |
| 1996 | 257.39 | 7322.73 | 1600.09 | 6382.9 | 2479.73 | 1796.96 | 1869.37 | 12912.3 |
| 1997 | 3 7.1 | 7898.92 | 1599.44 | 6720.21 | 2484.03 | 1985.7 | 2115.6 | 12904.8 |
| 1998 | 1395.6 | 8556.5 | 1606.71 | 7085.48 | 2476.71 | 2208.09 | 2407.12 | 12714.8 |
| 1999 | 511.81 | 9290.09 | 1611.54 | 7485.72 | 2463.04 | 2470.08 | 2740.7 | 12324.7 |
| 2000 | 1645.2 | 10129.1 | 1624.02 | 7939.18 | 2456.93 | 2777.74 | 3138.59 | 11701. |

| | PFBAL | RINS | FUND | FUND77 | EXBITEL | R99L | E99L | SIMP |
|---|---|---|---|---|---|---|---|---|
| 1977 | 2.4 | 75.343 | 670.6 | 6?1.36s | 0.131 | 531.912 | 557.16 | -137.452 |
| 1978 | 48.975 | 46.954 | 666.22 | 602.545 | 0.134 | 568.509 | 595.272 | -4.38 |
| 1979 | 153.275 | 46.98 | 967.064 | 834.991 | 0.132 | 622.581 | 650.949 | 300.844 |
| 1980 | 275. | 68.461 | 1330.05 | 1093.85 | 0.135 | 714.74 | 744.811 | 362.987 |
| 1981 | 411.475 | 94.479 | 1922.99 | 1496.93 | 0.125 | 796.569 | 828.444 | 592.942 |
| 1982 | 563.425 | 136.667 | 2635.46 | 1?31.91 | 0.115 | 905.719 | 939.5137 | 712.469 |
| 1983 | 731.699 | 187.299 | 3391.16 | 2366.32 | 0.117 | 1036.7 | 1072.52 | 7.55.7 |
| 1984 | 948.649 | 241.039 | 4525.12 | 3048.11 | 0.13 | 1149.35 | 1187.32 | 1133.96 |
| 1985 | .1187.55 | 321.501 | 5936.51 | 3645.63 | 0.132 | 1222.34 | 1262.58 | _1411.4 |
| 1986 | 1437.35 | 421.493 | 7302.28 | 4531.71 | 0.129 | 1294.23 | 1336./39 | 1365.77 |
| 1987 | 1684.2 | 518.346 | 8673.14 | 5139.25 | 0.125 | 1390.52 | 1435.7% | 1370.87 |
| 1988 | 1935.8 | 615.541 | 10003.5 | 5652.23 | 0.122 | 1520. | 1567.93 | 1330.35 |
| 1989 | 2199.32 | 709.923 | 11333.7 | 6105.4 | 0.121 | 1669.35 | 1720.66 | 1330.17 |
| 1990 | 2458.6 | 804.352 | 12460.3 | 6414.43' | 0.121 | 1838.09 | 1891.94 | 1126.6 |
| 1991 | 2711.47 | 884.51 | 13466.5 | 6622.?7 | 0.12 | 2000.85 | 2057.93 | 1006.22 |
| 1992 | 2968.35 | 956.21 | 14402.9 | 677?.69 | 0.119 | 2173.3 | 2233.8 | 936.422 |
| 1993 | 3229.32 | 1323.04 | 15269.7 | 6862.63 | 0.117 | 2359.76 | 2423.9 | 866.758 |
| 1994 | 3488.02 | 1085.02 | 15981.1 | 6860.99 | 0.116 | 2577.?1 | 2644.99 | 71?.426 |
| 1995 | 37$2.45 | 1136.11 | 16517.8 | 6772.62 | 0.115 | 2807.52 | 28"79.58 | 536.719 |
| 1996 | 3997.35 | 1174.96 | 16909.7 | 6624.7 | 0.114 | 3065.31 | 3141.7 | 391.906 |
| 1997 | 4253.82 | 1233.66 | 17158.6 | 6417.1 | 0.113 | 3334.38 | 34.15.96 | 248.902 |
| 1998 | 4510.59 | 1222.37 | 17225.4 | 6151.21 | 0.112 | 3646.5 | 3732.33 | 66.789 |
| 1999 | 4766.77 | 122 f? .33 | 17091.4 | 5321.85 | 0.11 | 3980.98 | 4071.96 | -133.957 |
| 2000 | 5922.66 | 1222.23 | 16723.7 | 5434.6 | 0.109 | 4370.14 | 4466.5"8 | -367,754 |

| | EXBITES | VIABL2 | RENSRAT |
|---|---|---|---|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.242 | 0.467 | 0.047 |
| 1980 | 0.237 | 0.442 | 0.043 |
| 1981 | 0.219 | 0.438 | 0.041 |
| 1982 | 0.205 | 0.442 | 0.042 |
| 1983 | 0.215 | 0.435 | 0.048 |
| 1984 | 0.241 | 0.421 | 0.053 |
| 1985 | 0.245 | 0.411 | 0.053 |
| 1986 | 0.247 | 0.4 | 0.052 |
| 1987 | 0.244 | 0.399 | 0.053 |
| 1988 | 0.242 | 0.399 | 0.054 |
| 1989 | 9.241 | 0.401 | 0.056 |
| 1990 | 0.244 | 0.402 | 0.059 |
| 1991 | 0.241 | 0.408 | 0.061 |
| 1992 | 0.239 | 0.415 | 0.062 |
| 1993 | 0.234 | 0.424 | 0.064 |
| 1994 | 0.231 | 0.433 | 0.066 |
| 1995 | 0.227 | 0.444 | 0.068 |
| 1996 | 0.223 | 0.455 | 0.07 |
| 1997 | 0.219 | 0.469 | 0.071 |
| 1998 | 0.215 | 0.482 | 0.074 |
| 1999 | 0.21 | 0.497 | 0.075 |
| 2000 | 0.206 | 0.513 | 0.078 |

5% NORTHERN GULF OCS DEVELOPMENT SCENARIO -
HIGH BASE CASE

(Levels and Differences from the Base Case)

| | POP | MIGNET | NINCTOT | EMG9 | EMSPP | EMG9P | EMNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 410.66 | -24.935 | 6.383 | 185.508 | 0.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.709 | -11.199 | 7.202 | 178.557 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 417.661 | 4.23 | 6.699 | 184.486 | 0.382 | 0.376 | 0.242 | 1.2 |
| 1980 | 431.495 | 7.005 | 6.J'2° | 192.187 | 0.394 | 0.363 | 0.244 | 1.2 |
| 1981 | 454.273 | 15.744 | 7.04 | 205.895 | 0.408 | 0.341 | 0.251 | 1.3 |
| 1982 | 486.141 | 24.292 | 7.595 | 224.856 | 0.423 | 0.319 | 0.258 | 1.3 |
| 1983 | 509.747 | 15.172 | 8.466 | 235.658 | 0.425 | 0.315 | 0.257 | 1.4 |
| 1984 | 520.191 | 1.538 | 8.923 | 236.585 | 0.432 | 0.321 | 0.248 | 1.4 |
| 1985 | 540.357 | 11.336 | 8.824 | 245.927 | 0.444 | 0.308 | 0.249 | 1.4 |
| 1986 | 562.731 | 11.233 | 9.152 | 255.(765 | 0.45 | 0.302 | 0.248 | 1.5 |
| 1987 | 582.34 | 12.168 | 9.45 | 264.996 | 0.458 | 0.295 | 0.247 | 1.5 |
| 1988 | 605.1 | 12.991 | 9.781 | 275.525 | 0.465 | 0.288 | 0.247 | 1.6 |
| 1989 | 623.917 | 8.69 | ?0.139' | 283.001 | 0.468 | 0.285 | 0.247 | 1.6 |
| 1990 | 639.451 | 5.224 | 10.315 | 288.328 | 0.471 | 0.282 | 0.247 | 1.7 |
| 1991 | 656.425 | 6.614 | 10.358 | 295.235 | o* 478 | 0.276 | 0.246 | 1.7 |
| 1992 | 670.49 | 3.596 | 10.471 | 309.08 | 0.481 | 0.273 | 0.245 | 1.8 |
| 1993 | 686.752 | 5.794 | 10.463 | 306.934 | 0.488 | 0.'267 : | 0.245 | 1.8 |
| 1994 | 704.358 | 7.042 | 1(3.561 | 314.864 | 0.494 | 0.262 | 0.244 | 1.8 |
| 1995 | 72?.291 | 8.219 | 10.714 | 323.607 | 0.501 | 0.256 | 0.244 | 1.9 |
| 1996 | 742.659 | 8.452 | 10.918 | 333.013 | 0.59-7 | 0.25 | 0.243 | 2. |
| 1997 | 764.683 | 10.893 | ?I .133 | 344.153 | 0.514 | 0.243 | 0.243 | 2.1 |
| 1998 | 787.251 | 11.124 | 11.449 | 355.455 | 0.52 | 0.236 | 0.243 | 2.1 |
| 1999 | 912.471 | 13.456 | 11.768 | 368.566 | 0.528 | 0.229 | 0.243 | 2.2 |
| 2000 | 837.888 | 13.245 | 12.179 | 381.508 | 0.534 | 0.223 | 0.243 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMFI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.842 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.365 | 10.296 | 21.'905 | ?. 194 | 14.27 | 11.906 | 5.739 |
| 1979 | 42.921 | 4.368 | 10.728 | 23.533 | 1.244 | 14.5'25 | 12.411 | 6.133 |
| 1980 | 42.921 | 4.692 | 11.284 | 25.552 | 1.308 | 14.813 | 12.896 | 6.654 |
| 1981 | 42.921 | 4.778 | 12.235 | 28.945 | 1.4 | 15.34 | 13.37 | 7.477 |
| 1982 | 42.921 | 4.325 | 13.397 | 33.628 | 1.509 | 16.041 | 13.843 | 8.545 |
| 1983 | 42.921 | 5.377 | 14.036 | 35.676 | 1.576 | 16.426 | 14.32 | 9.167 |
| 1984 | 42.921 | 5.801 | 14.277 | 35.751 | 1.615 | 16.459 | 14.867 | 9.426 |
| 1985 | 42.921 | 5.65 | 15.244 | 38.451 | 1.689 | 16.784 | 15.424 | 10.145 |
| 1986 | 42.921 | 5.392 | 15.704 | 40.827 | 1.747 | 17.097 | 15.937 | 10.742 |
| 1987 | 42.921 | 5.398 | 16.353 | 43.569 | 1.812 | 17.43 | 16.548 | 11.435 |
| 1988 | 42.921 | 6.005 | 17.225 | 46.277 | 1.876 | 77.7-?6 | 17.092 | 12.122 |
| 1989 | 42.921 | 7.067 | 17.549 | 48.131 | 1.919 | 18.017 | 17.737 | 12.601 |
| 1990 | 42.921 | 7.99 | 17.965 | 49.415 | 1.953 | 18.188 | 18.315 | 12.955 |
| 1991 | 42.921 | 7.76 | 18.462 | 51.649 | 2.004 | 18.406 | 18.91 | 13.532 |
| 1992 | 42.921 | 7.568 | 18.64 | "53.108 | 2.037 | 18.557 | 19.527 | 13.913 |
| 1993 | 42.921 | '7.39 | 19.099 | 55.37 | 2.086 | 18.77 | 20.163 | 14.485 |
| 1994 | 42.921 | 7.208 | 19.642 | 57.846 | 2.139 | 19.012 | 20.82 | 15.119 |
| 1995 | 42.921 | 7.037 | 20.229 | 60.66 | 2.199 | 19.282 | 21.499 | 15.845 |
| 1996 | 42.921 | 7.023 | 20.805 | 63.478 | 2.258 | 19.556 | 22.201 | 16.569' |
| 1997 | 42.921 | 7.102 | 21.505 | 66.97 | 2.328 | 19.882 | 22.926 | 17.462 |
| 1998 | 42.921 | 7.148 | 22.194 | 70.473 | 2.397 | 20.208 | 23.675 | 18.353 |
| 1999 | 42.921 | 7.149 | 22.993 | 74.61 | 2.476 | 20.579 | 24.449 | 19.405 |
| 2000 | 42.921 | 7.105 | 23.751 | 78.671 | 2.552 | 20.938 | 25.249 | 20.435 |

| | EMD9 | EMCN | EMCN? | EMGA | PI | PIRPC | RPI | EXOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924.32 | 252.71 | 010. |
| 1978 | 24.771 | 11.436 | 11.309 | 25.941 | 4237.42 | 3"724.25 | 279.75 | 944. |
| 1979 | 26.247 | 12.129 | 11.912 | 26.421 | 4707. | 3845.76 | 293.049 | 1019. |
| 1980 | 28.19 | 13.203 | 12.84 | 26.81 | 5301.84 | 3994.15 | 307.633 | 1114.32 |
| 1981 | 31.163 | 16.822 | 14.074 | 27.297 | 6380.53 | 4318.76 | 325.232 | 1232.22 |
| 1982 | 34.9319 | 22.515 | 15.801 | 28.712 | 7939.13 | 4725.5 | 345.607 | 1427.79 |
| 1983 | 37.157 | 23.024 | 17.024 | 31.37 | 8932.54 | 4824.14 | 363.253 | 1698.96 |
| 1984 | 38.171 | 20.065 | 17.803 | 32.962 | 9218.75 | 46'30.48 | 377.827' | 1902.13 |
| 1985 | 40.71 | 21.886 | 19.242 | 32,75 | 1336"?,6 | 4839.89 | 396.434 | 2021.75 |
| 1986 | 42.783 | 23.27 | 20.532 | 34.211 | 11554.4 | 495$]*54 | 415.572 | 2279.21 |
| 1987 | 45.176 | 24.621 | 21.63 | 35.238 | 12919.7 | 5088.48 | 436.01 | 2540.91 |
| 1988 | 47.531 | 25.653 | 22*828 | 36.4 | 14413. | 5207.65 | 457.398 | 2854.31 |
| 1989 | 49.168 | 25.545 | 23.698 | 37.677 | 15659.3 | 5'245.99 | 478.435 | 3106.37 |
| 1990 | 50.397 | 25.128 | 24.383 | 38.359 | 16784.6 | 5255.31 | 499.423 | 3490.25 |
| 1991 | 52.335 | 25.966 | 25.215 | 38.52 | 18314.9 | 5.346.07 | 521.904 | 3772.17 |
| 1992 | 53.622 | 26.162 | 25.047 | 39.146 | 19673.2 | 5388.71 | 544.503 | 4108.25 |
| 1993 | 55.537 | 27.041 | 26.737 | 39.152 | 21421.4 | 5483.3 | 568.865 | 4419.69 |
| 1994 | 57.649 | 28.007 | 27.782 | 39.467 | 23441.6 | 5595.18 | 594.817 | 4789.73 |
| 1995 | 60.061 | 29.16 | 28.981 | 39.836 | 25688. | 5797.92 | 622.32 | 5199.23 |
| 1996 | 62.451 | 33.273 | 30.184 | 40.269 | 28174.7 | 5826.64 | 651.114 | 5642.81 |
| 1997 | 65.376 | 31.754 | 31.7 | 40.577 | 31126.4 | 5967.6 | 682.106" | 6119.54 |
| 1998 | 68.278 | 33.3 | 33.245 | 41.123 | 34381.1 | 6113.12 | 713.414 | 6666.31 |
| 1999 | 71.677 | 35.178 | 35.122 | 41.583 | 38164. | 6272.01 | 748.937 | 7260.07 |
| 2000 | 74.987 | 37.041 | 36.983 | 42.26 | 42275, | 6428.27 | 784.892 | 7937.83 |

| | EXCAP | E99S | E99SPPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 277.326 | 1160.82 | 1116.56 | 796.27 | 197.201 | 214.391 | 278.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.37 | 1053.P4 | 471.4 | 206.933 | 240.288 | 617.245 |
| 1979 | 290. | 1414.71 | 11'55.86 | 1439.75 | 860.7 | 273.822 | 222.013 | 813.799 |
| 1980 | 329.271 | 1558.6 | 1174.16 | 1620. | 996.3 | 310.38 | 227.772 | 1055.05 |
| 1981 | 367.356 | 1723.39 | 1165.47 | 1982.8 | 1279.41 | 352.193 | 259.429 | 1512.33 |
| 1982 | 444.658 | 2011.3 | 1197.1 | 2328.74 | 1475.74 | 436.99 | 336.403 | 2071.52 |
| 1983 | 523.594 | 2375.68 | 1282.99 | 2663.09 | 1642.7 | 550.913 | 426.673 | 2654.9 |
| 1984 | 580.82 | 2652.99 | 1349.83 | 3271.59 | 2121.71 | 679..316 | 431.991 | 3572.66 |
| 1985 | 694.158 | 2904.1 | 1255.69 | 372'5,62 | 2422.22 | 743.449 | 527.161 | 4734.48 |
| 1986 | ,834.413 | 3324,98 | 1426.88 | 3351.56 | 2432.18 | 827.266 | 614.294 | 5784.29 |
| 1987 | 879.174 | 3664.62 | 1443.3 | 4221.02, | 2483.62 | 899,559 | 707.62 | 6824.99 |
| 1988 | 951.94 | 4070.68 | 1470.77 | 4500.99 | 2527.54 | 996.437 | 817.102 | 7808.97 |
| 1989 | 1007.56 | 44?0.24 | 1504.25 | 4834.6 | 2623.32 | 1093.04 | 932.36 | 8767.47 |
| 1990 | 1061.13 | 4877.2'3 | 1527,22 | 4987.66 | 2553.11 | 1171.12 | 1034.11 | 9562.34 |
| 1991 | 1074.1 | 5206.08 | 1519.62 | 5161.2 | 2597.46 | 1242.04 | 1140.34 | 10256.3 |
| 1992 | 1114.03 | 5617. | 1538.55 | 5427.12 | 2536.49 | 1347. | 1271.58 | 10867.4 |
| 1993 | 1148.19 | 5993.24 | 1534.1 | 5697.41 | 2571.11 | 1456.98 | 14(?3. | 11429. |
| 1994 | 1204.15 | 6451.7 | 1539.92 | 5942.82 | 2544.81 | 1578.4? | 1569.69, | 11857.6 |
| 1995 | 1250.15 | 6944.72 | 1542.86 | 6?91.?6 | 2498.88 | 7?17.27 | 1764.86 | 12125.9 |
| 1996 | 1300.76 | 7479.36 | 1546.7 | 6507.13 | 2497.39 | 1890.99 | 1989.86 | 12266.8 |
| 1997 | 1367.77 | 8061.7 | 1545.59 | 6858.41 | 2501.45 | 2090.04 | 2248.34 | 12250.4 |
| 1998 | 1453.52 | 8737.83 | 1553.6 | 7246.43 | 2494.58 | 2328.3 | 2559.35 | 12086..7 |
| 1999 | 7575.07 | 9489.05 | 1559.44 | 7671.37 | 2484.74 | 2608.46 | 2915.25 | 11723.3 |
| 2000 | 1713.66 | 10343.4 | 1572,78 | 8152.32 | 2473.12 | 2935.58 | 3337.0s | 11141.6 |

|      | PFBAL   | RINS    | FUND    | FUND77  | EXBITEL | E99L    | E99L    | SIMP     |
|------|---------|---------|---------|---------|---------|---------|---------|----------|
| 1977 | 2.4     | 35.343  | 670.6   | 671.369 | 0.131   | 531.912 | 557.16  | -1.37.452 |
| 1978 | 48.975  | 46.954  | 666.22  | 602.515 | . 0.134 | 568.533 | 595.272 | -4.38    |
| 1979 | 153.275 | 46.88   | 967.064 | 834.901 | 0.132   | 622.501 | 650.949 | 300.844  |
| 1980 | 275.    | 68.461  | 1330.05 | 1093.85 | 0.135   | 714*74  | 744.811 | 362.987  |
| 1981 | 411.475 | 94.479  | 1923.9  | 1496.54 | 0.125   | 796.607 | 828.482 | 593.751  |
| 1982 | 563.425 | 136.724 | 2634.95 | 1928.9  | 0.114   | 908.592 | 942.29  | 711.145  |
| 1983 | 731.699 | 187.263 | 3386.6  | 2358.72 | 0.117   | 1943.25 | 1075.06 | 751.656  |
| 1984 | 948.649 | 240.721 | 4521.31 | 3027.56 | 0.126   | 1159.62 | ?197.58 | '1134.71 |
| 1985 | 1187.55 | 321.235 | 5922.'33| 3779.37 | 0.122   | 1263.45 | 1303.69 | 1400.72  |
| 1986 | 1437.35 | 420.48  | 7221.64 | 4396.53 | 0.122   | 14(37.03| 1449.68 | 1299.61  |
| 1987 | 1684.2  | 512.701 | 8509.19 | 4937.55 | 0.119   | 1541.75 | 1586.96 | 1287.55  |
| 1988 | 1935.9  | 604.064 | 9744.77 | 5390.11 | 0.118   | 1698.21 | 1746.14 | 1235.52  |
| 1989 | 2199.32 | 691.813 | 10966.9 | 5799.32 | 0.119   | 1864.43 | 1915.24 | 1222.03  |
| 1990 | 2458.6  | 778.672 | 12?2?.9 | 6089.62 | 0.12    | 2914.33 | 2068.99 | 1054.15  |
| 1991 | 2711.47 | 853.759 | 12967.8 | 6286.3  | 0.118   | 2160.01 | 2217.09 | 946.812  |
| 1992 | 2968.35 | 921.3   | 13935.8 | 6428.71 | 0.119   | 2338.85 | 2399.36 | 868.023  |
| 1993 | 3229.32 | 983.346 | 14658.3 | 6519.21 | 0.117   | 2522.57 | 2566.81 | 822.523  |
| 1994 | 3488.02 | 1042.23 | 15345.6 | 6527.11 | 0.115   | 2702.98 | 2-?70.97| 687.297  |
| 1995 | 3742.45 | 1091.63 | 15868.4 | 6451.17 | 0.114   | 2929.73 | 3001.8  | 522.75   |
| 1996 | 3997.35 | 1129.5  | 16258.1 | 6317.34 | 0.113   | 3187.67 | 3264.06 | 389.789  |
| 1997 | 4253.82 | 1158.06 | ?6514.2 | 6125.29 | 0.111   | 3463.92 | 3544.89,| 256.078  |
| 1998 | 451?.59 | 1177.26 | 16597.3 | 5877.7  | 0.11    | 3789.22 | 3875.05 | 83.055   |
| 1999 | 4766.77 | 1184.36 | 16490.1 | 5570.55 | 0.108   | 4139.03 | 4230.01 | -107.172 |
| 2000 | 5022.66 | 1178.14 | 16164.3 | 5210.35 | 0.107   | 4533.98 | 4640.42 | -325.805 |

|      | EXBITES | VIABL2  | RENSPAT |
|------|---------|---------|---------|
| 1977 | f?.229  | 0.604   | 0.068   |
| 1978 | 9.25    | 0.506   | 0.057   |
| 1979 | 0.242   | 0.467   | 0.047   |
| 1980 | 0.237   | 0.442   | 0.043   |
| 1981 | 0.218   | 0.439   | 0.041   |
| 1982 | 0.204   | 0.443   | 0.042   |
| 1983 | 0.214   | 0.436   | 0.048   |
| 1984 | 0.232   | 0.425   | 0.052   |
| 1985 | 0.224   | 0.422   | 0.051   |
| 1986 | 0.23    | 0.414   | 0.053   |
| 1987 | 0.227   | 0.417   | 0.055   |
| 1988 | 0.227   | 0.419   | 0.057   |
| 1989 | 0.231   | 0.421   | 0.06    |
| 1990 | 0.234   | 0.421   | 0.062   |
| 1991 | 9.23    | 0.427   | 0.062   |
| 1992 | 0.232   | 0.432   | 0.065   |
| 1993 | 0.228   | 0.44    | 0.065   |
| 1994 | 0.224   | 0.448   | 0.067   |
| 1995 | ?).221  | 0.459   | 0.069   |
| 1996 | 0.217   | 0.471   | 0.071   |
| 1997 | 0.212   | 0.485   | 0.072   |
| 1998 | 0.208   | 0.459   | o*074   |
| 1999 | 0.204   | 0.515   | 0.076   |
| 2000 | 0.201   | 0.531   | 0.079   |

| | PⵁP | MIGNΣT | NINCTOⵁ | EM99 | EMA9 | EMGP | EMP9 | EⵁT9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | O. | o. | 0. | 'G. | 0. | 0. | o |
| 1978 | ɔ. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | O. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | ⌐. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.74 | 0.74 | 0. | 0.547 | 0. | o. | 0.166 | 0.11 |
| 1982 | 1.681 | 0.913 | 0.03 | 1.18 | 0. | 0. | 0.266 | 0.204 |
| 1983 | 2.563 | 0.818 | 0.065 | 1.709 | 0. | 0. | 0.34 | 0.271 |
| 1984 | 8.031 | 5.375 | 0.095 | 5.585 | 0. | 0. | 0.418 | 0.572 |
| 1985 | 20.886 | 12.555 | 0..399 | 14.367 | o. | 0. | 0.391 | 1.335 |
| 1986 | 29.594 | 7.928 | 0.8 | 18.959 | 0. | 0. | 0.32 | 1.475 |
| 1987 | 35.852 | 5.197 | 1.074 | 21.436 | 0. | 0. | 0.399 | 1.616 |
| 1988 | 4ɔ.446 | 3.360 | 1.234 | 22.635 | 0. | 0. | 0.798 | 1.909 |
| 1989 | 40.187 | -1.571 | 1.317 | 20.386 | 0 | 0. | 1.539 | 1.624 |
| 1990 | 39.166 | -2.22 | 1.197 | 18.115 | 0. | 0. | 2.3 | 1.575 |
| 1991 | 40.121 | -0.111 | 1.063 | 17.725 | 0. | 0. | 2.461 | 1.573 |
| 1992 | 37.771 | -3.37 | 1.021 | 15.006 | 0. | 0. | 2.279 | 1.263 |
| 1993 | 35.532 | -3.09 | ɔ.845 | 12.744 | 0. | 0. | 2.248 | 1.121 |
| 1994 | 34.523 | -1.7 1 | 0.696 | 11.664 | 0. | 0. | 2.154 | 1.094 |
| 1995 | 33.914 | -1.222 | ɔ.61 | 11.001 | ɔ. | 0. | 2.014 | 1 . 0 6 2 |
| 1996 | 33.998 | -0.466 | 0.549 | 10.927 | o. | 0. | 2.044 | 1.057 |
| 1997 | 34.743 | 0.22 | 0.524 | 11.364 | 0. | 0. | 2.144 | 1.078 |
| 1998 | 35.576 | 0.303 | ɔ.53 | 11.849 | 0. | 0. | 2.194 | 1.1 |
| 1999 | 36.328 | 0.21 | 0.542 | 12.246 | 0 | 0 | 2.194 | 1.117 |
| 2000 | 36.771 | -0.109 | 0.551 | 12.403 | o. | 0. | 2.156 | 1.11 |

| | EMS9 | EMPU | EMOT | EMM9 | EMFI | EMD9 | EMCM | EMCN |
|---|---|---|---|---|---|---|---|---|
| 1977 | ⌐. | o. | 0. | 0, | 0. | 0. | 0. | 0. |
| 1978 | o. | 0. | o. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | G. | 0. | 0. " | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | o. | 0. |
| 1981 | 0.106 | 0.003 | 0.021 | 0. | 0.028 | 0.7 | 0.002 | 0.043 |
| 1982 | 0.239 | 0.007 | 0.043 | 0. | 0.062 | 0.221 | 0.003 | 0.104 |
| 1983 | ?. 349 | ɔ.009 | 0.06 | 0. | 0.09 | 0.319 | 0.005 | 0.154 |
| 1984 | 1.404 | 0.038 | 0.198 | 0. | 0.362 | 1.283 | 0.021 | 1.312 |
| 1985 | 3.733 | 0.098 | 9.5'-)3 | 0. | ɔ.964 | 3.395 | 0.054 | 3.561 |
| 1986 | 4.763 | (3.122 | 0.655 | 0. | 1.227 | 4.296 | 0.07 | 4.154 |
| 1987 | 5.367 | 0.134 | 0.727 | 0.085 | 1.38 | 4.795 | 0.078 | 4.4 |
| 1988 | 5.599 | ?. 136 | ɔ.753 | ɔ.085 | 1.437 | 4.955 | 0.081 | 4.185 |
| 1989 | 4.836 | 0.115 | 0.667 | 0.17 | 1.24 | 4.25 | 0.068 | 3.04 |
| 1990 | 4,157 | 0.097 | 0.586 | 0.17 | 1.066 | 3.637 | 0.057 | 2.201 |
| 1991 | 4.169 | 0.095 | 0.566 | 0..17 | 1.068 | 3.622 | 0.057 | 2.243 |
| 1992 | 3.44 | 0.077 | 0.474 | 0.17 | 0.881 | 2.972 | 0.047 | 1.68 |
| 1993 | 2.911 | ɔ.064 | 0.397 | 0.17 | ɔ.744 | 2.498 | 0.039 | 1.306 |
| 1994 | 2.713 | 0.058 | 0.358 | 0.17 | 0.693 | 2.312 | 0.036 | 1.226 |
| 1995 | 2.602 | '0.055 | 0.33 3 | 0.17 | 0.664 | 2.2 | 0.034 | 1.195 |
| 1996 | 2.622 | (7, '354 | ɔ.325 | 0.17 | ɔ.668 | 2.202 | 0.034 | 1.2-15 |
| 1997 | 2.771 | 0.056 | 0.333 | 0.17 | 0.705 | 2.309 | 0.036 | 1.292 |
| 1998 | 2.929 | 0.057 | 0.341 | 0.17 | 0.745 | 2.423 | 0.03? | 1.373 |
| 1999 | 3.075 | 0.059 | 0.346 | 0.17 | 0.781 | 2.522 | 0.039 | 1.445 |
| 2000 | 3.157 | 0.059 | 0.345 | 0.17 | 0.8 | 2.568 | 0.039 | 1.487 |

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| | E MCN1 | EMGA | PI | PIRPC | RPI | EXOPS | EXCAP | E99S |
|------|--------|------|-----|-------|-----|-------|-------|------|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | ⁿ. | 0. | 0. | 0. | o*. | 0. | 0. | 0. |
| 1979 | 0. | e* | o. | 0. | o. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | ). | 0. | 0. | 0. |
| 1981 | 0.043 | -0.031 | 27.094 | 8.375 | 0.223 | o. | 0. | o. |
| 1982 | 0.104 | 0.032 | 65.504 | 16.293 | 0.472 | 4.319 | 1.524 | 5.844 |
| 1983 | 2.154 | 0.113 | 120.598 | 21.23 | 0.681 | 10.")19 | 2.855 | 12.917 |
| 1984 | 0.547 | -0.022 | 404.27 | 108.273 | 2.232 | 15.411 | 3.725 | 19.259 |
| 1985 | 1.46 | 0.332 | 1122.84 | 283.16 | 5.877 | 61.179 | 18.288 | .79.692 |
| 1986 | 1.946 | 1.$377 | 1512.32 | 320.824 | 7.996 | 168.744 | 43.591 | 213.072 |
| 1987 | 2.178 | 2.454 | 1795.1 | 320.746 | 9.04 | 226.989, | 35.302 | 264.237 |
| 1988 | 2.297 | 2.698 | 197"7.46 | 289.102 | 9.631 | 264.97 | 34.362 | 302.215 |
| 1989 | 2.042 | 2.837 | 1801.94 | 191.273 | 8.783 | 286.105 | 34.495 | 324.371 |
| 1990 | 1.757 | 2.27 | 1629.17 | 118.598 | 7.962 | 251.787 | 19.855 | 276.305 |
| 1991 | 1.794 | 1.701 | 1778.07 | .103.277 | 7.937 | 218.157 | 29.124 | 252.406 |
| 1992 | 1.541 | 1.723 | 1480.87 | 40.684 | 6.867 | 219.669 | 39.007" | 264.559 |
| 1993 | 1.306 | 1.247 | 1313.68 | -1.773 | 5.928 | 173.609 | 28.588 | 209.121 |
| 1994 | 1.226 | 0.85 | 1203.82 | -18.191 | 5.514 | 134.262 | 30.479 | 172.414 |
| 1995 | 1.195 | 0.673 | 1288.7 | -29.012 | 5.277 | 116.07 | 37.919 | 162.484 |
| 1996 | 1.215 | 0.535 | 1364.43 | -31●773 | 5.326 | "103.52 | 43.365 | 156.422 |
| 1997 | 1.292 | 0.47 | 1515.2 | -29.032 | 5.613 | 102.27 | 50.668 | 163.68 |
| 1998 | 1.373 | 0.479 | 16 S6.78 | -26.211 | 5.933 | 111.258 | 57.917 | 181.336 |
| 1999 | 1.445 | 0.499 | 1862.43 | -25.293 | 6.197 | 121.918 | 63.255 | 198.961 |
| 2000 | 1.487 | 0.511 | 2014.2 | -26.918 | 6.347 | 730.312 | 68.462 | 214.344 |

| | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL | PFBAL | RINS |
|------|---------|-------|------|------|------|-------|-------|------|
| 1977 | 0. | o. | 0. | 0. | o. | 0. | 0. | 0. |
| 1978 | 0• | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | o. | 0. | o* | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | o* | o. | 0. | 0. | 0. |
| 1981 | -2.704 | 0.819 | 0. | 0.434 | 0.434 | 0.81 | o. | o. |
| 1982 | -2.303 | 3.335 | o. | 1.937 | 2.37 | -0.514 | 0. | 0.057 |
| 1983 | -1.[382 | 6.382 | 0. | 3.931 | 4.986 | -4.555. | 0. | -0.036 |
| 1984 | -19.302 | 16.507 | 0. | 10.514 | 12.171 | -3.805. | 0. | -3.319 |
| 1985 | -36.448 | 53.502 | o. | 34.459 | 41.225 | -14.48 | 0. | -0.266 |
| 1986 | -12.277 | 106.441 | 0.5 | 69.401 | 88.519 | -00.637 | 0. | -1.014 |
| 1987 | -14.007 | 135.484 | 0.51 | 91.658 | 117.829 | -163.953 | 0. | -5.645 |
| 1988 | -19.72 | 157.633 | 1.13 | 109.177 | 140.811 | -253.719 | 0. | -11.477 |
| 1989 | -15.397 | 163.461 | 1.54 | 116.423 | 151.973 | -366.059 | 0. | -18.11 |
| 1990 | -32.342 | 161.824 | 17.81 | 108.105 | 141.261 | -439.309 | 0. | -25.68 |
| 1991 | -44.24 | 152.031 | 17.91 | 103.912 | 134.572 | -498.715 | 0. | -33.751 |
| 1992 | -.34.897 | 151.023 | 17.97 | 105.6.38 | 138.268 | -567.113 | o* | -34.91 |
| 1993 | -43.698 | 130.516 | 17.98 | 94.28 | 123.136 | -611.348 | 0. | -39.698 |
| 1994 | -50.839 | 118.805 | 17.93 | 88.135 | 114.216 | -635.457 | 0 | -42..794 |
| 1995 | -51.546 | 118.703 | 17.84 | 89.266 | 115.177 | -649.426 | o. | -44.482 |
| 1996 | -53.393 | 124.23 | 17.66 | 94.032 | 120.483 | -651.543 | 0. | -45.46 |
| 1997 | -53.855 | 138.199 | 17.42 | 104.333 | 122.743 | -644.367 | 0. | -45.608 |
| 1998 | -53.107 | 160.953 | 17.87 | 120.21 | 152.224 | -628.102 | 0. | -45.106 |
| 1999 | -52.097 | 185.648 | 16.7 | 138.377 | 174.554 | -601.316 | 0. | -43.967 |
| 2000 | -51.234 | 213.133 | 16.19 | 157.832 | 198.463 | -559.367 | 0. | -42.092 |

|      | FUND | FUND77 | R99L | E99L |
|------|------|--------|------|------|
| 1977 | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. |
| 1981 | 0.81 | -0.397 | 0.038 | 0.038 |
| 1982 | -0.514 | -3.015 | 2.783 | 2.783 |
| 1983 | -4.555 | -7.61 | 6.544 | 6.544 |
| 1984 | -3.805 | -20.554 | 10.266 | 10.266 |
| 1985 | -14.48 | -66.254 | 41.108 | 41.108 |
| 1986 | -80.037 | -135.187 | 112.792 | 112.792 |
| 1987 | -163.053 | -201.691 | 151.226 | 151.226 |
| 1988 | -258.719 | -262.121 | 178.207 | 178.207 |
| 1989 | -366.859 | -306.078 | 194.581 | 194.581 |
| 1990 | -439.309 | -324.805 | 176.747 | 176.747 |
| 1991 | -498.715 | -342.578 | 159.162 | 159.162 |
| 1992 | -567.113 | -348.99 | 165.555 | 165.555 |
| 1993 | -611.348 | -343.414 | 142.916 | 142.916 |
| 1994 | -635.457 | -333.887 | 125.978 | 125.978 |
| 1995 | -649.426 | -321.449 | 122.217 | 122.217 |
| 1996 | -651.543 | -307.359 | 122.363 | 122.363 |
| 1997 | -644.367 | -291.812 | 128.932 | 128.932 |
| 1998 | -628.102 | -273.516 | 142.722 | 142.722 |
| 1999 | -601.316 | -251.301 | 158.048 | 158.051 |
| 2000 | -559.367 | -224.25 | 173.844 | 173.844 |

LOW BASE CASE

| | POP | MIGNET | KINCTOT | EM99 | EMSPP | EMG9P | EMMSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 419.66 | -24.935 | 6.383 | 185.508 | 0.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.709 | -11.192 | 7.202 | 178.557 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 417.661 | 4.23 | 6.699 | 104.496 | 0.382 | 0.376 | 0.242 | 1.2 |
| 1980 | 431.495 | 7.005 | 6.829 | 192.187 | 0.394 | 0.363 | 0.244 | 1.2 |
| 1981 | 451.557 | 13.127 | 7.24 | 203.886 | 0.406 | 0.345 | 3.24'1 | 1.3 |
| 1982 | 482.344 | 23.31/3 | 7.485 | 222.33 | 0.421 | 0.321 | 0.258 | 1.3 |
| 1983 | 498.942 | 8.306 | 8.324 | 228.242 | 0.423 | 0.325 | 0.252 | 1.4 |
| 1984 | 497.291 | -10.153 | 8.528 | 221.$7? | 0.42 | 0.341 | 0.24 | 1.4 |
| 1985 | 504.71 | -0.564 | 7.959 | 222.88 | 0.426 | 0.333 | 0.241 | 1.4 |
| 1986 | 518.422 | 5.852 | 7.852 | 229.756 | 0.433 | 0.324 | 0.243 | 1.5 |
| 1987 | 534.266 | 7.847 | 7.998 | 238.04 | 0.441 | 0.316 | 0..242 | 1.5 |
| 1988 | 551.407 | 8.93 | 8.215 | 246.998 | 0.448 | 0.309 | 0.242 | 1.6 |
| 1989 | 569.207 | 9.33"1 | 8.474 | 256.188 | 0.456 | 0.303 | 0.242 | 1.6 |
| 1990 | 585.921 | 7.973 | 8.746 | 264.313 | 0.461 | 0.298 | 0.241 | 1.7 |
| 1991 | 601.605 | 6.727 | 8.961 | 271.644 | 0.468 | 0.293 | 9.239 | 1.7 |
| 1992 | 617.354 | 6.624 | 9.126 | 278.97 | 0.474 | 0.287 | 0.239 | 1.8 |
| 1993 | 635.153 | 8.509 | 9.29 | 287.806 | 0.482 | 0.28 | 0.238 | 1.8 |
| 1994 | 653.018 | 8.337 | 9.531 | 296.515 | 0.489 | 0.274 | 0.238 | 1.8 |
| 1995 | 671.975 | 9.199 | 9.761 | 305.943 | 0.4'36 | 0.267 | 0.237 | 1.9 |
| 1996 | 691.018 | 9.023 | 10.023 | 315.281 | 0.502 | 0.261 | 0.237 | 2. |
| 1997 | 712.023 | 10.734 | 10.274 | 325.984 | 0.509 | 0.253 | 0.237 | 2.1 |
| 1998 | 733.658 | 11.048 | 10.591 | 336.919 | 0.516 | 0.247 | 0.237 | 2.1 |
| 1999 | 757.817 | 13.251 | 10.912 | 349.551 | 0.524 | 0.239 | 0.237 | 2.2 |
| 2000 | 782.438 | 13..313 | 11.316 | 362.225 | 0.53 | 0.233 | 3.237 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMPI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.842 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.365 | 10.296 | 21.905 | 1.194 | 14.27 | 11:906 | 5.739 |
| 1979 | 42.921 | 4.368 | 10.728 | 23.533 | 1.244' | 14.509 | 12.411 | 6.133 |
| 1980 | 42.921 | 4.6'32 | 11.284 | 25.552 | 1.302 | 14.813 | 12.896 | 6.654 |
| 1981 | 42.921 | 4.336 | 12.033 | 28.495 | 1.387 | 15.264 | 73.37 | 7.36 |
| 1982 | 42.921 | 4.13 | 13.113 | 33.073 | 1.493 | 15.949 | 13.843 | 8.402 |
| 1983 | 42.921 | 3.736 | 13.436 | 33.992 | 1.53 | 16.163 | 14.32 | 8.735 |
| 1984 | 42.921 | 3.835 | 13.133 | 32.057 | 1.514 | 15.904 | 14.867 | 8.471 |
| 1985 | 42.921 | 3.753 | 13.449 | 32.866 | 1.54 | 15.969 | 15.364 | 8.702 |
| 1986 | 42.921 | 3.725 | 13.911 | 34.749 | 1.59 | 16.217 | 15.877 | 9.181 |
| 1987 | 42.921 | 3.835 | 14.452 | 36.969 | 1.649 | 16.51 | 16.403 | 9.753 |
| 1988 | 47..921 | 3.975 | 15.008 | 39.304 | 1.708 | 16.821 | 16.947 | 10.352 |
| 1989 | 42.921 | 4.151 | 15.59 | 41.786 | 1.771 | 17.135 | 17.5(37 | 10.992 |
| 1990 | 42.921 | 4.36 | 16.091 | 43.918 | 1.825 | 17.407 | 18.085 | 11.555 |
| 1991 | 42.921 | 3.068 | 16.589 | 46.119 | 1.877 | 17.649 | 18.68 | 12.121 |
| 1992 | 42.921 | 3.856 | 17.068 | 48.255 | 1.928 | 17.387 | 19.297 | 12.674 |
| 1993 | 42.921 | 3.809 | 17.653 | 50.933 | 1.989' | 1/3.171 | 19.933 | 13.357 |
| 1994 | 42.921 | 3.733 | 18.209 | 53.514 | 2.046 | 18.446 | 20.59 | 14.019 |
| 1995 | 42.921 | 3.661 | 18.823 | 56.396 | 2.109 | 18.739 | 21.269 | 14.761 |
| 1996 | 42.521 | 3.619 | 19.41 | 59.211 | 2.17 | 19.025 | 21.971 | 15.483 |
| 1997 | 42.921 | 3.6 | 20.092 | 62.538 | 2.239 | 19.347 | 22.696 | 16.333 |
| 1998 | 42.921 | 3.598 | 20.766 | 65.888 | 2.307 | 19.671 | 23.445 | 17.187 |
| 1999 | 42.921 | 3.545 | 21.545 | 69.834 | 2.385 | 20.038 | 24.219 | 18.192 |
| 2000 | 42.921 | 3.593 | 22.306 | 73.76 | 2.46 | 20.4 | 25.119 | 19.19 |

| | EMDO | EMCN | EMCN1 | EMCA | PI | PIRPC | RPI | EXOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924.32 | 252.71 | 810. |
| 1978 | 24.771 | 11.436 | 11.309 | 25.941 | 4237.42 | 3724.25 | 279.75 | 944. |
| 1979 | 26.247 | 12.129 | 11.912 | 26.421 | 4707. | 3845.78 | 293.049 | 1019. |
| 1980 | 28.18 | 13.203 | 12.94 | 26.81 | 5301.84 | 3994.15 | 307.633 | 1114.32 |
| 1981 | 30.736 | 16.434 | 13.899 | 27.412 | 6267.25 | 4278.38 | 324.412 | 1232.22 |
| 1982 | 34.427 | 22.056 | 15.555 | 28.451 | 7788.36 | 4685.88 | 344.602 | 1410.43 |
| 1983 | 35.623 | 21.793 | 16.336 | 31.314 | 8455.86 | 4703.56 | 360.317 | 1676.29 |
| 1984 | 34.777 | 16.946 | 16.307 | 32.437 | 8155.89 | 4414.17 | 371.543 | 1830.07 |
| 1985 | 35.611 | 17.19 | 16.964 | 31.323 | 8685.5 | 4448.06 | 386.886 | 1887.08 |
| 1986 | 37.31 | 18.446 | 18.038 | 31.494 | 9621. | 4582.89 | 404.95 | 2053.14 |
| 1987 | 39.328 | 19.445 | 18.987 | 32.415 | 10707.9 | 4720.6 | 424.578 | 2291.21 |
| 1988 | 41.427 | 20.531 | 20.009 | 33.492 | 11945.4 | 4866.2 | 445.187 | 2565.52 |
| 1989 | 43.652 | 21.534 | 21.051 | 34.603 | 13293.5 | 5003.09 | 466.806 | 2869.87 |
| 1990 | 45.603 | 22.166 | 21.987 | 35.729 | 14635.1 | 5109.99 | 488.814 | 3197.53 |
| 1991 | 47.547 | 22.939 | 22.759 | 36.548 | 16053.9 | 5219.21 | 511.29 | 3518.78 |
| 1992 | 49.433 | 23.703 | 23.588 | 37.14 | 17590.9 | 5328.01 | 534.801 | 3846.62 |
| 1993 | 51.749 | 24.864 | 24.682 | 37.578 | 19424.5 | 5461.91 | 559.928 | 4194.1 |
| 1994 | 53.977 | 25.943 | 25.76 | 38.232 | 21395.5 | 5590.21 | 586.104 | 4589.25 |
| 1995 | 56.462 | 27.068 | 26.957 | 38.717 | 23579.7 | 5717.76 | 613.712 | 5002.19 |
| 1996 | 58.864 | 28.21 | 28.139 | 39.247 | 25958.6 | 5847.45 | 642.437 | 5446.57 |
| 1997 | 61.675 | 29.628 | 29.574 | 39.623 | 28708.6 | 5990.23 | 673.101 | 5917.61 |
| 1998 | 64.479 | 31.148 | 31.093 | 40.173 | 31748.6 | 6137.4 | 705.102 | 6452.18 |
| 1999 | 67.753 | 32.934 | 32.878 | 40.65 | 35280.2 | 6297.34 | 739.293 | 7034.25 |
| 2000 | 70.985 | 34.729 | 34.671 | 41.325 | 39151.6 | 6456.57 | 775.004 | 7698.62 |

| | EXCAP | E99S | E99SRPC | REVGF | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.82 | 1118.56 | 796.269 | 197.2 | 214.301 | 278.522 | 668.165 |
| 1978 | 280. | 1311.13 | 1152.37 | 1053.84 | 471.4 | 206.933 | 240.288 | 617.245 |
| 1979 | 290. | 1414.71 | 1155.86 | 1439.75 | 860.7 | 273.322 | 222.013 | 813.789 |
| 1980 | 320.271 | 1558.6 | 1174.16 | 1620. | 996.3 | 310.38 | 227.772 | 1055.05 |
| 1981 | 367.356 | 1723.39 | 1176.45 | 1979.55 | 1278.41 | 350.363 | 257.599 | 1509.12 |
| 1982 | 438.358 | 1987.63 | 1195.81 | 2318.53 | 1475.74 | 430.826 | 328.462 | 2076.88 |
| 1983 | 519.389 | 2347.63 | 1305.85 | 2641.6 | 1642.7 | 545.471 | 410.847 | 2661.78 |
| 1984 | 559.485 | 2559.27 | 1385.15 | 3216.1 | 2121.71 | 644.263 | 439.283 | 3599.55 |
| 1985 | 653.029 | 2727.38 | 1396.76 | 3620.69 | 2421.88 | 676.142 | 442.097 | 4798.83 |
| 1986 | 781.256 | 3043.7 | 1449.83 | 3802.1 | 2429.91 | 730.619 | 488.959 | 5028.82 |
| 1987 | 837.412 | 3361.66 | 1481.97 | 4047.45 | 2478.65 | 785.191 | 560.005 | 7047.66 |
| 1988 | 905.241 | 3730.58 | 1519.71 | 4299.57 | 2518.62 | 862.611 | 645.08 | 8112.87 |
| 1989 | 957.021 | 4115.37 | 1548.92 | 4558.96 | 2553.89 | 942.811 | 743.085 | 9114.2 |
| 1990 | 1004.1 | 4520.31 | 1578.28 | 4667.32 | 2430.95 | 1018.65 | 851.055 | 9394.7 |
| 1991 | 1001.08 | 4870.91 | 1583.55 | 4822.41 | 2364.37 | 1092.01 | 964.129 | 10535.6 |
| 1992 | 1021.29 | 5251.84 | 1590.69 | 5082.76 | 2400.58 | 1193.17 | 1087.67 | 11107.9 |
| 1993 | 1064.81 | 5670.89 | 1594.56 | 5350.79 | 2428.14 | 1309.47 | 1227.98 | 11595.2 |
| 1994 | 1113.89 | 6145.23 | 1605.6 | 5580.47 | 2393.23 | 1428.85 | 1395.25 | 11919.5 |
| 1995 | 1149.1 | 6628.35 | 1607.27 | 5804.14 | 2341.42 | 1561.11 | 1581.18 | 12065.2 |
| 1996 | 1192.77 | 7153.8 | 1611.45 | 6083.17 | 2327.77 | 1723.84 | 1793.88 | 12049. |
| 1997 | 1254.45 | 7722.26 | 1611.28 | 6393.15 | 2323.5 | 1906.6 | 2034.21 | 11868.4 |
| 1998 | 1361.96 | 8403.72 | 1624.52 | 6742.36 | 2321.79 | 2125.88 | 2318.27 | 11476.6 |
| 1999 | 1476.21 | 9134.35 | 1630.41 | 7134.33 | 2329.04 | 2383.17 | 2644.11 | 10876.9 |
| 2000 | 1607.52 | 9965.29 | 1643.37 | 7572.25 | 2331.72 | 2684.56 | 3030.63 | 10034.1 |

|      | PFBAL | RINS | FUND | EXBITEL | | R99L | E99L | SIMP |
|------|-------|------|------|---------|------|------|------|------|
| 1977 | 2.4 | 35.343 | 670.6 | 9 | 0.131 | 531.912 | 557.16 | -137.453 |
| 1978 | 48.975 | 46.454 | 666.22 | 602.515 | 0.134 | 568.509 | 595.272 | -4.38 |
| 1979 | 153.275 | 46.88 | 967.064 | 834.901 | 0.132 | 622.581 | 653.949 | 300.844 |
| 1980 | 275. | 68.461 | 1330.05 | 1093.85 | 0.135 | 714.74 | 744.811 | 362.987 |
| 1981 | 411.475 | 94.479 | 1920.59 | 1497.82 | 0.127 | 796.469 | 828.344 | 590.54 |
| 1982 | 563.425 | 136.499 | 2640.3 | 1938.46 | 0.115 | 897.113 | 930.9 | 719.713 |
| 1983 | 731.699 | 187.638 | 3393.47 | 2382.76 | 0.122 | 1028.04 | 1063.86 | 753.171 |
| 1984 | 949.649 | 241.202 | 4548.2 | 3097.07 | 0.136 | 1122.56 | 1150.52 | 1154.73 |
| 1985 | 1187.55 | 323.117 | 5986.38 | 3914.73 | 0.133 | 1156.25 | 1196.49 | 1438.19 |
| 1986 | 1437.35 | 424.984 | 7366.17 | 4532.15 | 0.129 | 1237.76 | 1280.41 | 1379.79 |
| 1987 | 1684.2 | 522.818 | 8731.86 | 5203.19 | 0.126 | 1350.06 | 1395.26 | 1365.69 |
| 1988 | 1935.8 | 619.651 | 10048.7 | 5710.66 | 0.124 | ?483.43 | 1531.36 | 1316.82 |
| 1989 | 2192.22 | 713.086 | 11306.4 | 6127.86 | 0.122 | 1628.4 | 1679.2 | 1257.76 |
| 1990 | 2449.75 | 802.411 | 12335.5 | 6384.57 | 0.122 | 1789.27 | 1843.12 | 1029.03 |
| 1991 | 2689.6 | 875.685 | 13216.2 | 6539.71 | 0.122 | 1952.24 | 2009.32 | 880.718 |
| 1992 | 2925.5 | 938.534 | 14033.4 | 6638.84 | 0.121 | 2121.84 | 2182.34 | 817.266 |
| 1993 | 3173.85 | 996.968 | 14769.1 | 6673.31 | 0.119 | 2372.74 | 2366.88 | 735.64s |
| 1994 | 3419.25 | 1049.7 | 15338.8 | 6621.2 | 0.117 | 2513.77 | 2581.76 | 569.703 |
| 1995 | 3659.62 | 1090.81 | 15724.8 | 6482.49 | 0.116 | 2737.25 | 2809.31 | 366.955 |
| 1996 | 3899.12 | 1119.04 | 15948.1 | 6280.56 | 0.115 | 2988.63 | 3065.02 | 223.246 |
| 1997 | 4139.3 | 1135.86 | 16007.7 | 6016.84 | 0.113 | 3254.47 | 3335.45 | 59.586 |
| 1998 | 4380.25 | 1141.23 | 15856.9 | 5689.65 | 0.112 | 3561.35 | 3646.88 | -150.612 |
| 1999 | 4622.62 | 1131.88 | 15499.5 | 5304.22 | 0.11 | 3891.97 | 3982.95 | -357.34 |
| 2000 | 4866.29 | 1108.08 | 14900.4 | 4864.23 | 0.109 | 4274.44 | 4370.88 | -599.121 |

|      | EXBITES | VIABL2 | RENSRAT |
|------|---------|--------|---------|
| 1977 | 0.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.242 | 0.467 | 0.047 |
| 1980 | 0.237 | 0.442 | 0.043 |
| 1981 | 0.222 | 0.437 | 0.041 |
| 1982 | 0.205 | 0.442 | 0.042 |
| 1983 | 0.223 | 0.43 | 0.049 |
| 1984 | 0.253 | 0.414 | 0.054 |
| 1985 | 0.251 | 0.401 | 0.051 |
| 1986 | 0.252 | 0.391 | 0.051 |
| 1987 | 0.25 | 0.39 | 0.052 |
| 1988 | 0.25 | 0.389 | 0.054 |
| 1989 | 0.248 | 0.391 | 0.056 |
| 1990 | 0.249 | 0.394 | 0.058 |
| 1991 | 0.246 | 0.401 | 0.06 |
| 1992 | 0.242 | 0.409 | 0.062 |
| 1993 | 0.238 | 0.417 | 0.063 |
| 1994 | 0.234 | 0.427 | 0.065 |
| 1995 | 0.23 | 0.438 | 0.067 |
| 1996 | 0.226 | 0.45 | 0.069 |
| 1997 | 0.221 | 0.463 | 0.071 |
| 1998 | 0.217 | 0.476 | 0.073 |
| 1999 | 0.212 | 0.49 | 0.075 |
| 2000 | 0.209 | 0.506 | 0.077 |

95% NORTHERN GULF OCS DEVELOPMENT SCENARIO -
**LOW** BASE CASE

(Levels and Differences from the Base Case)

| | POP | MIGNET | NINCTOT | EM99 | EMSPP | EMG9P | EMNSP | EMA9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 410.66 | -24.935 | 6.383 | 185.508 | 0.363 | 0.378 | 0.259 | 1.1 |
| 1978 | 406.709 | -11.199 | 7.202 | 178.557 | 0.373 | 0.386 | 0.242 | 1.2 |
| 1979 | 417.661 | 4.23 | 6.699 | 184.486 | 0.382 | 0.376 | 0.242 | 1.2 |
| 1980 | 431.495 | 7.005 | 6.829 | 192.187 | 0.394 | 0.363 | 0.244 | 1.2 |
| 1981 | 452.241 | 13.712 | 7.24 | 204.393 | 0.407 | 0.344 | 0.249 | 1.3 |
| 1982 | 483.427 | 23.69 | 7.513 | 223.073 | 0.422 | 0.32 | 0.258 | 1.3 |
| 1983 | 500.077 | 8.316 | 8.365 | 228.948 | 0.423 | 0.325 | 0.252 | 1.4 |
| 1984 | 498.073 | -10.545 | 8.547 | 221.443 | 0.42 | 0.341 | 0.239 | 1.4 |
| 1985 | 505.276 | -0.802 | 7.981 | 223.064 | 0.426 | 0.333 | 0.241 | 1.4 |
| 1986 | 518.872 | 5.722 | 7.864 | 229.85 | 0.433 | 0.324 | 0.243 | 1.5 |
| 1987 | 534.66 | 7.786 | 8.004 | 238.1 | 0.441 | 0.316 | 0.242 | 1.5 |
| 1988 | 551.766 | 8.89 | 8.219 | 247.041 | 0.448 | 0.309 | 0.242 | 1.6 |
| 1989 | 569.539 | 9.302 | 8.476 | 256.222 | 0.456 | 0.303 | 0.242 | 1.6 |
| 1990 | 586.227 | 7.947 | 8.748 | 264.339 | 0.461 | 0.298 | 0.241 | 1.7 |
| 1991 | 601.891 | 6.706 | 8.961 | 271.666 | 0.468 | 0.293 | 0.239 | 1.7 |
| 1992 | 617.622 | 6.606 | 9.125 | 278.987 | 0.474 | 0.287 | 0.239 | 1.8 |
| 1993 | 635.402 | 8.492 | 9.289 | 287.82 | 0.482 | 0.28 | 0.238 | 1.8 |
| 1994 | 653.25 | 8.321 | 9.53 | 296.526 | 0.489 | 0.274 | 0.238 | 1.8 |
| 1995 | 672.192 | 9.184 | 9.759 | 305.953 | 0.496 | 0.267 | 0.237 | 1.9 |
| 1996 | 691.214 | 9.002 | 10.022 | 315.284 | 0.502 | 0.261 | 0.237 | 2. |
| 1997 | 712.212 | 10.729 | 10.272 | 325.991 | 0.509 | 0.253 | 0.237 | 2.1 |
| 1998 | 733.838 | 11.041 | 10.59 | 336.928 | 0.516 | 0.247 | 0.237 | 2.1 |
| 1999 | 757.989 | 13.244 | 10.911 | 349.56 | 0.524 | 0.239 | 0.237 | 2.2 |
| 2000 | 782.602 | 13.305 | 11.315 | 362.233 | 0.53 | 0.233 | 0.237 | 2.2 |

| | EMGF | EMP9 | EMT9 | EMS9 | EMPU | EMOT | EMM9 | EMFI |
|---|---|---|---|---|---|---|---|---|
| 1977 | 42.921 | 4.514 | 9.842 | 22.649 | 1.184 | 14.55 | 11.356 | 5.779 |
| 1978 | 42.921 | 4.365 | 10.296 | 21.905 | 1.194 | 14.27 | 11.906 | 5.739 |
| 1979 | 42.921 | 4.368 | 10.728 | 23.533 | 1.244 | 14.509 | 12.411 | 6.133 |
| 1980 | 42.921 | 4.692 | 11.284 | 25.552 | 1.308 | 14.813 | 12.896 | 6.654 |
| 1981 | 42.921 | 4.485 | 12.141 | 28.593 | 1.39 | 15.294 | 13.37 | 7.385 |
| 1982 | 42.921 | 4.279 | 13.233 | 33.221 | 1.498 | 15.976 | 13.843 | 8.441 |
| 1983 | 42.921 | 3.95 | 13.533 | 34.134 | 1.534 | 16.188 | 14.32 | 8.772 |
| 1984 | 42.921 | 3.856 | 13.168 | 32.13 | 1.516 | 15.917 | 14.867 | 8.49 |
| 1985 | 42.921 | 3.753 | 13.458 | 32.901 | 1.541 | 15.976 | 15.364 | 8.711 |
| 1986 | 42.921 | 3.725 | 13.916 | 34.767 | 1.591 | 16.22 | 15.877 | 9.186 |
| 1987 | 42.921 | 3.835 | 14.455 | 36.982 | 1.649 | 16.512 | 16.403 | 9.756 |
| 1988 | 42.921 | 3.975 | 15.011 | 39.313 | 1.709 | 16.823 | 16.947 | 10.355 |
| 1989 | 42.921 | 4.151 | 15.592 | 41.794 | 1.771 | 17.136 | 17.507 | 10.994 |
| 1990 | 42.921 | 4.36 | 16.092 | 43.924 | 1.825 | 17.408 | 18.085 | 11.557 |
| 1991 | 42.921 | 3.968 | 16.591 | 46.125 | 1.878 | 17.65 | 18.68 | 12.123 |
| 1992 | 42.921 | 3.856 | 17.069 | 48.26 | 1.928 | 17.888 | 19.297 | 12.675 |
| 1993 | 42.921 | 3.809 | 17.654 | 50.937 | 1.989 | 18.171 | 19.933 | 13.359 |
| 1994 | 42.921 | 3.733 | 18.21 | 53.518 | 2.046 | 18.446 | 20.59 | 14.02 |
| 1995 | 42.921 | 3.661 | 18.823 | 56.4 | 2.109 | 18.739 | 21.269 | 14.762 |
| 1996 | 42.921 | 3.619 | 19.411 | 59.212 | 2.17 | 19.025 | 21.971 | 15.483 |
| 1997 | 42.921 | 3.6 | 20.093 | 62.54 | 2.239 | 19.347 | 22.696 | 16.334 |
| 1998 | 42.921 | 3.598 | 20.767 | 65.891 | 2.307 | 19.671 | 23.445 | 17.188 |
| 1999 | 42.921 | 3.595 | 21.546 | 69.837 | 2.385 | 20.039 | 24.219 | 18.193 |
| 2000 | 42.921 | 3.593 | 22.307 | 73.763 | 2.46 | 20.4 | 25.019 | 19.191 |

| | ? FLi. | RIN | FUND | FUND77 | EXBITEL | R99L | _99L | SLAP |
|---|---|---|---|---|---|---|---|---|
| 1977 | 2.4 | 35.343 | 670.6 | 671.369 | 0.131 | 531.912 | 557.16 | -137.853 |
| 1978 | 48.975 | 46.954 | 666.22 | 602.515 | •0.134 | 568.509 | 595.272 | -4.38 |
| 1979 | 153.275 | 46.88 | 967.064 | 834.901 | 0.132 | 622.581 | 650.949 | 300.844 |
| 1980 | 275. | 68.461 | 133').05 | 1093.85 | 0.135 | 714.74 | 744.811 | 362.967 |
| 1981 | 41?.475 | 94.479 | 1921.34 | 1497.44 | 0.127 | 796.503 | 828.378 | 591.285 |
| 1982 | 563.425 | 136.551 | 2639.23 | 1936. | 0.115 | 899.646 | 933.433 | 717.895 |
| 1983 | 731.699 | 187.563 | .3389.26, | 2377.9 | 0.121 | 1032.1 | 1067.91 | 750.035 |
| 1984 | 948.649 | 240.907 | 4540.41 | 3090.3 | 0.137 | 1116.56 | 1154.52 | 1151.15 |
| 1985 | 1187.55 | 322.572 | 5974.8 | 3906.11 | 0.133 | 1158.42 | 1198.66 | 1434.39 |
| 1986 | 1437.35 | 424.174 | 7352.24 | 4592.7 | 0.129 | 1238.86 | 1281.51 | 1377.45 |
| 1987 | 1684.2 | 521.843 | 8715.84 | 5193. | 0.126 | 1350.117 | 1395.89 | 1363.6 |
| 1988 | 1935.8 | 618.53 | 10030.7 | 5699.88 | 0.124 | 1483.88 | 1531.8 | 1314.91 |
| 1989 | 2192.22 | 711. s31 | 11286.7 | 6116.57 | 0. ?22 | 1628.77 | 1679.57 | 1255.92 |
| 1990 | 2440.75 | 001.027 | 12.?13.9 | 6372.86 | 0.122 | 1789.6 | 1843.45 | 1027.23 |
| 1991 | 2680.6 | 874. 176 | 13192.8 | 6527.61 | 0.122 | 1952.54 | 2009.63 | 878.906 |
| 1992 | 2925.5 | 536.899 | 14002.3 | 6626.41 | 0.121 | 2122.12 | 2182.63 | 815.453 |
| 1993 | 3173.85 | 995.205 | 14742.1 | 6660.62 | 0.119 | 2303.31 | 2367.15 | 733.844 |
| 1994 | 341?.25 | 1047.82 | 15310. | 6608.29 | 0.117 | 2514..13 | 2522.02 | 567.891 |
| 1995 | 3659.62 | 1088.8 | 15694.2 | 6469.41 | 0.?16 | 2737.5 | 2805.57 | 384.211 |
| 1996 | 3399. ?2 | 1116.89 | 15915.5 | 6267.34 | 0.115 | 2988.88 | 3065.27 | 221,309 |
| 1997 | 4139.3 | 1133.58 | 15972.9 | 6093.37 | 0.113 | 3254.64 | 3335.62 | 57.363 |
| 1998 | 4389.25 | 1138.8 | 15819.7 | 5675.95 | 0.112 | 3561.31 | 3647.14 | -153. '148 |
| 1999 | 4622.62 | 1129.28 | 15459.9 | 5290.32 | 0.11 | 3892.27 | 3983.25 | -359.801 |
| 2000 | 4866.29 | 1105.31 | 14858.2 | 4850.15 | 0.109 | 4274.77 | 4371.21 | -601.707 |

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| | EXBITES | VIABL2 | RENSPAT |
|---|---|---|---|
| 1977 | 9.229 | 0.604 | 0.068 |
| 1978 | 0.25 | 0.506 | 0.057 |
| 1979 | 0.242 | 0.467 | 0.047 |
| 1980 | 0.237 | 0.442 | 0.043 |
| 1981 | ?.221 | 0.437 | 0.041 |
| 1982 | 0.205 | 0.442 | 0.042 |
| 1983 | 0.223 | 0.43 | 0.049 |
| 1984 | 0.253 | 0.414 | 0.054 |
| 1985 | 0.252 | 0.401 | 0.051 |
| 1986 | 0.252 | 0.391 | 0.051 |
| 1987 | 0.251 | 0.39 | 0.052 |
| 1988 | 0.25 | 0.389 | 0.054 |
| 1989 | 0.248 | 0.391 | 0.056 |
| 1990 | 0.249 | 0.394 | 0.058 |
| 1991 | 0.246 | 0.401 | 0.06 |
| 1992 | 0.242 | 0.409 | 0.062 |
| 1993 | 0.239 | 0.417 | 0.063 |
| 1994 | 0.234 | 0.427 | 0.065 |
| 1995 | 0.23 | 0.438 | 0.067 |
| 1996 | 0.226 | 0.45 | 0.069 |
| 1997 | 0.221 | 0.463 | 0.071 |
| 1998 | 0.217 | 0.476 | 0.073 |
| 1999 | 0.212 | 0.49 | 0.075 |
| 2000 | 0.209 | 0.506 | 0.077 |

| | POP | MIGNET | NINCTOT | EM99 | EMA9 | EMGF | EMP9 | EMT9 |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.684 | 0.685 | 0. | 0.506 | 0. | 0. | 0.149 | 0.108 |
| 1982 | 1.084 | 0.372 | 0.028 | 0.743 | 0. | 0. | 0.149 | 0.12 |
| 1983 | 1.134 | 0.01 | 0.041 | 0.706 | 0. | 0. | 0.114 | 0.097 |
| 1984 | 0.782 | -0.392 | 0.039 | 0.366 | 0. | 0. | 0.021 | 0.035 |
| 1985 | 0.566 | -0.238 | 0.022 | 0.183 | 0. | 0. | 0. | 0.009 |
| 1986 | 0.45 | -0.13 | 0.012 | 0.094 | 0. | 0. | 0. | 0.005 |
| 1987 | 0.395 | -0.062 | 0.006 | 0.06 | 0. | 0. | 0. | 0.003 |
| 1988 | 0.359 | -0.04 | 0.004 | 0.043 | 0. | 0. | 0. | 0.002 |
| 1989 | 0.332 | -0.029 | 0.002 | 0.034 | 0. | 0. | 0. | 0.002 |
| 1990 | 0.307 | -0.026 | 0.001 | 0.026 | 0. | 0. | 0. | 0.001 |
| 1991 | 0.286 | -0.02 | 0. | 0.022 | 0. | 0. | 0. | 0.001 |
| 1992 | 0.268 | -0.018 | -0. | 0.018 | 0. | 0. | 0. | 0.001 |
| 1993 | 0.25 | -0.017 | -0.001 | 0.014 | 0. | 0. | 0. | 0.001 |
| 1994 | 0.233 | -0.016 | -0.001 | 0.011 | 0. | 0. | 0. | 0.001 |
| 1995 | 0.217 | -0.015 | -0.001 | 0.009 | 0. | 0. | 0. | 0.001 |
| 1996 | 0.196 | -0.021 | -0.001 | 0.003 | 0. | 0. | 0. | 0. |
| 1997 | 0.189 | -0.005 | -0.002 | 0.007 | 0. | 0. | 0. | 0.001 |
| 1998 | 0.18 | -0.006 | -0.001 | 0.008 | 0. | | 0. | 0.001 |
| 1999 | 0.172 | -0.007 | -0.001 | 0.009 | 0. | 0. | 0. | 0.001 |
| 2000 | 0.164 | -0.008 | -0.001 | 0.009 | 0. | 0. | 0. | 0.001 |

| | EMS9 | EMPU | EMOT | EMM9 | EMFI | EMD9 | EMCM | EMCN |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | 0. | 0. | 0. | 0. | 0 | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.097 | 0.003 | 0.019 | 0. | 0.025 | 0.093 | 0.001 | 0.04 |
| 1982 | 0.149 | 0.004 | 0.027 | 0. | 0.038 | 0.138 | 0.002 | 0.066 |
| 1983 | 0.141 | 0.004 | 0.025 | 0. | 0.036 | 0.13 | 0.002 | 0.064 |
| 1984 | 0.073 | 0.002 | 0.013 | 0. | 0.019 | 0.068 | 0.001 | 0.034 |
| 1985 | 0.035 | 0.001 | 0.007 | 0. | 0.009 | 0.033 | 0.001 | 0.013 |
| 1986 | 0.018 | 0 | 0.003 | 0. | 0.005 | 0.017 | 0. | 0.002 |
| 1987 | 0.013 | 0. | 0.002 | 0. | 0.003 | 0.011 | 0. | 0.001 |
| 1988 | 0.009 | 0. | 0.001 | 0. | 0.002 | 0.009 | 0. | 0. |
| 1989 | 0.008 | 0. | 0.001 | 0. | 0.002 | 0.007 | 0. | -0. |
| 1990 | 0.006 | 0. | 0.001 | 0. | 0.002 | 0.006 | 0. | -0. |
| 1991 | 0.006 | 0. | 0.001 | 0. | 0.001 | 0.005 | 0. | 0. |
| 1992 | 0.005 | 0. | 0.001 | 0. | 0.001 | 0.004 | 0. | 0. |
| 1993 | 0.004 | 0. | 0. | 0. | 0.001 | 0.004 | 0. | 0. |
| 1994 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0. |
| 1995 | 0.003 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0. |
| 1996 | 0.001 | 0. | 0. | 0. | 0. | 0.001 | 0. | -0. |
| 1997 | 0.003 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.001 |
| 1998 | 0.003 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.002 |
| 1999 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.002 |
| 2000 | 0.004 | 0. | 0. | 0. | 0.001 | 0.003 | 0. | 0.002 |

| | ?E? | EP N | ERCN | EMGA | PI | PIRPC | ??I | XOPS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 24.819 | 16.559 | 11.189 | 27.256 | 4072.38 | 3924.32 | 252.71 | 810." |
| 1978 | 24.771 | 11.436 | 11.309 | 25.941. ● k237.42 | | 3724.25 | 279.75 | 944. |
| 1979 | 26.247 | 12.129 | 11.912 | 26.421 | 4707. | "3845.72 | 293.049 | 1019. |
| 1980 | 28.18 | 13.203 | 12.84 | 26.81 | 5301.84 | 3994.15 | 307.633 | 1114.32 |
| 1981 | 30.828 | 16.473 | '13.938 | 27.383 | 6292.12 | 02$36.13 | 324.619 | 1232.22 |
| 1982 | 34.565 | 22.122 | 15.621 | 28.5 | 7829.1 | 4695.79 | 344.899 | 1414.43 |
| 1983 | 35.753 | 21.857 | 16.4 | .31 .406 | 8496.34 | 4711.6 | 360.605 | 1682,58 |
| 1984 | 34.844 | 16.?$?1 | 16.342 | 32.536 | ?177.23 | 4416.8 | 371.719' | 1836.3 |
| 1985 | 35.643 | 17.203 | 16.977 | 31.4 | 8696.63 | 4447.58 | 386.99 | 189.2.89 |
| 1986 | 37.327 | 18.448 | 18.04 | 31.537 | 9627.34 | 4581.2 | 405.016 | 2056.95 |
| 1987 | 39.33? | 19.445 | 18.988 | 32.431 | 107.12.6 | 4718.58 | 424.631 | 2 2 9 4 . 0 2 |
| 1988 | 41.436 | 20.531 | 20.009 | 33.511 | 1?949.2 | 4864.17 | 445.234 | 2567.84 |
| 1989 | 43.65'3 | 21.534 | 21.051 | 34.617 | 13297. | 5001.02 | 466.851 | 2871.87 |
| 1990 | 45.609 | 22.166 | 21.987 | 35.739 | 14638.4 | 5107,99 | 488.857 | 3199-28 |
| 1991 | 47.551 | 22.939 | '22.759 | 36.556 | 16056.9 | 5217.3 | 511.332 | 3520.29 |
| 1992 | 49.438 | 23.703 | 23.588 | 37.145 | 17593.8 | 5326.19 | 534.843 | 3847.94 |
| 1993 | 51.752 | 24.864 | 24.682 | 37.581 | 19427.4 | 5460.17 | 559.97 | 4195.22 |
| 1994 | 53.98 | 25.943 | 25.76 | 38.234 | 21398.4 | 5588.35 | 586.146 | 4590.19 |
| 1995 | 56.465 | 27.069· | 26.958 | 38.718 | 23582.5 | 5716.21 | 613.755 | 5002.95 |
| 1996 | 58.865 | 28.21 | 28.139 | 39.247 | 2596).8 | 5845.94 | 642.477 | 5447.18 |
| 1997 | 61.677 | 29.63 | 29.576 | 39.621 | 28711.7 | 5988.9 | 673.145 | 5918.04 |
| 1998 | 64.482 | 31.15 | 31.095 | 40.172 | 31752.2 | 6136.17 | 705.149 | 6452.66 |
| 1999 | 67.756 | 32.93s | 32.87'3 | 40.648 | 35284.1 | 6296.2 | 739.342 | 7034,7? |
| 2000 | 70.988 | 34.731 | 34.673 | 41.324 | 39155.9 | 6455.52 | 775.054 | '7699.06 |

| | EXCAP | E99S | E99SRPC | REVGP | RP9S | RT98 | RENS | GFBAL |
|---|---|---|---|---|---|---|---|---|
| 1977 | 270.326 | 1160.82 | 1118.56 | 796.269 | 197.2 | 214.301 | 278.522 | 668.165 |
| 1978 | 28?. | 131?.13 | 1152.37 | 1053.84 | 471.4 | 226.933 | 240.288 | 617.245 |
| 1979 | 290. | 1414.71 | 1155.86 | 1$39.75 | 860.7 | 273.922 | 222.013 | 013.789 |
| 1980 | 329.271 | 1558.6 | 1174.16 | ·1620. | 996.3 | 310.38 | 227.772 | 1055.05 |
| 1981 | 367.3s6 | 17'23.39 | 1173.93 | 1980.3 | 1278.41 | 350.'753 | 257.996 | 1509. |
| 1982 | 439.758 | 19?.3 •03 | 1195.34 | 2321.01 | 1475.74 | 432.272 | 330.3$34 | 2075.8 |
| 1983 | 519.9.3a | 2355.51 | 1306.22 | 2644.87 | 1642.7 | 547.526 | 413.558 | 2657.56 |
| 1984 | 560.615 | 2566.71 | 1386.34 | 3218.67 | 2121.71 | 646.014 | 441.699 | 3591.76 |
| 1985 | 652.662 | 27.32.94 | 1397.66 | 3521.77 | 24.21.88 | 677.067 | 443.388 | 4787.25 |
| 1986 | 779.791 | 3046.14 | 1449.49 | 3802. 25 | 2429.91 | 731.094 | 489.635 | 5914.89 |
| 1987 | 836.263 | 3363.37 | 1481.44 | 4047.14 | 2478.65 | 785.4?1 | 560. 408 | 7031.64 |
| 1988 | 904.106 | 3731.79 | 1519.06 | 429(3.99 ' | 2518.62 | 862.922 | 645.383 | 8094.95 |
| 1989 | 955.973 | 4116.31 | 1548.13 | 455:<.2 | 2553.89 | 942.993 | 743.346 | 9094.44 |
| 1990 | 1003.13 | 4521.04 | 1577.58 | 4666.4 | 2430.95 | 1018.32 | 851.297 | 9873.15 |
| 1991 | 1000.29 | 4871.56 | 1582.88 | 4821.36 | 2364.37 | 1092.13 | 964.36 | 10512.2 |
| 1992 | 102').61 | 5252.38 | 1590.04 | 5081.57 | 2400.58 | 1193.34 | 1087.91 | 31082.8 |
| 1993 | 1064.19 | 5671.28 | 1593.92 | 5349.46· | 2428.14 | 1309.64 | 1228.21 | 11568.2 |
| 1994 | 1113.34 | 6145.49 | 1604.98 | .5579.02 | 2393.23 | 1429.01 | 1395.48 | 11890.7 |
| 1995 | 1148.69 | 6628.55 | 1606.68 | 5802.57 | 2341.42 | 1561.29 | 1581.42 | 12034.6 |
| 1996 | 1192.5 | 7153.97 | 1610.93 | 6081.43 | 2327.77 | 1724. | 1794.12 | 12016.4 |
| 1997 | 1254.65 | 7722.72 | 1610.84 | 6391.25 | 2323.5 | 1906.76 | 2034.42 | 11833.6 |
| 1998 | 1.361.21 | 8404.27 | 1624.12 | 6743.42 | 2321.,79 | 2126,12 | 2318.58 | 11439.5. |
| 1999 | 1476.48 | 9134.92 | 1630.03 | 7132.28 | 2329.04 | 2383.45 | 2644.48 | 10837.3 |
| 2000 | 1607.82 | 9965.87 | 1643.02 | 7571.07 | 2331.72 | 2684.89 | 3031.05 | 5991.92 |

| | EMCN1 | EMGA | PI | PIRPC | EPI | EXOPS | EXCAP | E99S |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | n. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1979 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0.04 | -0.029 | 24.879 | 7.75 | 0.207 | 0. | 0. | 0. |
| 1982 | 0.067 | 0.05 | 40.742 | 9.91 | 0.297 | 3.997 | 1.4 | 5.397 |
| 1983 | 0.064 | 0.091 | 40.48 | 8.039 | 0.287 | 6.29 | 1.55 | 7.879 |
| 1984 | 0.034 | 0.099 | 21.332 | 2.629 | 0.176 | 6.228 | 1.13' | 7.44 |
| 1985 | 0.013 | 0.077 | 11.129 | -0.48 | 0.104 | 5.808 | -0.365 | 5.555 |
| 1986 | 0.002 | 0.043 | 6.34 | -1.699 | 0.066 | 3.805 | -1.464 | 2.441 |
| 1987 | 0.001 | 0.026 | 4.668 | -2.016 | 0.053 | 2.807 | -1.149 | 1.714 |
| 1988 | 0. | 0.018 | 3.867 | -2.09 | 0.047 | 2.325 | -1.134 | 1.212 |
| 1989 | -0. | 0.014 | 3.496 | -2.066 | 0.044 | 2.005 | -1.048 | 0.945 |
| 1990 | -0. | 0.01 | 3.22"3 | -2. | 0.042 | 1.745 | -0.97 | 0.73 |
| 1991 | Q. | 0.007 | 3.094 | -1.906 | 0.042 | 1.509 | -0.794 | 0.648 |
| 1992 | 0. | 0.005 | 2.98 | -1.816 | 0.042 | 1.313 | -0.684 | 0.535 |
| 1993 | 0. | 0.003 | 2.887 | -1.746 | 0.042 | 1.121 | -0.62 | 0.387 |
| 1994 | 0. | 0.002 | 2.84 | -1.656 | 0.042 | 0.934 | -0.537 | 0.266 |
| 1995 | 0. | 0.001 | 2.867 | -1.551 | 0.043 | 0.758 | -0.406 | 0.203 |
| 1996 | -0.001 | -0. | 2.191 | -1.508 | 0.04 | 0.605 | -0.267 | 0.172 |
| 1997 | 0.001 | -0.002 | 3.117 | -1,"332 | 0.044 | 0.43 | 0.202 | 0.46? |
| 1998 | 0.002 | -0.002 | 3.621 | -1..23 | 0.047 | 0.477 | 0.246 | .0.555 |
| 1999 | 0.002 | -0.002 | 3.949 | -1.145 | 0.049 | 0.465 | 0.272 | 0.574 |
| 2000 | 0.002 | -0.002 | 4.32 | -1.059 | 0.05 | 0.441 | 0.295 | 0.586 |

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| | E99sRpC | REVGF | RP9S | RT98 | RENS | GPBAL | PFBAL | RINS |
|---|---|---|---|---|---|---|---|---|
| 1977 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1978 | '3. | 0. | 0. | 0. | 0. | 0. | 0. | 0, |
| 1979 | P. | 0. | 0. | 0. | 0. | c* | 0. | 0. |
| 1980 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981 | -2.52a | 0.754 | 0. | 0.397 | 0.397 | 0.745 | 0. | 0. |
| 1982 | -0.47 | 2.48 | 0. | 1.446 | 1.842 | -1.075 | 0. | 0.052 |
| 1983 | 0.369 | 3.27 | 0. | 2.055 | 2.711 | -4.212 | 0. | -0.075 |
| 1984 | 1.189 | 2.567 | 0. | 1.751 | 2.416 | -7.785 | 0. | -0.295 |
| 1985 | 0.902 | 1.086 | 0. | 0.925 | 1.291 | -11.582 | 0. | -0.545 |
| 1986 | -0.332 | 0.145 | 0. | 0.475 | 0.676 | -13.926 | 0. | -0.811 |
| 1987 | -f'.523 | -0.316 | 0. | 9.28 | 0.403 | -16.016 | 0. | -0.975 |
| 1988 | -3.656 | -0.578 | 0. | 0.211 | 0.302 | -17.926 | 0. | -1.121 |
| 1989 | -0.695 | -0.762 | 0. | 0.182 | 0.261 | -19.766 | 0. | -1.255 |
| 1990 | -0.708 | -0.918 | 0. | 0.171 | 0.243 | -21.555 | 0. | -1.384 |
| 1991 | -0.673 | -1.059 | 0. | 0.164 | 0.231 | -23..367 | 0. | -1.509 |
| 1992 | -0.653 | -1.191 | 0. | 0.164 | 0.233 | -25.18 | 0. | -1.636 |
| 1993 | -0.638 | -1.328 | 0. | 0.165 | 0.231 | -26.984 | 0. | -1.762 |
| 1994 | -0.618 | -1.457 | 0. | 9.167 | 0.233 | -28.797 | 0. | -1.889 |
| 1995 | -0.582 | -1.578 | 0. | 0.176 | 0.242 | -30.641 | 0. | -2.016 |
| 1996 | -0.518 | -1.734 | 0. | 0.167 | 0.231 | -32.570 | 0. | -2.145 |
| 1997 | -0.437 | -1.895 | 0. | 0.155 | 0.202 | -34.801 | 0. | -2.281 |
| 1998 | -0.398 | -1.941 | 0. | 0.231 | 0.311 | -37.137 | 0. | -2.436 |
| 1999 | -0.375 | -2.051 | 0. | 0.283 | 0.365 | -39.593 | 0. | -2.6 |
| 2000 | -?.354 | -2.172 | ?. | 0.329 | 0.42 | -42.134 | 0. | -2.772 |

|      | FUND    | FUND77  | R99L   | E99L    |
|------|---------|---------|--------|---------|
| 1977 | 0.      | 0.      | 0.     | 0.      |
| 1978 | 0.      | 0.      | 0.     | 0.      |
| 1979 | 0.      | 0.      | 0.     | 0.      |
| 1980 | 0.      | 0.      | 0.     | 0.      |
| 1981 | 0.745   | -0.373  | 0.035  | 3.035"  |
| 1982 | -1.075  | -2.456  | 2.533  | 2.5.33  |
| 1983 | -4.212  | -4.854  | 4.')54 | 4.054   |
| 1984 | -7.785  | -6.764  | 3.996  | 3.996   |
| 1985 | -11.582 | -8.618  | 2.17   | 2.17    |
| 1986 | -13.926 | -9.453  | ?. 103 | 1.103   |
| 1987 | -16.016 | -10.191 | 0.613  | 0.613   |
| 1988 | -17.926 | -10.785 | 1.41$5 | 0.445   |
| 1989 | -19.766 | -11.293 | 0.368  | 0.368   |
| 1990 | -27.555 | -11.711 | '1.332 | 0.3.32  |
| 1991 | -23.367 | -12.098 | 0.301  | 0.301   |
| 1992 | -25.18  | -12.434 | 0.29   | 0.29    |
| 1993 | -26.984 | -12.691 | 0.275  | 0.2"75  |
| 1994 | -28.797 | -12.906 | 0.265  | 0.265   |
| 1995 | -30.641 | -13.082 | 0.252  | 0 . 2 5 2 |
| 1996 | -32.578 | -13.223 | 0.251  | 0.251   |
| 1997 | -34.8(?1| -13.473 | 0.16q  | 0.169   |
| 1998 | -37.137 | -13.703 | 0.256  | 0.256   |
| 1999 | -39.598 | -13.$399| 0"299  | 0.299   |
| 2000 | -42.124 | -14.082 | 0.3.32 | 0.332   |

APPENDIX E

Census Division Projections

The purpose of this appendix is to describe the methodology chosen to allocate the MAP projections for the Southcentral Region to census divisions within the region. Projections of employment, population, and income for the Southcentral Region were made through the year 2000. Within the Southcentral Region, it is necessary to disaggregate the results to census divisions. The following seven census divisions are included: Matanuska-Susitna, Kenai-Cook Inlet, Seward, Valdez-Chitina-Whittier, Kodiak, Cordova-McCarthy, and Yakutat (a portion of the Skagway-Yakutat Census Division). Population, income, and employment by the five regional industrial sectors was allocated to each census division. Census division projections were made consistent with projections made by Alaska Consultants (1979).

The approach described below produces only allocations of regional projections and cannot be assumed to substitute for a detailed analysis and forecast of local economic growth. Two types of information are used to make the census division allocations: historical information on the census divisions and the regional projections made by the MAP model. Judgmental review of the historical period is used to set starting parameters for each census division. These parameters are adjusted throughout the projection period to account for changes in relationships at the regional level. This process allows the census division allocations to reflect changes in relationships such as scale effects projected by the MAP model.

The allocation of population and income to the census divisions depends upon the allocation of employment. Census division allocations of employment follow traditional economic base theory. This theory assumes the main cause of regional economic growth is the growth in the region's basic sector; growth in the basic sector is determined by factors external to the region. Employment in the nonbasic sector responds to growth in the basic sector since it serves the basic sector. Once the relation between these sectors is known and basic employment is known, nonbasic employment is determined. For this allocation process, industrial sector I (mining and exogenous construction), sector II (manufacturing and agriculture-forestry-fisheries), and sector III (government) are basic. Sector IV (construction and transportation-communications-utilities) and sector V (trade, services, and finance] are nonbasic. Employment was allocated in the following six steps:

- Adjustment for Census Division of Direct Impact. For the base case and each OCS scenario, the regional totals were adjusted by subtracting the projections made by Alaska Consultants *for* the census divisions of impact. Alaska Consultants' projections were used for Yakutat, Cordova, Seward, and Kodiak.[1]

- Allocation of Employment in Industries I and II and Federal Government. Employment in these industries was allocated to each census division exogenously. This allocation will reflect assumptions regarding particular

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[1] Kodiak is assumed to be unaffected by Northern Gulf OCS development and remains at its base case level throughout.

projects and developments such as a bottomfishery in Kodiak
or construction and operation of an LNG in Kenai. Alaska
resident OCS employment in excess of Alaska Consultants'
resident employment estimates were allocated to the other
census divisions based on the proportion of population in
the census division.

● Allocation of State and Local Government Employment.
Regional projections of government employment in the base
case were allocated to the census divisions using the shift-
share technique. Shift-share analysis assumes that the growth
rate of subregions is related to that of regions. The sub-
regional growth rate is made up of a share component equal
to the regional rate plus a shift component which describes
the subregion's comparative advantage.

The comparative advantage term for each census division was
found by examining the growth rate of government employment in
each census division over four periods: 1965-1970, 1965-1976,
1970-1976, and 1972-1976. The average annual growth rates for
government employment for each census division and the region
are shown in Table El.

After examining the differential in growth rates from Table El.
the differences shown in Table E.2 were selected for the pro-
jection period. For each census division, except Valdez, the
average differential over all periods was used. The period

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## TABLE EI.  GROWTH RATES OF STATE AND LOCAL GOVERNMENT EMPLOYMENT FOR SELECTED PERIODS

| Census Divisions | 1965-1970 | 1965-1976 | 1970-1976 | 1972-1976 |
|---|---|---|---|---|
| Kodiak | 1.089 | 1.078 | 1.098 | 1.029 |
| Kenai | 1.122 | 1.108 | 1.096 | 1.062 |
| Matanuska-Susitna | 1.061 | 1.107 | 1.147 | 1.103 |
| Seward | 1.038 | 1.053 | 1.066 | 1.100 |
| Cordova | 1.071 | 1.078 | 1.084 | 1.060 |
| Valdez | 1.070 | 1.075 | 1.079 | 1.104 |
| Southcentral Region | 1.097 | 1.085 | 1.075 | 1.052 |

SOURCE:  Alaska Department of Labor, Labor Force Estimates, various years.

## TABLE E.2.  YEARLY GOVERNMENT EMPLOYMENT GROWTH RATES FOR THE PROJECTION PERIOD

| Census Division | Growth Rate |
|---|---|
| Kodiak | R- .04 |
| Kenai | R + .02 |
| Mat-Su | R-I- .03 |
| Seward | R- .01 |
| Cordova | R |
| Valdez | R |
| Yakutat | R |

Where:  R is the Southcentral regional rate of growth from the MAP regional model.

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1972-1976 was dropped for Valdez to abstract from pipeline-induced increases. Yakutat was assumed to resemble the Cordova Census Division since separate information was not available for this area. A check against the Lynn-Canal Icy Straits labor market area which contains Yakutat shows that this is a reasonable assumption. Excess government employment was allocated to the census divisions based on the proportion of government employment in the initial allocation.

- Allocation of Nonbasic Employment. Economic base theory is operationalized through the development of nonbasic/basic multipliers which describe the relationship between the sectors. Two multipliers are developed to allocate nonbasic employment to the region, one describing Sector IV and one describing Sector V. The long-run multipliers for a change in basic employment are assumed to equal the average nonbasic-to-basic ratios found for the period 1972-1976 {except Valdez, where 1975 and 1976 were ignored because of the pipeline). Table E.3 shows the nonbasic/basic ratios used in the projection. (Yakutat is assumed to be the same as Cordova. A check against a 1976 employment survey in Yakutat conducted by Alaska Consultants showed these ratios to be similar.)

The major cause of growth in the Matanuska-Susitna Census Division (without the capital move) is assumed to be the growth of this area as a suburban community of Anchorage. Because of this assumption, nonbasic employment is assumed

| Census    Division | Multiplier for Sector IV (Construction and **Transportation-** Communications- Utilities) | Multiplier for Sector V (Trade, Services, and Finance-Insurance- Real Estate) |
|---|---|---|
| Kodiak | .18 | .35 |
| **Kenai** | .39 | .57 |
| Seward | .11 | .33 |
| Cordova | .18 | .32 |
| **Val**dez | .25 | .38 |
| **Yakutat** | .18 | .32 |

**to** grow as a function of population. Estimates of **Matanuska-Susitna** (blat-Su) Census Division nonbasic employment are based on the following approach:

1. blat-Su population is estimated as a function of Anchorage population using the following regression equation:

   **Mat-Su** Population = -9851 + .1269 x (Anchorage Population)

   $$R^2 = .986$$

   This was estimated in "The Effects of Regional Population Growth on Hunting for Selected Big Game Species in **South-**central Alaska, 1976-2000" **(ISER,** 1978).

2. Nonbasic employment **is** estimated using multipliers relating the change in population and the change in employment.  These multipliers are assumed to equal **the** average from the period 1970-1976; they were .03 for industry IV and .06 for industry V.

The extra regional nonbasic employment was allocated to
the census division based on the proportion of employment
in the census division.   This captures any scale effects
projected at the regional level since multipliers in
larger regions will change.

- Allocation of Regional Population.   Except for the Matanuska-
Susitna Census Division, population was allocated as a
function of total civilian employment. Population-to-
employment ratios were found from two sources.   For Kodiak,
Kenai, Seward, and Valdez, population/employment ratios were
found by comparing Alaska Labor Department estimates of popu-
lation and employment.   In all but Valdez, the ratios used
are the average of the 1972-1976 ratios.   For Valdez, the
1975 and 1976 ratios were not included in the average because
of the pipeline.   The population-to-employment ratios for
Cordova and Yakutat were based on estimates made by A"laska
Consultants.   Table E.4 shows these estimates.

The extra population in the region was allocated based on
the proportion of total population occurring in each census
division.   For this allocation, the population in Matanuska-
Susitna was assumed to equal that found by multiplying the
population/employment ratio by total employment.

TABLE E.4.   POPULATION-TO-EMPLOYMENT RATIOS
FOR THE PROJECTION PERIOD

| Census Division | Population-to-Employment Ratio |
|---|---|
| Kodiak | 2.3 |
| Kenai | 2.6 |
| Seward | 2.3 |
| Cordova | 2.7 |
| Valdez | 2.6 |
| Yakutat | 2.2 |

SOURCES:   Alaska Department of Labor, Labor Force Estimatesby Industry and Area and Population Estimates by Census Division.

Alaska Consultants, Inc, Cordova Comprehensive Development Plan, 1976, and Yakutat Comprehensive Development Plan, 1976.

● __Allocation of Real Disposable Personal Income.__   Real disposable personal income by place of residence was allocated to each census division by the proportion of the total population in the census division.

Tables E.5 through E.8 include the estimates of growth in each census division in the Southcentral region in five-year increments.'   These

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'Low scenario projections are provided for only the period of significant impact, 1981-1984.

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projections are consistent with the census division projections made for the communities of impact (Alaska Consultants, 1978) and the MAP projections for the Southcentral region. However, the variables will not add to the Southcentral totals.  Since a portion of the growth in the Matanuska-Susitna Census Division is assumed to be Anchorage metropolitan area growth, a portion of the Matanuska-Susitna population is assumed to be projected in the Anchorage region.

TABLE E.5. CENSUS DIVISION PROJECTIONS
NORTHERN GULF MODERATE BASE CASE

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| **Seward** | | | | | | | | | |
| EM1 EX | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 7 | 9 |
| EMRR | 223 | 224 | 204 | 245 | 290 | 352 | 508 | 543 | 568 |
| EMG9 | 404 | 412 | 420 | 428 | 437 | 446 | 492 | 543 | 600 |
| EMS4 | 93 | 95 | 117 | 100 | 103 | 106 | 131 | 141 | 161 |
| EMS5 | 433 | 438 | 443 | 455 | 469 | 484 | 562 | 734 | 955 |
| POP | 3,468 | 3,516 | 3,564 | 3,634 | 3,779 | 3,967 | 4,415 | 4,920 | 5,732 |
| DPIR | 10.2 | 11.9 | 13.1 | 12.6 | 12.7 | 13.6 | 17.4 | 21.8 | 28.7 |
| **Kodiak** | | | | | | | | | |
| EM1 EX | 2 | 2 | 4 | 5 | 6 | 7 | 9 | 9 | 9 |
| EMRR | 1,867 | 2,644 | 2,776 | 2,916 | 3,062 | 2,382 | 2,734 | 2,932 | 3,082 |
| EMG9 | 2,031 | 2,099 | 2,120 | 2,141 | 2,163 | 2,184 | 2,296 | ,2,366 | 2,414 |
| EMS4 | 495 | 533 | 588 | 643 | 733 | 778 | 863 | 959 | 1,048 |
| EMS5 | 1,302 | 1,416 | 1,540 | 1,672 | 1,801 | 1,917 | 2,306 | 2,803 | 2,998 |
| POP | 10,856 | 11,447 | 12,017 | 12,614 | 13,278 | 13,851 | 15,668 | 17,967 | 19,556 |
| DPIR | 33.8 | 38.9 | 44.1 | 43.6 | 44.6 | 47.5 | 61.9 | 79.6 | 97.9 |
| **Cordova** | | | | | | | | | |
| EM1 EX | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 5 | 8 |
| EMRR | 409 | 707 | 717 | 727 | 737 | 439 | 474 | 496 | 549 |
| EMG9 | 359 | 404 | 408 | 412 | 416 | 420 | 440 | 452 | 489 |
| EMS4 | 97 | 98 | 100 | 101 | 103 | 104 | 112 | 117 | 128 |
| EMS5 | 281 | 290 | 300 | 310 | 321 | 328 | 384 | 438 | 599 |
| POP | 2,872 | 3,002 | 3,054 | 3,104 | 3,156 | 3,208 | 3,498 | 3,714 | 4,322 |
| DPIR | 8.9 | 10.2 | 11.2 | 10.7 | 10.6 | 11.0 | 13.8 | 16.5 | 21.6 |
| **Yakutat** | | | | | | | | | |
| EM1 EX | 2 | 2 | 3 | | 2 | 2 | 4 | | 6 |
| EMRR | 53 | 96 | 98 | 10: | 110 | | | 10? | 112 |
| EMG9 | 90 | 90 | 90 | 95 | 95 | 1;; | 1;: | 123 | 130 |
| EMS4 | 44 | 41 | 43 | 55 | 60 | 60 | 80 | 75 | 72 |
| EMS5 | 71 | 73 | 73 | 82 | 85 | 93 | 123 | 149 | 156 |
| POP | 604 | 604 | 622 | 634 | 634 | 639 | 746 | 877 | 934 |
| DPIR | 1.9 | 2.1 | 2.3 | 2.2 | 2.1 | 2.2 | 2.9 | 3.9 | 4.7 |

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| **Kenai** | | | | | | | | | |
| EMIEX | 851 | 1,549 | 2,028 | 1,125 | 705 | 705 | 880 | 430 | 430 |
| EMRR | 2,100 | 781 | 807 | 833 | 920 | 2,278 | 2,644 | 3,319 | 4,202 |
| EMG9 | 856 | 848 | 907 | 1,056 | 1,111 | 1,037 | 1,251 | 1,397 | 1,536 |
| EMS4 | 1,870 | 1,875 | 2,046 | 1,766 | 1,569 | 1,687 | 1,945 | 2,046 | 2,412 |
| EMS5 | 4,378 | 4,591 | 4,762 | 4,393 | 4,123 | 3,894 | 5,110 | 5,401 | 6,316 |
| POP | 27,044 | 28,370 | 29,775 | 26,291 | 25,100 | 26,307 | 29,015 | 29,001 | 32,801 |
| DPIR | 82.8 | 96.4 | 109.2 | 90.9 | 84.3 | 90.3 | 114.6 | 128.5 | 164.2 |
| **Matanuska-Susitna** | | | | | | | | | |
| EMIEX | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| EMRR | 100 | 56 | 58 | 60 | 62 | 94 | 141 | 167 | 215 |
| EMG9 | 622 | 604 | 634 | 723 | 748 | 685 | 749 | 756 | 749 |
| EMS4 | 622 | 695 | 690 | 751 | 754 | 696 | 873 | 1,076 | 1,264 |
| EMS5 | 1,991 | 2,329 | 2,197 | 2,514 | 2,709 | 2,520 | 3,117 | 3,825 | 3,731 |
| POP | 16,458 | 17,495 | 18,533 | 19,750 | 20,608 | 21,645 | 27,659 | 34,623 | 43,778 |
| DPIR | 51.2 | 59.4 | 68.0 | 68.3 | 69.2 | 78.2 | 118.4 | 162.6 | 230.4 |
| **Valdez** | | | | | | | | | |
| EMIEX | 417 | 327 | 327 | 327 | 327 | 327 | 327 | 327 | 327 |
| EMRR | 41 | 25 | 26 | 28 | 29 | 45 | 56 | 72 | 95 |
| EMG9 | 475 | 463 | 486 | 557 | 576 | 530 | 585 | 597 | 599 |
| EMS4 | 293 | 270 | 261 | 292 | 284 | 243 | 253 | 254 | 256, |
| EMS5 | 716 | 688 | 630 | 743 | 776 | 665 | 691 | 696 | 697 |
| POP | 5,223 | 17,495 | 18,533 | 19,750 | 20,608 | 4,958 | 4,674 | 4,468 | 4,464 |
| DPIR | 16.6 | 16.9 | 17.1 | 18.2 | 18.7 | 17.0 | 18.5 | 19.8 | 22.3 |

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EMIEX includes exogenous construction, mining, and all direct OCS employment.
EMRR includes other manufacturing and agricul ture-forestry-fisheries.
EMG9 includes federal, state, and local government.

EMS4 includes local construction and transportation.
EMS5 includes trade, services, and finance-insurance-real estate.

POP is population.
DPIR is real disposable personal income (millions of constant dollars).

TABLE E.6.    CENSUS DIVISION PROJECTIONS
LOW NORTHERN GULF DEVELOPMENT SCENARIO
MODERATE BASE CASE

|  | 19811 | 1982 | 1983 | 1984 |
|---|---|---|---|---|
| **Seward** | | | | |
| EM1 EX | 3 | 4 | 4 | 4 |
| EMRR | 224 | 205 | 245 | 290 |
| EMG9 | 414 | 423 | 431 | 438 |
| | | | | |
| EMS4 | 110 | 140 | 119 | 108 |
| EMS5 | 441 | 448 | 459 | 471 |
| | | | | |
| POP | 3,376 | 3,628 | 3,686 | 3,795 |
| DPIR | 11.7 | 13.5 | 12.9 | 12.8 |
| | | | | |
| **Kodiak** | | | | |
| EM1EX | 2 | 4 | 5 | 6 |
| EMRR | 2,644 | 2,776 | 2,916 | 3,062 |
| EMG9 | 2,099 | 2,120 | 2,141 | 2,163 |
| | | | | |
| EMS4 | 533 | 588 | 643 | 733 |
| EMS5 | 1,416 | 1,540 | 1,672 | 1,801 |
| | | | | |
| POP | 11,447 | 12,017 | 12,614 | 13,278 |
| DPIR | 39.5 | 44.8 | 44.2 | 44.8 |
| | | | | |
| **Cordova** | | | | |
| EM1EX | 2 | 2 | 2 | 3 |
| EMRR | 707 | 717 | 727 | 737 |
| EMG9 | 404 | 408 | 412 | 416 |
| | | | | |
| EMS4 | 103 | 110 | 111 | 106 |
| EMS5 | 291 | 301 | 311 | 319 |
| | | | | |
| POP | 1,507 | 1,538 | 1,563 | 1,581 |
| DPIR | 5.2 | 5.7 | 5.5 | 5.3 |
| | | | | |
| **Yakutat** | | | | |
| EM1EX | 2 | 3 | 3 | 2 |
| EMRR | 97 | 98 | 108 | 110 |
| EMG9 | 94 | 93 | 96 | 95 |
| | | | | |
| EMS4 | 82 | 71 | 70 | 63 |
| EMS5 | 79 | 81 | 84 | 86 |
| | | | | |
| POP | 708 | 692 | 670 | 642 |
| DPIR | 2.4 | 2.6 | 2.4 | 2.2 |

|  | 1981[1] | 1982 | 1983 | 1984 |
|---|---|---|---|---|
| **Kenai** | | | | |
| EM1 EX | 1,645 | 2,129 | 1,200 | 720 |
| EMRR | 1,234 | 1,294 | 1,357 | 1,484 |
| EMG9 | 849 | 908 | 1,054 | 1,111 |
| | | | | |
| EMS4 | 1,792 | 1,957 | 1,707 | 1,550 |
| EMS5 | 4,623 | 4,970 | 4,379 | 4,116 |
| | | | | |
| POP | 29,863 | 31,267 | 27,677 | 26,505 |
| DPIR | 103.1 | 116.6 | 97.1 | 89.4 |
| | | | | |
| **Matanuska-Susitna** | | | | |
| EM1 EX | 68 | 71 | 54 | 16 |
| EMRR | 56 | 58 | 60 | 62 |
| EMG9 | 604 | 634 | 722 | 747 |
| | | | | |
| EMS4 | 526 | 559 | 591 | 624 |
| EMS5 | 1,052 | 1,118 | 1,182 | 1,248 |
| | | | | |
| POP | 17,884 | 20,022 | 21,274 | 21,137 |
| DPIR | 58.2 | 66.0 | 66.3 | 66.5 |
| | | | | |
| **Valdez** | | | | |
| EM1EX | 344 | 344 | 341 | 330 |
| EMRR | 25 | 26 | 28 | 29 |
| EMG9 | 464 | 487 | 556 | 476 |
| | | | | |
| EMS4 | 256 | 248 | 280 | 281 |
| EMS5 | 690 | 656 | 749 | 773 |
| | | | | |
| POP | 4,625 | 4,579 | 5,080 | 5,171 |
| DPIR | 18.1 | 18.2 | 19.6 | 19.8 |

[1] Only years with significant impact..

EM1EX includes exogenous construction, mining, and all direct OCS employment.
EMRR includes other manufacturing and agriculture-forestry-fisheries.
EMG9 includes federal, state, and local government.

EMS4 includes local construction and transportation.
EMS5 includes trade, services, and finance-insurance-real estate.

POP is population.
DPIR is real disposable personal income (millions of constant dollars).

TABLE E.7. CENSUS DIVISION PROJECTIONS
MEAN NORTHERN GULF DEVELOPMENT SCENARIO ·
MODERATE BASE CASE

|  | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| Seward |  |  |  |  |  |
| EM1 EX | 3 | 440 | 5 | 7 | 9 |
| EMRR | 223 | 354 | 510 | 543 | 568 |
| EMG9 | 404 | 463 | 510 | 545 | 602 |
| EMS4 | 93 | 144 | 2 6 3 | 155 | 175 |
| EMS5 | 433 | 511 | 510 | 736 | 957 |
| POP | 3, 468 | 4,135 | 4, 775 | 5, 056 | , 5, 768 |
| DPIR | 10. 8 | 14. 7 | 20. 4 | 22. 7 | 29. 3 |
| Kodiak |  |  |  |  |  |
| EM1 EX | 2 | 7 | 9 | 9 | 9 |
| EMRR | 1,867 | 2, 382 | 2, 734 | 2, 932 | 3, 082 |
| EMG9 | 2, 031 | 2, 184 | 2, 269 | 2, 366 | 2, 414 |
| EMS4 | 495 | 778 | 863 | 959 | 1, 048 |
| EMS5 | 1, 302 | 1,917 | 2, 306 | 2, 803 | 2, 998 |
| POP | 10, 856 | 13,851 | 15,668 | 17,967 | 19, 556 |
| DPIR | 33. 8 | 49. 2 | 67*0 | 80. 8 | 99. 3 |
| Cordova |  |  |  |  |  |
| EM1 EX | 2 | 3 | 557 | 17 | 24 |
| EMRR | 697 | 749 | 812 | 902 | 969 |
| EMG9 | 359 | 420 | 475 | 495 | 523 |
| EMS4 | 97 | 119 | 313 | 324 | 332 |
| EMS5 | 281 | 329 | 439 | 530 | 652 |
| POP | 2, 872 | 3, 240 | 4, 098 | 4, 536 | 5, 000 |
| DPIR | 8. 9 | 11. 5 | 17. 5 | 20. 4 | 25. 4 |
| Yakutat |  |  |  |  |  |
| EM1 EX | 2 | 2 | 12 | 20 | 20 |
| EMRR | 94 | 111 | 164 | 197 | 204 |
| EMG9 | 90 | 107 | 1 7 9 | 188 | 198 |
| EMS4 | 44 | 129 | 554 | 395 | 520 |
| EMS5 | 71 | 104 | 231 | 250 | 263 |
| POP | 604 | 815 | 2, 148 | 2, 175 | 2, 306 |
| DPIR | 1.9 | 2. 9 | 9. 2 | 9. 8 | 11. 7 |

|  | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| **Kenai** | | | | | |
| EMIEX | 851 | 1,055 | 1,602 | 712 | 787 |
| EMRR | 2,100 | 2,278 | 2,644 | 3,319 | 4,202 |
| EMG9 | 856 | 1,031 | 1,270 | 1,357 | 1,497 |
| | | | | | |
| EMS4 | 1,870 | 1,736 | 1,783 | 1,890 | 2,165 |
| EMS5 | 4,378 | 4,738 | 5,787 | 5,690 | 6,686 |
| | | | | | |
| POP | 27,046 | 28,900 | 33,794 | 32,191 | 34,404 |
| DPIR | 84.2 | 102.7 | 144.6 | 144.8 | ?74.7 |
| | | | | | |
| **Matanuska-Susitna** | | | | | |
| EMIEX | 6 | 230 | 469 | 187' | 235 |
| EMRR | 100 | 94 | 141 | 167 | 215 |
| EMG9 | 622 | 681 | 761 | 734 | 730 |
| | | | | | |
| EMS4 | 622 | 669 | 721 | 949 | 1,151 |
| EMS5 | 1,991 | 2,500 | 3,199 | 3,908 | 4,866 |
| | | | | | |
| POP | 16,458 | 21,869 | 28,972 | 35,553 | 44,846 |
| DPIR | 51.2 | 76.4 | 118.7 | 145.8 | 189.7 |
| | | | | | |
| **Valdez** | | | | | |
| EMIEX | 417 | 387 | 451 | 376 | 388 |
| EMRR | 41 | 45 | 56 | 72 | 95 |
| EMG9 | 475 | 527 | 594 | 580 | 584 |
| | | | | | |
| EMS4 | 293 | 245 | 228 | 231 | 228 |
| EMS5 | 716 | 693 | 769 | 724 | 732 |
| | | | | | |
| POP | 5,222 | 5,058 | 4,048 | 3,345 | 4,547 |
| DPIR | 16.3 | 18.0 | 17.3 | 15.0 | 23.1 |

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EMIEX includes exogenous construction, mining, and all direct OCS employment.
EMRR includes other manufacturing and agriculture-forestry-fisheries. "
EMG9 includes federal, state, and local government.

EMS4 includes local construction and transportation.
EMS5 includes trade, services, and finance-insurance-real estate.

POP is population.
DPIR is real disposable personal income (millions of constant dollars).

## TABLE E.8. CENSUS DIVISION PROJECTIONS
## HIGH NORTHERN GULF DEVELOPMENT SCENARIO
## MODERATE BASE CASE

|  | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| **Seward** | | | | | |
| EM1 EX | 3 | 116 | 34 | 7 | 9 |
| EMRR | 223 | 353 | 514 | 544 | 568 |
| EMG9 | 404 | 454 | 528 | 549 | 605 |
| | | | | | |
| EMS4 | 93 | 147 | 391 | 185 | 198. |
| EMS5 | 433 | 497 | 619 | 743 | 963 |
| | | | | | |
| POP | 3, 468 | 4, 093 | 5, 129 | 5, 740 | 5, 832 |
| DPIR | 10. 8 | 17.1 | 22.1 | 23. 5 | 29. 9 |
| | | | | | |
| **Kodiak** | | | | | |
| EM1 EX | 2 | 7 | 9 | 9 | 9 |
| EMRR | 1,867 | 3,214 | 3, 689 | 3, 957 | 4, 159 |
| EMG9 | 2, 031 | 2, 184 | 2, 269 | 2, 366 | 2, 414 |
| | | | | | |
| EMS4 | 495 | 778 | 863 | 959 | 1, 048 |
| EMS5 | 1,302 | 1, 917 | 2, 306 | 2, 803 | 2, 998 |
| | | | | | |
| POP | 10, 856 | 13, $51 | 15, 668 | 17, 967 | 19,556 |
| DPIR | 33. 8 | 57. 8 | ·67.5 | 82. 0 | 100. 4 |
| | | | | | |
| **Cordova** | | | | | |
| EM1 EX | 2 | 3 | 54 | 50 | 57 |
| EMRR | 409 | 749 | 884 | 945 | 1,012 |
| EMG9 | 359 | 421 | 509 | 530 | 556 |
| | | | | | |
| EMS4 | 97 | 124 | 478 | 502 | 504 |
| EMS5 | 281 | 329 | 492 | 584 | 704 |
| | | | | | |
| POP | 2, 872 | 3, 252 | 4, 834 | 5, 222 | 5, 666 |
| DPIR | 8. 9 | 13.6 | 20. 9 | 23. 8 | 29. 7 |
| | | | | | |
| **Yakutat** | | | | | |
| EM1 EX | 2 | 3, 495 | 64 | 100 | 137 |
| EMRR | 53 | 117 | 237 | 263 | 271 |
| EMG9 | 90 | 166 | 242 | 255 | 267 |
| | | | | | |
| EMS4 | 44 | 183 | 904 | 847 | 843 |
| EMS5 | 71 | 197 | 329 | 357 | 369 |
| | | | | | |
| POP | 604 | 1, 239 | 3>420 | 3,519 | 3, 670 |
| DPIR | 1. 9 | 5. 2 | 14. 8 | 16. 1 | 18. 8 |

|  | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| **Kenai** |  |  |  |  |  |
| EM1 EX | 851 | 2,242 | 2,012 | 1,214 | 1,283 |
| EMRR | 2,100 | 2,278 | 2,644 | 3,319 | 4,202 |
| EMG9 | 856 | 1,005 | 1,262 | 1,315 | 1,444 |
|  |  |  |  |  |  |
| EMS4 | 1,870 | 2,145 | 1,583 | 1,697 | 2,058 |
| EMS5 | 4,378 | 5,671 | 6,237 | 6,136 | 7,165 |
|  |  |  |  |  |  |
| POP | 27,044 | 33,397 | 35,205 | 34,049 | 36,853 |
| DPIR | 84.2 | 139.4 | 151.6 | 155.5 | 189.3 |
|  |  |  |  |  |  |
| **Matanuska-Susitna** |  |  |  |  |  |
| EM1 EX | 6 | 992 | 732 | 283 | 553 |
| EMRR | 100 | 94 | 141 | 167 | 215 |
| EMG9 | 622 | 664 | 756 | 711 | 704 |
|  |  |  |  |  |  |
| EMS4 | 622 | 681 | 617 | 819 | 1,052 |
| EMS5 | 1,991 | 2,464 | 3,323 | 4,050 | 5,010 |
|  |  |  |  |  |  |
| POP | 16,458 | 22,806 | 29,963 | 36,703 | 46,049 |
| DPIR | 51.2 | 88.0 | 124.6 | 155.2 | 229.7 |
|  |  |  |  |  |  |
| **Valdez** |  |  |  |  |  |
| EM1 EX | 417 | 591 | 522 | 462 | 474 |
| EMRR | 41 | 45 | 56 | 72 | 95 |
| EMG9 | 475 | 514 | 590 | 562 | 563 |
|  |  |  |  |  |  |
| EMS4 | 293 | 287 | 200 | 204 | 216 |
| EMS5 | 716 | 787 | 821 | 765 | 780 |
|  |  |  |  |  |  |
| POP | 5,223 | 5,567 | 5,609 | 5,139 | 4,855 |
| DPIR | 16.3 | 23.3 | 24.1 | 23.5 | 25.0 |

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EM1EX includes exogenous construction, mining, and all direct OCS employment.
EMRR includes other manufacturing and agriculture-forestry-fisheries.
EMG9 includes federal, state, and local-government.

EMS4 includes local construction and transportation.
EMS5 includes trade, services, and finance-insurance-real estate.

POP is population.
DPIR is real disposable personal income (millions of constant dollars).

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