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**A DESCRIPTION OF THE SOCIOECONOMICS
OF THE NORTH SLOPE BOROUGH**

Alaska OCS Socioeconomic Studies Program

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OF THE NORTH SLOPE BOROUGH

Prepared for

Minerals Management Service
Alaska Outer Continental Shelf Region

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NOTICE

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ABSTRACT

This report describes current and projected economic and social conditions on the North Slope, establishes an analytical framework for assessing changes in these conditions due to OCS development, and describes research methods specifically developed to examine the issues of future North Slope Borough revenues and expenditures and Inupiat perceptions of the potential effects of petroleum development.

The primary source of social and economic change on the North Slope between 1973 and 1983 has been the North Slope Borough. We expect this situation to continue as long as the borough continues to receive substantial property taxes from the petroleum industry and significant environmental effects can be avoided. Following our examination of the factors affecting borough revenues, we conclude that OCS development will not substantially increase borough revenues. Other factors, however, can be expected to cause the borough to begin to curtail its construction program and thereby reduce local employment opportunities.

Our review of Inupiat employment patterns and projected borough employment opportunities suggests that reduced Inupiat employment, rather than increased Inupiat involvement in petroleum activities, may best characterize the coming decade unless there are specific efforts to reduce constraints to Inupiat employment associated with petroleum development. These constraints include job rotation schedules, work crew composition, hiring location, and training opportunities.

To date, conflicts between onshore petroleum development and Inupiat land use and land-use values appear to have been isolated. The major potential conflict associated with onshore petroleum development is posed by the regulatory restriction of subsistence activities in development areas. Oil spills related to offshore development could reduce the subsistence resources available to Inupiat, as could noise. Rudimentary available data on oil spill risks, biological responses to environmental disturbances, and Inupiat hunting and fishing patterns suggest that development activities in coastal areas near Inupiat settlements and/or areas with significant concentrations of wildlife could adversely affect the North Slope subsistence economy.

We analyzed ten years of Inupiat testimony on proposed developments and conclude that Inupiat fears that offshore development will inevitably harm subsistence resources are both intense and widespread and themselves constitute an impact of development. The report describes Inupiat perceptions through direct quotations and specific references to past Inupiat experiences with their environment or development activities. Inupiat institutions have actively attempted to place controls on development activities. Barring unforeseen successes, however, we do not expect that North Slope institutions will be particularly effective in influencing offshore activities, an outcome which may generate significant social stress on the North Slope.

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CHAPTER ONE

INTRODUCTION AND SUMMARY OF RESULTS

The federal government expects to open the remainder of the Beaufort Sea for oil exploration in 1984. Under the current five-year outercontinental leasing plan, the government will issue a draft environmental impact statement (EIS) on the proposed action, Lease Sale 87, sometime in 1983. This report will be used by the Minerals Management Service of the Department of the Interior in its preparation of the environmental impact statement.

The Minerals Management Service (MMS) contracted the Institute of Social and Economic Research (ISER) to design and perform the research necessary to describe current social and economic conditions on the North Slope, to identify likely changes in these conditions, and to develop a framework for assessing the social and economic impacts of Lease Sale 87. This report does not contain a comprehensive description of social and economic conditions on the North Slope. Given the wealth of information readily available from other recent reports, we chose to focus our attention on several potential social and economic impacts which warrant additional research and which can be feasibly investigated within the constraints of our contract. Throughout the report, we attempt to summarize relevant previous research. For a comprehensive review of North Slope social and economic conditions, however, we suggest the

reader review the following reports: Worl, Worl, and Lonner (1981); Kruse (1982); Kleinfeld (1981); and McBeath (1981).

Report Organization

With the exception of Chapters One and Three, each chapter of the report corresponds to a separate research objective. In Chapter Two, we describe our approach to the development of a forecast methodology. To acquaint the reader with the cumulative scale of development activities, Chapter Three contains an overview of state and federal leasing areas on the North Slope and projected estimates of oil reserves. Chapter Four traces the relationship between oil development and North Slope Borough (NSB) revenues and expenditures.

Chapter Five establishes estimates of the North Slope workforce likely to be employed by the North Slope Borough and the petroleum industry. Chapters Six and Seven primarily focus on the potential relationships between oil development and Inupiat subsistence activities. In Chapter Six, we identify the types of land-use conflicts that may result from development. Chapter Seven and its associated appendix contain the results of the largest component of our research effort: the documentation of Inupiat perceptions of the threats posed by oil development on the North Slope.

Over the past several years, North Slope researchers have repeatedly turned their attention to the relationships between local institutions and oil development (McBeath and Morehouse, 1981; Worl,

Worl, and Lonner, 1981). The ability of local institutions to influence development has emerged as a key factor in the projection of development impacts. In Chapter Eight, we extend the discussion of local institutional activity to cover recent changes which may significantly alter the scale and form of development impacts. Finally in Chapter Nine, we present updated information on the economic well-being of North Slope residents and discuss the implications of development on Inupiat social well-being and culture.

Summary of Results

FORECASTING METHODOLOGY

Our first step in generating a forecasting methodology was to identify what we expect could be the most important social and economic changes that can be logically related to petroleum development on the North Slope. We based our assessment on a review of recent research literature, our own past work on the North Slope, and on field visits to Barrow, Kaktovik, and Nuiqsut. We then constructed an overall analytical framework centered on a diagram illustrating the major potential causal factors and resulting social and economic changes that could occur on the North Slope. The following appear to be significant potential social or economic changes that could be influenced by continued petroleum development activity:

- decrease in the net supply of subsistence resources available to Inupiat hunters

- increased social stress due to perceived threats to subsistence resources
- enhancement of expected North Slope Borough financial situation in the next decade
- increased industry employment
- change in ability of local institutions to influence development activities
- long-term changes in Inupiat cultural values

We next considered the feasibility of designing and implementing data collection efforts which would permit us to assess the likelihood and characteristics of each type of change. Factors affecting the feasibility of one or more data collection efforts included uncertainties as to the magnitude, location, likelihood, and consequences of industry activities; restrictions on systematic data collection; unacceptable impacts of the research itself; and insufficient time to collect information. Based upon these considerations, we chose to focus our data collection efforts primarily on two research topics: North Slope Borough revenues, expenditures, and employment and Inupiat perceptions of potential threats to subsistence resources posed by petroleum development. In addition, we devoted part of our research effort to analyses of the factors which may affect the net supply of subsistence resources and Inupiat participation in employment opportunities. Finally, we reviewed recent trends concerning local institutional attempts to influence development and concerning changes in Inupiat social and economic well-being.

NORTH SLOPE BOROUGH REVENUES, EXPENDITURES, AND EMPLOYMENT

By now, the average Alaskan firmly connects oil development with state wealth and believes that what is true for the state is particularly true for the North Slope Borough. It stands to reason, then, that further oil development in the north will continue to fuel the North Slope economy. Our analysis shows that OCS development will not, in fact, substantially increase North Slope Borough revenues.

The primary source of North Slope Borough revenues is property taxes. Property taxes are not presently constrained by borough property values, but rather by state-imposed limitations on borough property tax operating revenues. We project that the borough's property tax base will continue to be at least as high as current levels and possibly much higher for at least two decades. As a result, property values will not be the limiting factor for borough operating revenues during this period. Instead, the primary factor affecting borough operating revenues will continue to be revenue limits determined in the statewide political arena.

North Slope Borough capital expenditures, the driving force behind local employment, will have to decline in the 1980s. While the NSB is not presently limited in the extent to which it can raise money for capital expenditures, it cannot exceed state-imposed limits on the taxes that can be levied to fund operating expenditures. Borough operating expenditures are skyrocketing as CIP projects are

completed. The NSB simply cannot afford to operate a much larger set of facilities. In addition, the size of the NSB's debt (over one billion dollars) may result in future state restrictions on the NSB's borrowing.

INUPIAT EMPLOYMENT

Local job opportunities with the North Slope Borough or those supported indirectly by borough spending currently employ most of the available Inupiat labor force. However, these employment opportunities are likely to decline as borough capital expenditures decline.

While the number of jobs created by a given amount of operating funds may exceed that generated by an equal capital expenditure, the higher rate of capital spending during the CIP is certainly generating more employment than will the much lower rate of NSB operations spending in the future. We expect that borough employment will decline from current levels, with or without OCS development.

Thus, the oil industry is likely to become more important as a potential source of employment for Inupiat. Our 1977 survey results indicated that only a small proportion of the Inupiat labor force had worked directly for industry prior to the survey. Although similar current data are not available, a variety of evidence suggests that Inupiat oil industry employment continues to be very

low. Both industry and various Native-owned corporations have attempted to increase Inupiat participation in oil development activities with little results. Inupiat workers view the jobs they are offered as menial; industry supervisors express frustration that their efforts to hire Natives fail due to a lack of job commitment on the part of the Natives themselves. Meanwhile, many village residents recall past industry promises of jobs and perceive the promises to be empty.

The size of the communication gap between industry and village residents is both awesome and bewildering. Beneath the mutual misperceptions of industry and the Inupiat, however, are several real constraints on Inupiat participation in oil development activities. As we mentioned, most Inupiat are not looking for industry jobs; they can work for the same or higher wages on better jobs at home. Another constraint involves the general lack of formal training and certification of skills. Inupiat men often learn to operate equipment on local jobs without joining a union. Those that do belong to a union complain that the location of the hiring hall in Fairbanks makes it extremely difficult to obtain a job. It is important to remember that perhaps half the jobs at Prudhoe Bay are not with the producers but rather with contractors and subcontractors. Hiring practices and job conditions can vary widely. Still another constraint involves the willingness of Inupiat to commit themselves to work a steady shift even if it conflicts with hunting opportunities or village activities. The NSB

permits Inupiat men to follow an intermittent work pattern which industry views as unacceptable.

OCS development, in general, and the incremental development effect of Lease Sale 87, in particular, will add relatively few jobs to the North Slope, and most of those that are added will require labor with special skills not present in the Inupiat labor force. The negative attitudes toward OCS development shared by most Inupiat may also limit their interest in OCS employment. Inupiat employment with industry may increase at the same time that OCS development occurs, but the increase will most likely be related to a decline in village employment opportunities.

LAND USE CONFLICTS

A comparison of the area subject to potential oil development activity on the North Slope and the area used by Inupiat for subsistence activities suggests a substantial potential for land-use conflicts on the North Slope. We identified six types of potential land-use conflicts: physical barriers to land use, regulatory barriers, habitat destruction, direct mortality of fish and wildlife, dislocation of fish and wildlife, and increased competition for resources. All of these involve Inupiat subsistence activities.

It appears that onshore development inevitably creates land-use conflicts as a result of physical and regulatory barriers to Inupiat

land use. To date, the cumulative impact of onshore development on Inupiat land use has reached significant proportions for Nuiqsut residents. Most North Slope villages could face similar problems if onshore development activities substantially expand.

Offshore development poses a potentially much greater, but highly uncertain, land-use conflict with Inupiat subsistence activities. Oil spills as well as visual and sound disturbances may reduce the supply of subsistence resources with profound effects on Inupiat economic and social well-being. Development risk analyses and the level of biological knowledge still appear to be inadequate to the task of projecting the likelihood of major changes in subsistence resource availability. It is, therefore, only possible to draw the crudest relationships between offshore development and Inupiat land use. If we use any of a variety of measures of development activity (e.g., areal extent, estimated production, distance to nearest village, water depth), Lease Sale 87 represents a large increase in the relative risk of land-use conflicts.

PERCEIVED THREATS OF OIL DEVELOPMENT

The Inupiat do not appear to share the uncertainty scientists attach to the risks that offshore oil development will harm subsistence resources; they believe it is inevitable. Inupiat concern over the dangers of offshore development represents a current impact of OCS development. As development proceeds, these concerns will increase to the detriment of Inupiat social well-being. We, therefore,

decided that one of the central research objectives of this study should be the documentation of Inupiat perceptions of the threats of oil development. Our primary sources of information were dozens of public hearings on North Slope oil development proposals conducted over the past eleven years.

The Inupiat fear that the ice, winds, and currents of the Beaufort Sea will combine to overpower offshore facilities. They assume that resulting oil spills will inevitably contaminate or kill marine wildlife. They also believe that industrial noise will drive away their subsistence resources. Judging from the depth of feeling pervading the Inupiat testimony, the loss of subsistence foods would have devastating effects on Inupiat health and culture.

Due to the uncertainties surrounding the environmental risks of oil development and the actual physionomic, social, and cultural effects of a loss of subsistence resources, it makes little sense to speculate about long-term impacts. At the same time, we should recognize that Inupiat fears are already affecting Inupiat social well-being. We documented Inupiat perceptions of the threats posed by oil development so that the reader can gauge the magnitude of this current impact.

ABILITY OF LOCAL INSTITUTIONS TO INFLUENCE OIL DEVELOPMENT

Inupiat concerns about development are likely to vary with their perceptions of the ability of local institutions to influence

development activities. Vigorous local intervention has been a trademark of the North Slope Inupiat. The Inupiat fought hard and effectively to push their land claims and to establish the North Slope Borough. They have aggressively developed new tools in attempts to achieve their objectives. The Inupiat have zoned, lobbied, litigated, reviewed, monitored, and manipulated public opinion in order to reduce environmental risks and increase local economic benefits. Both researchers and the Inupiat themselves have viewed the North Slope Borough as an effective protector of Inupiat subsistence and cultural values.

The perception of institutional effectiveness, however, has largely been based on NSB actions taken to influence onshore development. When local attention shifted offshore, the ability of local institutions to influence industry activities rapidly deteriorated. The NSB has thus far failed to extend its jurisdiction through the Coastal Zone Management Act. It lost its major law suit contesting offshore leasing beyond the barrier islands. Other North Slope institutions have tried to assume the role of protector of Inupiat culture previously held exclusively by the NSB. The Kaktovik village council opposed all offshore development in both state and federal courts. The Inupiat Community of the Arctic Slope (ICAS) initiated a federal suit as well; both institutions lost.

The Inupiat may well find new ways to reassert some influence over oil development activities. The NSB is continuing to litigate, to

seek public support through the Arctic Policy Review, to develop a Coastal Management Plan, and to develop alliances with other northern peoples and outside interest groups. Barring unforeseen successes, however, we believe that North Slope institutions will not be particularly effective in influencing offshore development activities. As a result, we expect Inupiat concerns about offshore development to continue unabated and, therefore, to generate considerable social stress.

INUPIAT SOCIAL AND ECONOMIC WELL-BEING

Our 1977 survey of the Inupiat population showed the Inupiat to be rapidly improving their economic well-being. Limited, but more current, information suggests that the trend has continued. Between 1977 and 1979 the median Inupiat family income more than doubled in nominal terms. Even in constant dollars, Inupiat incomes probably increased by an average of over 50 percent in three years. The NSB capital improvements program has delivered new housing, school facilities, roads, power generation systems, water supplies, health clinics, fire stations, and a host of other public services to every North Slope community. Most Inupiat now enjoy residential telephone service and television. While a poor spring whaling season in 1982 has temporarily reduced the subsistence harvest, the crises posed by past caribou regulations and threatened bans on subsistence whaling are over. In sum, Inupiat economic well-being has probably never been higher.

The Inupiat are still not rich by urban Alaskan standards, nor do most have such conveniences as flush toilets or a piped water supply. Furthermore, their economic well-being is largely dependent on the temporary employment demands generated by the borough CIP. Already, the loss of employment due to the completion of village projects has made it difficult for some families to pay for their new homes and higher utility bills. We expect the gap between expenses and income to grow during the 1980s as capital expenditures under the CIP decline.

As we mentioned earlier, OCS development will have little effect on Inupiat economic well-being; that is, unless development interrupts the supply of subsistence resources. However, local employment and household incomes will probably decline during the OCS development period for other reasons. Inupiat social well-being will doubtless decline if jobs disappear and incomes drop. Fears about the effects of OCS development on subsistence resources will further reduce Inupiat social well-being. If the NSB secures additional revenues, if the Inupiat find effective means to influence development, or if the Inupiat participate heavily in industry employment opportunities, then Inupiat social well-being may not significantly decline in the 1980s. In our view, however, each of these events is unlikely, and we would expect the Inupiat to face a much worse situation in the late 1980s than they do today.

CHAPTER TWO

FORECAST METHODOLOGY

To date, the socioeconomic studies program has published sixteen technical reports on the Beaufort Sea region. With the exception of the reports based on the MAP or SCIMP models, the methods used to analyze and project change vary widely. This lack of consistency is largely warranted. The authors of each report selected somewhat different topics for study. Topics treated adequately in a previous study could be ignored if further distinctions between the impacts of successive developments were impossible. Changing conditions caused previously unstudied areas to assume greater importance. Forecasting methods also differed in response to changes in the form of data available, particularly in view of the constraints placed on primary data collection.

While we think it would be a mistake to impose a consistent set of forecasting objectives and methods on future SESP socioeconomic studies, we recognize the value of developing a reference of methods that have been successfully used to analyze and forecast closely related sets of impacts. Since each study does not address all potential impacts (nor should it), we believe such a methodological reference is best developed over time.

In this chapter, we describe our procedure for identifying potentially significant impacts. These impacts may well differ from

those we would identify for another development proposal, a different region, or even for another time. We then show how we determined the feasibility of addressing each study topic. Finally, we discuss the methods that we would consider appropriate for topics not studied under this contract and describe the methods we actually used to address the subject areas included in our study.

Potentially Significant Impacts

Two sets of circumstances on the North Slope cause its mix of potentially significant impacts of oil development to differ from that observed in the Lower 48 or even elsewhere in Alaska. First, energy development on the North Slope does not result in rapid population increases in existing communities, attendant increases in service demands, and lags in the availability of public revenues necessary to meet such demands. While this has been the usual experience of western U.S. boomtowns, the dual factors of remoteness and regional taxing powers cause a completely different outcome. With no village located near Prudhoe Bay and no permanent roads connecting the development site with any Inupiat settlement, industry developed a virtually independent infrastructure from that supporting the North Slope traditional villages. Population increases directly induced by development thus occurred in enclaves, not in communities. Service demands in North Slope villages rapidly increased due to rising expectations, not rising populations. The formation of the North Slope Borough coincident with the multibillion dollar capital investments of the oil industry

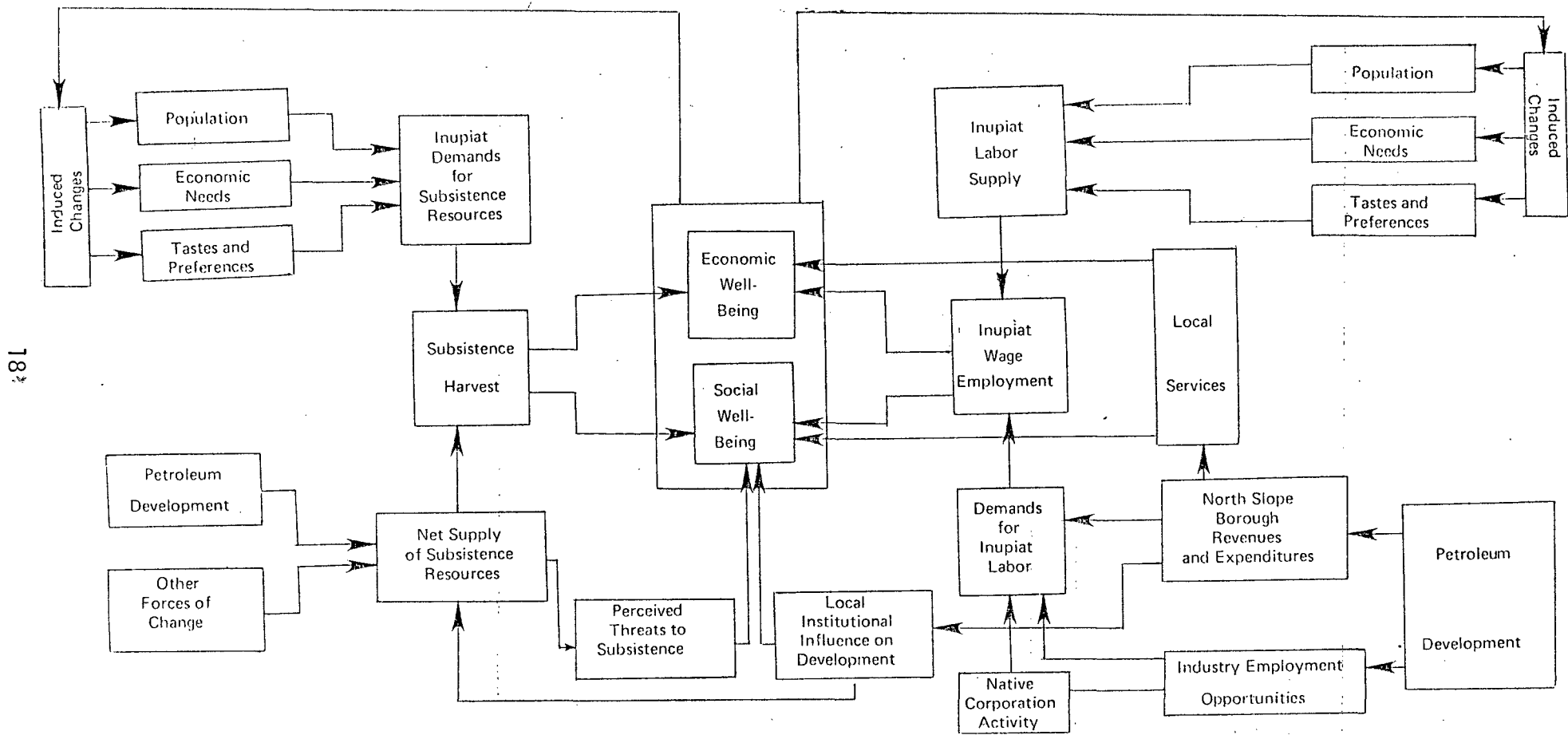
permitted the Inupiat to pay for these new services through a regional property tax. While there was some lag in revenue-generating ability due to court challenges, the North Slope Borough was ultimately successful in mounting a capital improvements program now worth over one billion dollars. The important point, however, is that the western boom-town model of impacts does not apply to the North Slope.

The second major set of circumstances differentiating the North Slope and other rural Alaskan regions from regions outside of Alaska experiencing energy impacts is the widespread use of and value attached to the wildlife resources of the region. Well over 90 percent of the Inupiat residents of the North Slope regularly consume wild foods (Kruse, 1982). As the traditional economic base of the region, these wild foods and the attendant harvesting activities are the object of the most important social and cultural values, values which have persisted in spite of a decline in the economic importance of wild foods.¹ Potential impacts involving subsistence resources are, therefore, clearly key topics to be addressed in North Slope impact studies.

Our forecasting methodology is based on an analytical framework that is illustrated in Figure 1. Starting in the lower left corner of Figure 1, we see that both petroleum development and other forces for change--the International Whaling Commission, for example--may

¹We should note, however, the wild foods continue to support a significant proportion of the Inupiat mixed economy (Kruse, 1982).

FIGURE 1. DYNAMICS OF SOCIAL AND ECONOMIC CHANGE ON ALASKA'S NORTH SLOPE



affect the net supply of subsistence resources available to Inupiat hunters. We discuss the potential means by which petroleum development could affect the net supply of subsistence resources in Chapter Six.

The potential relationship between OCS development and the net supply of subsistence resources may or may not prove to be significant. However, in designing our research, we observed that Inupiat perceptions of threats to subsistence are a current reality that may already be generating social stress. Therefore, we decided to document Inupiat perceptions so that policy makers are aware of the scope and intensity of Inupiat concerns. The results of this effort are contained in Chapter Seven.

The top left corner of Figure 1 illustrates our conception of the demand side of subsistence resource consumption. The size of the population consuming subsistence resources, both on a regional and on a community basis, will affect total demand, as will the level of economic need and a host of personal, social, and cultural factors that collectively determine tastes and preferences. We discuss the potential effects of population changes on Inupiat demands for subsistence resources in Chapter Six. The relationships between economic needs and tastes and preferences and Inupiat resource demands are discussed in Kruse (1982). Kruse found that despite rapid increases in Inupiat real incomes, subsistence resources still reflect a substantial economic value to the Inupiat. Kruse also

found that personal, social, and cultural factors appear to account for a significant amount of resource demands. Therefore, we expect that changes in Inupiat demand over at least the next decade will primarily be a function of intraregional population shifts.

Turning now to the lower right corner of Figure 1, we show the second major link between petroleum development and social and economic change on the North Slope. We discuss the relationship between development and North Slope Borough revenues and expenditures in Chapter Four. Chapter Five contains our analysis of the relationships among borough expenditures, development activity, industry employment opportunities, and demands for Inupiat labor.

According to our conceptual framework, the supply of Inupiat labor is affected by the same types of factors affecting Inupiat demands for subsistence resources: population, economic needs, and tastes and preferences. We did not investigate these relationships in the current project because they are treated in depth in Kleinfeld (1981). Kleinfeld observed that the supply of Inupiat labor is rapidly growing due to two major factors: the aging and entry into the labor force of a large number of Inupiat born in the 1950s and 1960s and the entry of a large number of women into the labor force for the first time. Kleinfeld found that, in contrast to Inupiat women, Inupiat men do not appear to be participating in the wage economy in greater proportions now than they did before the petroleum industry and the North Slope Borough became active on the

North Slope in the 1970s. At least for men, it appears that changes in the pattern of Inupiat wage employment will primarily result from changes in the character of demand for Inupiat labor. Thus, we believe our analysis of potential labor demands in Chapter Five is of primary significance to the projection of employment impacts.

The development and funding of the North Slope Borough not only increased local employment opportunities but also substantially expanded and improved the quality of local services. Chapter Nine contains an overview of changes in local services. We chose not to conduct an in-depth analysis of local services in this study because changes in local services are the result of local decisions and not petroleum development. In addition to borough affects on employment and local services, however, are its potential influences on development activities and the effects of these influence attempts on Inupiat social well-being. Since our initial investigations suggested that Inupiat perceptions of development threats on subsistence resources are potentially already affecting Inupiat social well-being, we chose to focus part of our research effort on the degree to which local institutional influence on development may affect Inupiat perceptions. The results of our analysis are contained in Chapter Eight.

As shown in the center of Figure 1, subsistence harvest, Inupiat wage employment, local services, perceived threats to subsistence, and local institutional influence on development are the major

factors we believe affect Inupiat economic and social well-being. Chapter Nine contains a discussion of these interrelationships.

Before describing our forecast methodology for each major element of our current research program, we should note that we intend Figure 1 to describe a dynamic social system in which changes in Inupiat social and economic well-being are expected to induce population shifts, alterations in economic needs, and changes in Inupiat tastes and preferences. These relationships are depicted as feedback loops in Figure 1.

North Slope Borough Revenues and Expenditures

The North Slope Borough has played a very important role for Inupiat over the past ten years, providing both employment and a variety of new services and facilities. The extent of the borough's role was made possible by the enormous property tax base arising from development of the oil resources at or near Prudhoe Bay. The most significant effects of oil development on the North Slope to date have arisen from the expenditure of the revenues arising from this tax base. Thus, it is important to assess the possible effects of OCS development upon North Slope Borough revenues, and the resulting indirect effects upon North Slope Borough expenditures.

In order to examine these questions, we have developed a model of the population and economy of the North Slope Borough. We refer to this model as the "North Slope Model." We describe the model in

detail in Appendix A and present a set of "base case" projections for the model in Appendix C.

Mathematical models have both disadvantages and advantages. The disadvantages result from the fact that models tend to be intimidating, causing some people to reject their results as too complicated to understand, and others to blindly accept their results because they convey an illusion of accuracy. In the case of our North Slope Model, we believe that these disadvantages are outweighed by two advantages. First, the model requires us to state the exact reasoning we have used in arriving at our conclusions. Our assumptions are explicit rather than implicit. Secondly, the model is flexible; if someone disagrees with a particular assumption which we have used—even a crucial assumption—we can change the assumption and calculate new results without abandoning the entire projection methodology.

Many people expect models to make complicated problems simple. They cannot do this. They can only make the methods used to solve the problems more explicit. We feel that modeling has an important role in SESP research tasks such as the projection of revenues, population, or employment. However, models impose a responsibility upon both the researcher and the user of the research. The researcher must document his assumptions clearly and completely so that his methodology is indeed explicit. The user must study the

assumptions and understand what the reader has done in order to have a basis for either accepting or rejecting the results.

Inupiat Employment

Our projections of declining future North Slope Borough expenditures suggest that borough-supported employment opportunities for Inupiat will decline in the future. As a result, the oil industry may become a more important source of employment for Inupiat. However, there are a number of uncertainties about the extent to which Inupiat may obtain oil industry employment. We use our North Slope model to develop a range of projections for future Inupiat employment, taking account of these uncertainties.

To date, direct Inupiat participation in oil development activities has been limited. This is disappointing both for Inupiat and for the oil industry since Inupiat perceive few direct benefits from oil development, and this perception contributes to Inupiat political resistance to oil development.

Future SESP research might reduce some of these uncertainties. One important area for research is oil industry labor requirements--not just how people are hired but how long individual jobs last, what skills or special training is required, and how existing employment practices work. The current manpower model used by the OCS office in developing sale employment assumptions provides relatively little guidance with respect to these questions. In addition, research

might examine measures specifically designed to increase local hire and how effective they have been.

Low current levels of Inupiat employment in the oil industry suggest that the limiting factor upon Inupiat employment is not the size of the industry or the total number of jobs. Thus, OCS development which would tend simply to expand rather than to change the industry is likely to have relatively little impact upon Inupiat employment.

Land Use Conflicts

Six types of potential land-use conflicts appear to exist: physical barriers to Inupiat land use, regulatory barriers to Inupiat land use, habitat destruction, direct mortality of fish and wildlife, dislocation of fish and wildlife, and competition for wildlife resources. In each case, impact forecasts must be based upon information concerning the location of industry activities capable of causing the impact and upon information concerning Inupiat land use.

Inupiat land use outside of the North Slope communities primarily consists of hunting and fishing activities. The geographic location of each hunting and fishing activity varies according to the current and future distribution of the specific wildlife resources being sought. Land-use patterns also vary according to individual and family knowledge of areas within their community's hunting range and their past association with these areas. Land-use patterns differ

according to seasonal changes in resource availability and in mode of travel. Activity commitments within the village such as wage employment can restrict the time available for hunting and fishing and, hence, the distance one can travel to hunt or fish. On the other hand, increased income can be used to purchase the equipment and fuel necessary to reach more distant hunting and fishing destinations. Even information for a single year of land use would dramatically improve our ability to assess the likelihood and intensity of land-use conflicts. An analysis of the association between individual differences in land-use patterns and the degree of past association with the area, income, and employment characteristics and other variables could reveal relationships which could be expected to shift land-use patterns in the future. If the survey were periodically repeated, hypothesized trends could be tested and projections of future land use under changing conditions could be improved.

Our task, then, is to develop a method which will document Inupiat land use in a manner that will permit us to assess the potential impacts of development. The first requirement is that the information be location-specific. If it is not, we cannot distinguish between the impacts of one development from another. The second requirement is that the method produce measures of intensity of use. Clearly the impact of disrupting one individual's subsistence activities is less than that resulting from the disruption of a prime hunting area for an entire community. Third,

the method must be sensitive to differences in the land-use patterns associated with each species being harvested.

The final methodological requirement in documenting Inupiat land use is that it must take into account two dimensions of intensity of land use: frequency of use and productivity of use for each geographic unit. The reason for this final complication is that some areas which are infrequently used are particularly productive and can provide a disproportionately large share of the total resource harvest. They are infrequently used usually because they are distant from the community. At the same time, other areas that are more accessible but less productive are critical for meeting subsistence requirements when a lack of time or money precludes visits to more productive areas.

Can information on both the frequency of land use and the productivity of land use be collected by researchers under contract to the SESP program? No. Due to the variability in land-use behavior among individual Inupiat and over time, such information is best collected through repeated surveys not currently permitted by MMS. Furthermore, Inupiat residents are unlikely to divulge their land-use behavior to OCS contractors because they distrust the motivations of anyone associated with offshore petroleum development.

In order to address land-use conflicts, then, we must depend on secondary information. The Subsistence Division of the Alaska

Department of Fish and Game has begun to collect information on both dimensions of Inupiat land use. To date, the Division has published land-use maps which depict the extent but not the intensity of land use. They have not performed the analysis necessary to report intensities of use, nor have they obtained community approval to release such information. Therefore, we are unable to implement what we believe is the only method capable of addressing the need to forecast the potential impacts of specific development proposals. We recommend that MMS ask the Subsistence Division to provide land-use information as they produce it.

Inupiat land use is difficult to document but currently exists. Industry land use, in contrast, is largely unpredictable since the location of most land uses capable of producing conflicts cannot be determined prior to exploration. The best available measure of the potential locations of industry activity is the leasing area itself. Even this information can be highly misleading, however, when specific tracts are not delineated as in the case of Lease Sale 87.

The task of forecasting land-use conflicts is further complicated by the fact that the likelihood that a given land use will result in a land-use conflict is not known. While we are not responsible for producing predictions of biological impacts, we must use such predictions to forecast subsequent human impacts. We reviewed the Diapir Field EIS and the Beaufort Sea Synthesis Report for Lease

Sale 71. We also discussed the contents of both reports with physical scientists who reviewed the reports. We concluded that there currently is insufficient information to estimate the probabilities of industry-induced land-use impacts.

CONCLUSIONS REGARDING METHODS OF FORECASTING LAND-USE CONFLICTS

The preceding discussion paints a bleak but, we believe, realistic picture of the present feasibility of forecasting the probable increase in land-use conflicts associated with leasing additional tracts in the Beaufort Sea. We did decide that it would be instructive to map the cumulative current and potential areas for oil exploration and to describe the generalized pattern of Inupiat subsistence activity. The map and accompanying text appears in Chapter Six. While this information cannot be used to identify the potential impacts of a single lease sale, it does establish the physical overlap between virtually all areas used by Inupiat living in Barrow, Nuiqsut, and Kaktovik and the combined current and potential petroleum lease sale areas. In addition, we document Inupiat reports of land-use conflicts in Chapter Seven.

Perceived Threats to Subsistence and Cultural Values

While the actual threats to subsistence resources have yet to be sufficiently defined to serve as a basis for impact forecasts, Inupiat perceptions of threats are a reality that can be measured. We believe such perceptions are an important area of impact in themselves because they appear to be associated with significant social stress.

PUBLIC HEARING TESTIMONY

The measurement of perceived threats can itself easily be a source of social stress. Residents have already faced numerous development proposals and have voiced their concerns repeatedly in public hearings and law suits. We discussed this issue with North Slope leaders during the research design phase of our study and concluded that an extensive data collection effort would be unacceptable to community residents. However, we also found that the long history of public testimony offers a rich source of information. We therefore designed our study around the public record and augmented this record with key informant interviews.

Public testimony is a difficult source of data to use because it is not organized by subject and because it is voluminous. To circumvent these problems, we devised a coding scheme whereby each mention of a type of impact constitutes a separate entry in a data file. One person's testimony can therefore generate dozens of separate entries. In this way, we can determine the frequency with which each specific impact is mentioned.

We also designed the coding scheme to serve as an analytical data base and as an index to the testimony. We wanted to be able to match the testimony of individuals over time and to compare testimony concerning different development proposals. Since the entire data base is a part of the public record, we coded the name of the person testifying along with the date of the testimony and

the hearing title or other reference as to the reason the testimony was given. Other potentially significant characteristics included in the coding scheme were:

- Location where the testimony was given
- Village of residence
- Organizational affiliation (up to three organizations)
- Sex
- Age
- Geographic reference (especially onshore/offshore)

We also attempted to categorize the testimony according to whether it primarily reflected an individual's point of view or experience, a group point of view or experience, generally accepted Inupiat knowledge, or scientific knowledge.

To meet its indexing objective, each subject entry included the page number of the original testimony, a keyword reference to specific animals, a flag for references to specific geographic locations, a flag if the testimony included detailed personal experiences, and a flag if recommendations were given.

Each original entry consists of a five-by-eight-inch card that includes a written paraphrase or quote from the testimony. We also entered the numerically coded data and the name of the person testifying on the University of Alaska computer. We created an SPSS

system file using the raw data and an appropriate set of variable and value labels. It is thus possible to perform cross-tabulations on the data and to use the computer file as a reference to either the cards or the original testimony.

The public hearing testimony proved to be a valuable source of Inupiat perceptions. However, it is important to recognize the limitations inherent in the use of public hearing testimony. First, those testifying may not present a representative view of resident perceptions. The majority of the Inupiat adult population in the three villages in which hearings were conducted never testified. Second, much of the testimony given at small village hearings is spontaneous, and some of it was apparently influenced by previous testimony. Therefore, some subjects may receive disproportionate attention by chance rather than because they are relatively more important. Public hearings are also political events; at times, speakers appeared to place more emphasis on pleasing other residents or intimidating the hearing officers than they did on expressing new perspectives or facts.

Speakers attempting to follow a chain of causality also may have stopped testifying before they have reached what logically could be a final impact. For example, we observed little testimony concerning the social and cultural impacts associated with the loss of subsistence resources. It may be that residents do not perceive that such impacts will occur. Alternatively, they may have felt

that they had spoken long enough before they reached the point that they would logically raise social and cultural issues. A third possibility is that they may not wish to publicly discuss or perhaps even privately recognize outcomes that would strike at the core of their existence. Finally, residents may not perceive some incremental but significant changes in their lives.

The North Slope case is particularly suited for an analysis of the public hearing record for two reasons. First, some ten years of relevant testimony exists. This method could not be applied in areas which have not repeatedly faced similar development proposals. Second, there was widespread public participation in the villages of Barrow, Nuiqsut, and Kaktovik. Over 150 individuals or almost 20 percent of the Inupiat adult population testified at least once. This reflects an unusually high rate of public participation when compared with most public hearings. Furthermore, those testifying generally did not represent special interests, but rather spoke for themselves or on behalf of local or regional governments or tribal organizations. While it is important to keep in mind that the Inupiat perceptions reported in Chapter Seven are not based on a scientific sampling of the Inupiat population, these perceptions do reflect the views of concerned individuals who chose to participate in a legally mandated form of public involvement. Just as we currently accept election results that are based upon the participation of a minority of eligible voters, so, too, can we argue that public hearing testimony can be interpreted as a valid

representation of public perceptions in its own right, particularly when it is based on relatively widespread public participation.

We also pointed out that the dynamics of the public hearings themselves may influence the content of individual testimony. In our judgment, these influences may produce minor distortions in the content of the public record but are unlikely to seriously misrepresent public perceptions. Our judgment is based on the fact that the record we analyzed included legal affidavits and formal resolutions which were not subject to spontaneous revisions in content, yet reflected the same perceptions as those contained in the public hearing record. In addition, we questioned our key informants about their testimony and probed to see if their testimony was incomplete. According to our key informants, the public record accurately reflects their views.

We could not resolve the question of why there was little testimony concerning social and cultural impacts on the basis of our key informant interviews. This fact, coupled with the expectation that the dynamics of the public hearings colored the content of the public record to some degree, prompted us to focus on the presentation of Inupiat perceptions within each subject area rather than to embark on an in-depth analysis of the relative frequency that subjects came up in the testimony. Used in this way, we believe the North Slope public record constitutes a valuable source of information on Inupiat perceptions.

KEY INFORMANT INTERVIEWS

The next step in our forecasting method was to identify key informants to verify our interpretation of the testimony, to fill in gaps in the testimony, and to extend the testimony to include the area proposed for Lease Sale 87. We selected key informants on the basis of the scope and frequency of their previous testimony, assuming that these factors suggested both knowledge and concern. We interviewed 19 key informants in August 1982 in the villages of Nuiqsut, Kaktovik, and Barrow. To produce a record comparable to that already coded, we recorded each interview on tape, arranged for translations where necessary, and transcribed the tapes.

We had hoped that the key informant interviews would produce documentation of Inupiat perceptions that would be of higher quality than that in the public hearing record. We reasoned that an extended interview would allow the individual more time to organize and voice their views. Instead, we found that, much like a legal deposition, the written transcription often appears disjointed and fragmentary, reflecting the conversational nature of the interview. In order to provide future researchers with a useful record of our field interviews, we edited the transcripts to produce more concise, grammatically correct documents that capture the meaning of the original interviews. These transcripts are contained in Appendix G, a separate document.

The key informant interviews successfully met the verification objective. Informants usually briefly reiterated their testimony when we described our interpretation of their public statements. It was difficult, however, to get the informants to expand on their previous testimony. We were particularly unsuccessful in getting informants to distinguish between the perceived threats posed by successive offshore development proposals such as Lease Sales 71 and 87. To some extent, deficiencies in the interview process may account for this result. However, we believe the more important reason is that many Inupiat residents perceive that any offshore development can result in regionwide threats to subsistence resources and cultural values. They expect that the combination of currents and migratory movements of subsistence resources will ensure contact between spilled oil and each resource.

One of the deficiencies of past SESP reports based on key informant interviews is that it is impossible to validate the interpretations of the researchers. Private field notes contain the only record of the content of the interviews. We chose to record our interviews on tape so that other researchers could review our interpretations and use transcripts of the interviews as raw data in their own studies. We encountered two significant problems with this approach. First, taped interviews consisting of relatively short questions and answers are much more difficult to reliably transcribe than interviews in which the informant talks at length. The frequency of incomplete sentences and garbled conversation is much higher.

Second, some respondents provided substantially more information when the interview was not being taped. Thus, there is a tradeoff between the amount of information produced for use in this study and the amount available for future studies.

On balance, we recommend continued use of tape recording for subject matter that is not controversial. We suggest researchers not follow our approach of holding a single, hour-long interview session; rather, we think an initial on-taped session is required to establish rapport and to verify past testimony. Subsequent interview sessions should then be arranged to address single topics. Some of these sessions would be taped. To increase the probability that the topics are completely covered and that the informants' views are correctly interpreted, we strongly recommend the use of a two-person interview team. We found the approach to be clearly superior to that employing a single interviewer.

Influence of Local Institutions on Development Activities

The North Slope case is a good example of why it is difficult to project patterns of institutional behavior and outcomes of institutional actions. It is even difficult to project which institutions will attempt to influence development activities. Yet, as we observed in Inupiat testimony, a sense of local control is a critical ingredient in the determination of the intensity of fears about potential development impacts.

Given the inevitable uncertainties associated with forecasting the influence of local institutions on development activities, it makes little sense to adopt a complex research method to approach the problem. We began by identifying the local institutions which have attempted to influence development in the past or which potentially are in a position to do so in the future. We then identified the strategies used by these institutions to exert some influence over development activities and reviewed the outcomes of past influence attempts. Based on this assessment, we projected future institutional behavior and projected the likelihood of success in influencing development activities.

In the case of the North Slope, the number of institutions attempting to influence development and the number of intervention strategies employed is relatively large. We can, therefore, be more confident in our projections than we could in a region where many strategies are as yet untested. It may be the case that one or more potential local institutions do not even exist in a study region. For example, many regions are not organized as boroughs and no other region in Alaska contains a formally recognized regional tribal institution formed under the Indian Reorganization Act. In these cases, one would have to first assess the likelihood of new institutions developing in response to anticipated development.

Social and Economic Well-Being

The mere measurement of the economic well-being of rural Alaskans is a formidable task. The methods employed will inevitably be largely determined by the data available. In most cases, current, reliable data differentiating Native and non-Native income, employment, housing quality, subsistence resource use, and other critical contributors to economic well-being simply do not exist. At the moment, it is possible to use data from the 1980 federal census to estimate family and household income by race. Rapid economic fluctuations, however, will quickly render even this source obsolete.

On the North Slope, we are fortunate to have a wealth of relevant, although somewhat dated, information from a survey of the Inupiat population funded by the National Science Foundation. The North Slope Survey should serve as a prototype for a program of periodic surveys in each region facing offshore development. We are well aware of the current ban on survey research within the SESP program. We also recognize that it is impossible to seriously describe, analyze, and project changes in economic and social well-being without reliable information developed through survey research. If the SESP program cannot be modified to provide for the collection of household information on income, employment, cost of living, housing quality, and subsistence activity, we think future Requests for Proposals (RFPs) should omit requirements to produce baseline descriptions and impact projections which must be based on such information. Otherwise, the SESP program will simply foster

the application of inappropriate research techniques or encourage the use of bastardized survey research techniques which produce unreliable data at no savings in response burden--the underlying reason for banning surveys in the first place.

Inupiat Culture

In order to address the issue of whether OCS development will change Inupiat culture, researchers inevitably must develop operational measures which describe the culture and are sensitive to cultural change. Clearly, part of Inupiat culture is the means by which life is sustained. Thus, prevalent economic relationships must be a central component of any analysis of Inupiat culture. Relatively common and enduring social relationships are relevant to an analysis of Inupiat culture as well. Traditional Inupiat production activities probably are responsible for several forms of social relationship which ethnographers and the Inupiat themselves associate with the Inupiat cultural identity. These relationships include the sharing of subsistence products among other households and various cooperative activities. Obviously, the language used to pursue the particular production activities and attendant social relationships that traditionally existed on the North Slope is another core element of Inupiat culture, as are the beliefs about man-environment relationships and the ceremonies and celebrations which affirm those beliefs.

Each of the above elements of Inupiat culture are, of course, subject to change. We are interested in the emergence and societal recognition of qualitatively new forms of behavior. Most likely, however, such new forms of behavior will not emerge simultaneously throughout the population; rather, a growing proportion of the population will adopt the new form of behavior. Until a large segment of the population has made this change and the change is sustained over two or more generations, it is impossible to conclude that the shift indeed qualifies as a cultural change.

Here we confront the basic dilemma with regard to projecting the cultural impact of OCS development. If we wait until new behaviors become normative to recognize them as cultural changes, we will certainly have to wait a long time, perhaps several generations, in order to draw our conclusions. Alternatively, if we monitor and analyze shifts in the proportion of the population exhibiting a behavior of interest (e.g., sharing), we may be misled by temporary fluctuations in behavior. Furthermore, we would have to systematically measure changes in the incidence of behaviors using either survey research or participant observation techniques, or both. The former, as we pointed out, is not permitted, and the latter is not feasible within the time limits placed on the research. Key informants cannot be used because they will tend to refer to normative behaviors, and we are interested in long-term trends away from current norms.

The only alternative we can suggest is to track changes in the basic environmental characteristics thought to be associated with cultural attributes and to project what cultural changes might arise from these new conditions. For example, reduced subsistence harvests may discourage Inupiat from sharing. New housing may permit nuclear families to live separately with the result that there are fewer extended family relationships. These relationships amount to no more than untested hypotheses, and they are by no means a certainty. Worl and Lonner, for example, maintain that sharing has continued despite harvest restrictions and that extended family relationships continue to be maintained among households who now live as nuclear families (1981:26,190). We cannot confirm their conclusions without data that currently cannot be collected.

Again, we must return to the issue of acceptable and feasible forms of data collection. If the SESP program must project the cultural impacts of OCS development, we recommend that a small number of operational measures be developed and that appropriate forms of data collection be instituted.

CHAPTER THREE

NORTH SLOPE OIL DEVELOPMENT OVERVIEW

In this chapter, we provide a brief overview of oil development activities on the North Slope and estimates of oil reserves. Our purpose is to provide an introduction to this subject for readers unfamiliar with North Slope oil development. We have based our discussion on the U.S. Geological Survey's Arctic Summary Report (USGS Open File Report 81-621, October 1981), the May 1982 Update to this report (USGS Open File Report 82-19), the Minerals' Management Service's Arctic Summary Report (January 1983), and the National Petroleum Council's U.S. Arctic Oil and Gas (December 1981). We recommend these studies to those interested in a detailed review of North Slope oil development.

Oil Development Activities

In describing oil development activities, it is convenient to divide the North Slope into the following different areas:

- State-owned lands and offshore lease areas

- Federal-owned lands

 - National Petroleum Reserve Alaska (NPRA)

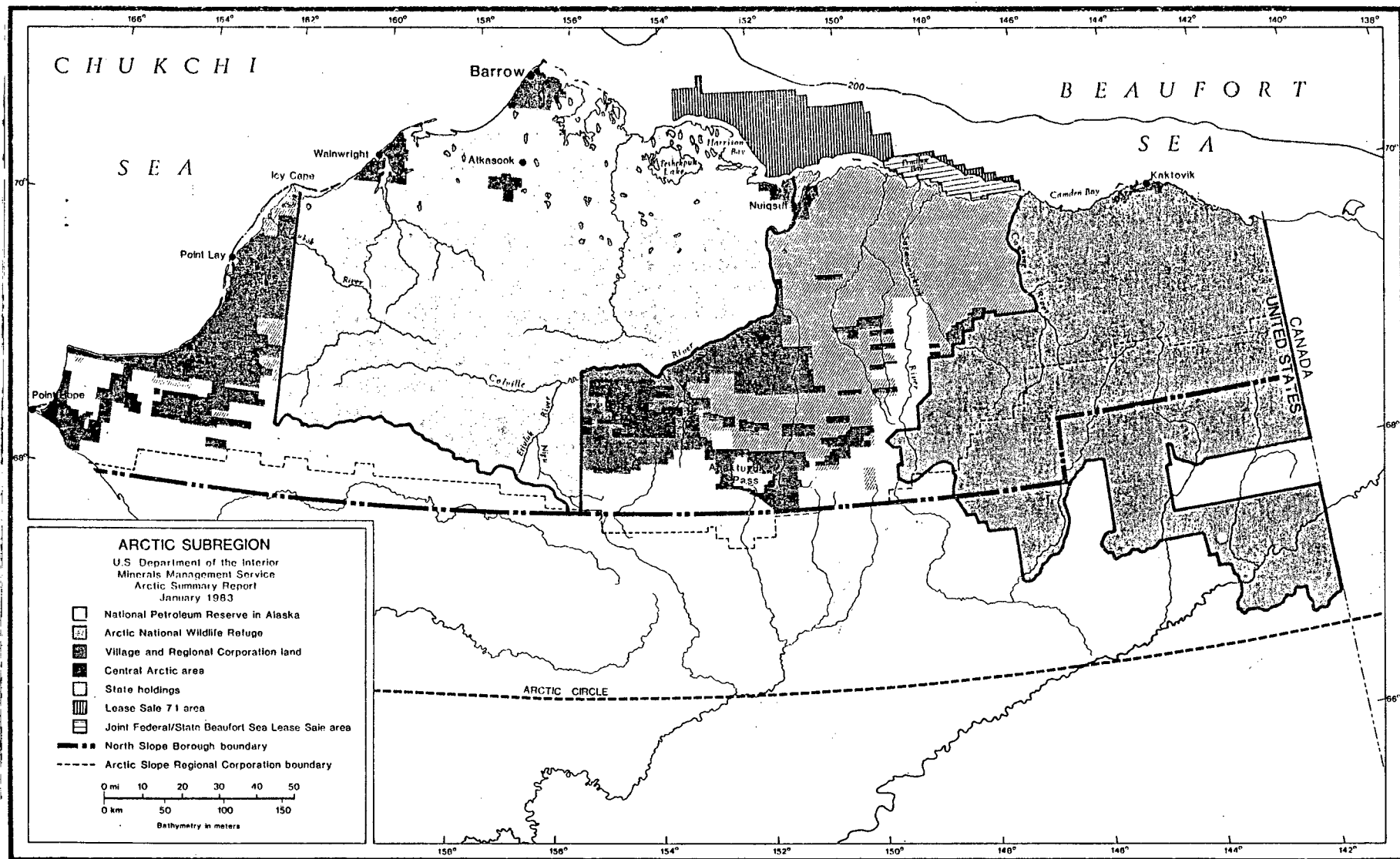
 - Arctic National Wildlife Range (ANWR)

- Native lands

- Federal offshore lease areas

These areas are shown in Figure 2 below.

FIGURE 2. NORTH SLOPE LAND OWNERSHIP AND LEASE SALE AREAS



SOURCE: Joanne Barnes Jackson and Frederick N. Kurz, *Arctic Summary Report*. Prepared for Minerals Management Service (1983), p. 5. Map prepared by Rogers, Golden, and Halpern.

State lands are mostly in an area located along the coast that is about 100 miles long and 50 miles wide and centered at Prudhoe Bay. Additional state lands are located to the south of Prudhoe Bay and to the west of the pipeline corridor. The state also has jurisdiction over submerged lands in a three-mile-wide strip along the coast. The state and federal governments have disputed the definition of this limit. Federal lands include the Arctic National Wildlife Range (ANWR), located to the east of these state lands, and the National Petroleum Reserve in Alaska (NPRA), located to the west. Native lands are located immediately around North Slope villages and in larger areas to the west and south of the NPRA. Federal offshore lease areas are beyond the three-mile limit.

Below we review past, current, and planned development activities for each of these areas.

STATE-OWNED LANDS

The State of Alaska selected 1.6 million acres in the Prudhoe Bay vicinity in 1964 as part of its land entitlement under the 1958 Statehood Act. The state conducted a number of lease sales beginning in 1964. In January 1968, a major discovery was announced at Prudhoe Bay. The main formation, known as the Sadlerochit reservoir, contains an estimated 9.6 billion barrels of recoverable oil and 20 trillion cubic feet of salable natural gas. Delineation and production drilling were carried out between 1968 and 1977, when production of oil began with the completion of the Trans-Alaska

Pipeline. In 1982, production was approximately 1.5 million barrels per day. ARCO operates the eastern side of the Prudhoe Bay field while Sohio operates the western side. Facilities in place include production structures, base camps, gravel roads, two gravel docks, two airstrips, a power station, and a small field refinery. Eventually, a total of 900 development wells, including water and gas injection wells, will be drilled. Work has begun on the water-flooding project to enhance recovery from the field.

The Kuparuk field is located approximately 20 miles to the west of Prudhoe Bay. Although smaller than the Sadlerochit reservoir, it is still one of the largest oil fields in the United States, with total recoverable resources of 1.2-1.5 billion barrels. ARCO began production from Kuparuk in 1981, and production was approximately 90 thousand barrels per day in 1982. When fully developed, Kuparuk will have up to 800 producing and water-injection wells.

In 1979, the state and federal governments conducted a joint lease sale (Sale BF) in shallow waters to the north and east of Prudhoe Bay, primarily inside the barrier islands. Several fields have been discovered within the lease area and are being considered for development. Much of the Sale BF drilling has taken place on natural islands. In addition, as of May 1982, ten gravel islands and two ice islands had been constructed. A development plan has been proposed for the Sag River/Duck Island unit which would involve

construction of several gravel islands, a causeway, and an underwater pipeline with production beginning as early as 1988.

Table 1 provides summary information about oil fields on state-owned lands.

TABLE 1. OIL FIELDS ON STATE-OWNED LANDS

<u>Unit</u>	<u>Location</u>	<u>Volume</u>	<u>Development</u>
Prudhoe Bay	Prudhoe Bay	Recoverable reserves 9.6 billion barrels oil; 20 trillion barrels gas	Production began 1979, current production 1.5 million barrels per day
Kuparuk	25 miles west of Prudhoe Bay	Recoverable reserves 1.5 billion barrels oil	Production began 1981, current production 90 thousand barrels per day
Sag River/ Duck Island	10 miles east of Prudhoe Bay	Recoverable reserves 300-500 million barrels of oil	Development plan proposed with production beginning 1988. Could produce 100,000 barrels per day by 1990
Gwydyr Bay	15 miles west of Prudhoe Bay	-	Development being considered
Milne Point	25 miles northwest of Prudhoe Bay	-	Development being considered
Flaxman Is.- Pt. Thompson	60 miles east of Prudhoe Bay	-	Development being considered

NATIONAL PETROLEUM RESERVE IN ALASKA

Oil seeps were discovered in 1904 on what is now the National Petroleum Reserve in Alaska. This area was designated Naval Petroleum Reserve Number 4 (NPR-4) by executive order in 1923. The U.S. Navy conducted an extensive mapping and exploratory drilling program on NPR-4 from 1944 until 1953. During 1949 and 1950, the Navy drilled several wells near Barrow in order to develop natural gas supplies for its Barrow station. These were the first development wells on the North Slope. In 1976, jurisdiction of NPR-4 was transferred from the Navy to the Department of the Interior, and it was redesignated the National Petroleum Reserve in Alaska.

Legislation passed by the U.S. Congress in 1980 called for competitive leasing for oil and gas exploration and development within NPRA. Lease sales were held in 1981 and 1982, with oil companies' accepted bids totaling \$67 million. A third sale is scheduled for July 1983. Due to its remoteness, only very large discoveries could be economically developed in most of the NPRA.

ARCTIC NATIONAL WILDLIFE RANGE

Under a provision of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), the U.S. Fish and Wildlife Service is conducting a baseline study of the coastal plain in ANWR in order to establish guidelines for oil and gas exploration. ANWR is believed to have considerable oil and gas potential along the coast, both on-

and offshore. Limited seismic exploration work will be allowed in 1983, but there are as yet no provisions for follow-up drilling or leasing.

NATIVE LANDS

The Arctic Slope Regional Corporation has title to 4.3 million acres in the North Slope Borough. The corporation has entered into agreements with a number of oil companies to permit exploratory work on ASRC lands with options to acquire oil and gas leases. Several wells have been drilled southeast and west of NPRA, but all have been reported as dry holes. Recently, ASRC has obtained lands near Cape Halkett and has negotiated a trade of title to lands located in the Brooks Range for title to lands with high petroleum potential currently located in the Arctic Wildlife refuge.

FEDERAL OFFSHORE LEASE AREAS

Following the 1979 joint federal-state lease sale (Sale BF), the first federal OCS lease sale in the Beaufort Sea was Sale 71 which took place in October 1982. The U.S. Geological Survey's mean resource estimates for this sale were 2.38 billion barrels of oil and 1.70 trillion cubic feet of gas, with a 99 percent chance that commercial quantities would be found. These very favorable prospects were reflected in the bidding for the sale, with accepted bids totaling over \$2 billion. The tracts receiving the highest bids were located north of Harrison Bay, to the northwest of Prudhoe Bay.

Additional federal OCS lease sales planned in waters off the North Slope are shown in Table 2. Sale 87, which is the focus of this report, is scheduled for June of 1984.

TABLE 2. SCHEDULED FEDERAL OCS LEASE SALES
IN THE BEAUFORT AND CHUKCHI SEAS

<u>Sale Number</u>	<u>Sale Date</u>	<u>Location</u>
71 (Diapir Field)	October 1982	Beaufort Sea, north and west of Sale BF
87 (Diapir Field)	June 1984	Beaufort Sea, north and west of Sale 71
85 (Barrow Arch)	February 1985	Chukchi Sea, west of Barrow
97 (Diapir Field)	June 1986	Beaufort Sea
109 (Barrow Arch)	February 1987	Chukchi Sea, west of Barrow

Estimates of Oil Reserves

There is great uncertainty about how much oil and gas might actually be discovered on the North Slope, when and where it might be discovered, and the extent to which it might be economically recoverable. Most estimates of undiscovered resources are based on analyses of geologic structures. Whether these structures actually hold oil and gas can be determined only by drilling. Before drilling actually takes place, reserve estimates remain highly uncertain.

Table 3 shows the National Petroleum Council's mean estimates of North Slope oil and gas resources. Economically recoverable undiscovered resources are estimated to total 16.3 billion barrels, with 6.5 billion barrels onshore (compared to 10.2 billion barrels already discovered onshore), and 9.8 billion barrels offshore. Table 4 shows U.S. Geological Survey mean estimates of North Slope oil and gas reserves. These U.S.G.S. total estimates of undiscovered recoverable resources are slightly lower than the National Petroleum Council's estimates, but are roughly similar in magnitude.

Future North Slope Oil Development Activity

Many factors other than future resource discoveries will influence oil development activity on the North Slope. These include world energy prices (which determine in large part whether discovered resources are economically recoverable); oil company operating strategies; local, state, and federal policies and regulations affecting onshore and offshore leasing, exploration, and development; and court decisions on lawsuits concerning these policies. All of these factors will influence the timing and character of future oil development on the North Slope, and the kinds of socioeconomic impacts oil development will have upon the Inupiat. The uncertainty introduced by all of these factors with respect to the overall pattern of future oil development magnifies the uncertainty associated with the specific impacts of any given lease sale, such as OCS Lease Sale 87.

TABLE 3. NATIONAL PETROLEUM COUNCIL MEAN ESTIMATES
OF NORTH SLOPE OIL AND GAS RESOURCES

	<u>Total(a)</u>	<u>Oil(b)</u>	<u>Gas(a)</u>
<u>Discovered Resources (onshore)</u>	16.5	10.2	6.3
<u>Undiscovered Resources</u>			
Onshore	12.8	6.5	6.3
Offshore	<u>21.8</u>	<u>12.9</u>	<u>8.9</u>
Total	34.6	19.4	15.2
<u>Economically Recoverable Undiscovered Resources (c)</u>			
Onshore	6.5	6.5	-
Offshore	<u>9.8</u>	<u>9.8</u>	-
Total	16.3	16.3	-
<u>Total: Discovered and Economically Recoverable Undiscovered Resources</u>			
Onshore	23.0	16.7	6.3
Offshore	<u>9.8</u>	<u>9.8</u>	-
Total	32.8	26.5	6.3

(a) Billion barrels of oil equivalent.

(b) Billion barrels.

(c) Providing a 10 percent rate of return.

SOURCE: National Petroleum Council, 1981. U.S. Arctic Oil and Gas
(Washington, D.C., National Petroleum Council, December),
pp. 13, 18, 19, 89.

TABLE 4. U.S. GEOLOGICAL SURVEY MEAN ESTIMATES OF
NORTH SLOPE OIL AND GAS RESERVES

	<u>Total(a)</u>	<u>Oil(b)</u>	<u>Gas(a,c)</u>
<u>Discovered Resources (onshore)</u>	13.5	8.3	5.2
<u>Undiscovered Recoverable Resources</u>			
Arctic Coastal Plain	7.6	4.4	3.2
Northern Foothills	3.5	1.4	2.1
Southern Foothills and Brooks Range	0.6	0.2	0.4
Onshore Total	11.7	6.0	5.7
Beaufort Sea (d)	13.2	7.0	6.2
Chukchi Sea (d)	2.5	1.4	1.1
Offshore Total	15.7	8.4	7.3
Total	27.4	14.4	13.0

(a) Billion barrels of oil equivalent.

(b) Billion barrels.

(c) Gas Volumes converted to billions of barrels of oil equivalent at
1 trillion cubic feet = .178 billion barrels of oil equivalent.

(d) Water depths 0 - 200 meters.

SOURCE: U.S. Geological Survey, Arctic Summary Report, U.S.G.S.
Open File Report 81-621, page 22.

One rough indication of the possible scale of future oil development activities is provided by projections of future North Slope crude oil production done by Arlon Tussing in 1980 (Tussing, 1981). Tussing reviewed numerous oil production forecasts published by a variety of groups and assessed the factors listed above in developing assumptions about the probabilities of different levels of future oil production from different fields. Based on these assumptions, he used a "Monte Carlo" technique to develop the North Slope oil production projections shown in Table 5. These are the only production projections we have found which attempt to assess systematically the likelihood of production from different fields in arriving at overall production figures.

Under Tussing's mean projection, North Slope oil production would rise from 1.5 million barrels per day in 1982 to about 1.9 million barrels per day in 1987 and would subsequently decline. Under the low projection, no substantial increase in production would occur. Under the high projection, production would rise steadily to over 4 million barrels per day in 1998. Thus, Tussing's projections suggest that, while total North Slope oil production could rise by a factor of almost three, it is most likely that it will not increase by more than about 25 percent. Long-run employment increases in the oil industry might also fall within this range although short-run (several-year) construction employment in the development of new fields might be much higher.

TABLE 5. ALASKA NORTH SLOPE CRUDE OIL PRODUCTION PROJECTIONS
1980 - 2000

(1,000 Barrels Per Day)

<u>Confidence Level</u>	<u>Low (95 percent)</u>	<u>Most Likely (50 percent)</u>	<u>High (5 percent)</u>
1981	1,484	1,500	1,560
1982	1,484	1,539	1,597
1983	1,452	1,558	1,643
1984	1,452	1,690	1,815
1985	1,500	1,771	1,950
1986	1,530	1,808	2,133
1987	1,585	1,906	2,332
1988	1,410	1,745	2,440
1989	1,092	1,465	2,798
1990	910	1,377	2,898
1991	759	1,295	3,270
1992	750	1,289	3,566
1993	720	1,279	3,541
1994	648	1,185	3,451
1995	584	1,112	3,429
1996	569	1,094	3,820
1997	521	1,013	4,055
1998	476	935	4,220
1999	433	867	4,040
2000	394	791	3,844

SOURCE: Arlon Tussing, The Outlook for Alaska North Slope Crude Oil Production: 1981-2000, ISER Research Summary No. 8, January 1981, page 4.

CHAPTER FOUR
NORTH SLOPE BOROUGH REVENUES AND EXPENDITURES

Introduction

To date, the most significant effects of oil development on the North Slope have resulted from property taxes levied on the oil industry by the North Slope Borough. The borough has used this huge source of revenues to embark on an ambitious Capital Improvement Program (CIP). Construction and operation of CIP facilities have provided a wide variety of employment opportunities to borough residents, not only in Barrow but also in the smaller villages.

To what extent will development of federal leases on the outer continental shelf further add to North Slope property tax revenues and the borough's ability to employ local residents? In this chapter, we show that the effects of federal outer continental shelf development on borough revenues and expenditures are likely to be much smaller than they have been for past onshore development. One reason for this is that development of federal leases on the outer continental shelf would produce smaller increases in the property tax base of the North Slope Borough than those associated with onshore oil development. The most important reason, however, is that North Slope Borough's property taxes for operating revenues are presently constrained by a state limitation on per capita revenues rather than by the size of the property tax base.

While there is no legal limit on the amount of property taxes the borough can collect to pay for capital projects (both principal and interest), the scale of the borough's capital construction program will ultimately be limited by the amount of money available to operate and maintain borough facilities. Thus, even if the North Slope property tax base were to dramatically increase, we expect that the borough's combined operating and capital expenditures in real dollars will have to be less in five to ten years than they are today. This will be the case unless the state's legal constraint on North Slope Borough operating revenues is significantly reduced, which seems unlikely given the projected decline in state revenues.

We begin this chapter with a description of current North Slope Borough revenues and expenditures. Then we discuss future borough revenues and expenditures and how these might be affected by federal OCS development.

In order to study the effects of different factors affecting borough revenues and employment, we developed a model of the population and economy of the North Slope Borough. We describe the model, which we refer to as the "North Slope Model," in Appendix A. In Appendix B, we summarize the assumptions which we made in preparing a set of "base case" projections of the model. We present tables of the base case projections in Appendix C.

Our model projections are subject to the following three main sources of uncertainty: future North Slope oil discoveries and developments; state government policies and court decisions affecting the borough's tax revenues; and the borough's spending policies. Despite our uncertainties in these areas, however, the model gives us an indication of reasonable ranges for future borough revenues and expenditures and how they might be affected by future federal OCS development.

Current North Slope Borough Revenues and Expenditures

NORTH SLOPE BOROUGH REVENUE SOURCES

The North Slope Borough receives revenue from four principal sources: property taxes, intergovernmental (state and federal) transfers, charges for services and utilities, and interest earnings. Below, we discuss each of these sources of revenue.

Property tax revenues are divided between those used to pay for principal and interest on bonds and those used to pay for borough operating expenditures. There is no restriction on the rate at which the borough may tax property to raise funds for paying principal or interest on bonds. In contrast, the rate at which the borough may tax property to raise revenue for operating purposes is restricted by state law.

State law restricts property taxes collected for operating revenues in two ways. First, and most significantly, the amount of property tax which may be collected per borough resident for operating purposes is limited to the greater of two numbers:

- \$1,500 or
- 6.75 percent of the average per capita assessed value of property in Alaska.²

The second formula has been used in recent years since it allows the borough to collect more taxes. In fiscal years 1981, 1982, and 1983, the per capita revenue limit for the borough, as determined by this formula, was \$3,614, \$3,915, and \$4,761, respectively (based on North Slope Borough Budget Document, FY 1982-83, p. 21). A second restriction imposed by state law is that the annual property tax rate for operating revenues may not exceed 30 mills (three percent of assessed value). However, this law is not presently restricting borough revenues since the mill rate for operating revenues is far below this limit. (The fiscal year 1982 mill rate for operating revenue taxes was 5.47 mills.)

More generally, the limit on borough property taxes for operating revenues may be expressed as the smaller of the values given by two alternative formulas:

²Legally, one arrives at this figure by limiting property tax collections to three percent of a maximum assessed value arrived at by multiplying 225 percent of the average per capita assessed value of property in Alaska by the number of residents of the borough.

- $\frac{\text{Borough Population}}{\text{State Population}} \times \text{Total Assessed Value of Property Statewide} \times .0675$
- $\text{Total Assessed Value of Property Within the Borough} \times .03$

These formulas follow directly from the operating revenue limit rules discussed above. At present, the first formula is that which is limiting revenues.

There are several important aspects of this formula to keep in mind when considering future borough revenues and the effects of OCS development upon borough revenues. First, the limit is proportional to the borough population. Thus, the legal definition of the borough's population--in particular, the extent to which oil field workers who reside in other areas of the state are included in the legal population--is a key factor affecting borough revenues. Second, it is statewide property values, rather than property values within the borough, which currently limit borough revenues. At present, the effect on borough revenues is the same whether an increase in property values occurs within the borough or elsewhere in the state.³

³The only difference is the effect on the mill rate paid for property taxes within the borough. To the extent that property values rise within the borough, the mill rate is lower. However, the total amount which may be collected by the borough remains the same. See Alaska Statute 29.53.045, quoted in Alaska Department of Community and Regional Affairs, Alaska Taxable 1981, Vol. XXI (January 1982), Appendix G., p. 121.

In addition to property tax revenues, the borough receives revenues from the state and federal governments under a number of programs. Most of these funds are specifically earmarked for certain purposes. The greatest share is for education. Two years after the borough spends funds for school capital outlays or school debt service, the state reimburses the borough for 50 percent of these expenditures (75 percent for vocational facilities). The state also supports a significant proportion of school operating expenses.⁴ The borough collects some revenues from charges for services and utilities. Most services and utilities are run at a deficit.

The borough also levies a three percent sales tax which is restricted to the first \$1,000 of each sale. Another important source of revenue is interest earnings on investments of the borough. The use of interest earnings on some funds is restricted to capital projects and debt repayments.

CURRENT NORTH SLOPE BOROUGH REVENUES

Table 6 summarizes the fiscal year 1983 North Slope Borough general fund revenue estimates. Total projected revenues are \$185 million, of which property taxes account for \$134 million, or 72 percent. Much of this money must be used to pay for previous borough

⁴The state provides a relatively lower share of operating expenses for education than in many other areas due to higher operating costs in the North Slope Borough. In addition, the North Slope Borough has not received direct school construction appropriations from the state (Robert Dupere, personal communication, February 22, 1983).

TABLE 6. NORTH SLOPE BOROUGH FISCAL YEAR 1982-1983
GENERAL FUND REVENUE ESTIMATES^a

	<u>Thousands of Dollars</u>	<u>Percent</u>
Property Taxes: Total	134,205	72
For Operations	33,796	18
For Debt Service	100,370	54
Sales Taxes	4,228	2
Interest Income	15,000	8
Restricted to Debt Service ^b	11,218	6
Other	3,782	2
Intergov't Revenues: Total	28,014	15
Debt Service for		
School Facilities	8,959	5
Education Operating Expenses	13,903	8
Health and Social Services	2,475	1
Other	2,677	1
Charges for Services ^c	3,903	2
TOTAL	185,350	100
Restricted to Debt Service	120,347	65
Other Funds	64,803	35

^aTotals may not add exactly due to rounding.

^bAssumes that the share of interest income restricted to debt service is the same as for property taxes.

^cExcludes Service Area Number 10 (Prudhoe Bay industrial area).

SOURCE: North Slope Borough, Budget Document, FY 1982-1983, pp. 10, 21-33.

expenditures. Over \$100 million of these property taxes must go toward debt service. The borough must apply another \$9 million of intergovernmental revenues to debt service on school facilities. Some interest income is likewise restricted to debt service. We could not determine the exact share of interest income that must be applied to debt service. If we assume that this share is the same as for property taxes, then the projected revenues that are restricted to debt service total \$121 million, or 65 percent of total revenues. Thus, projected revenues other than those for debt service total \$65 million. Of these revenues, property taxes account for 52 percent.

Table 7 presents a similar breakdown of borough revenues for the past five fiscal years. Over this period, total borough revenues more than tripled. However, almost all of the increase in revenues had to be applied to debt service. While revenues for debt service increased by a factor of more than ten between FY 1979-1980 and FY 1982-1983, there was almost no change in other revenues.

TABLE 7. SUMMARY OF NORTH SLOPE BOROUGH GENERAL FUND REVENUES (MILLIONS OF DOLLARS)^a

	<u>Actual FY 78/79</u>	<u>Actual FY 79/80</u>	<u>Actual FY 80/81</u>	<u>Revised Budget FY 81/82</u>	<u>Budget FY 82/83</u>
Property Taxes	35.1	52.4	59.1	110.3	134.2
For Debt Service	9.0	26.2	32.8	74.2	100.4
For Operations	26.1	26.3	26.2	36.1	33.8
Sales Taxes	1.9	2.1	3.7	3.3	4.2
Interest and Rental Earnings	6.5	7.4	24.0	8.9	15.0
Restricted to Debt Service	1.6	3.7	13.3	6.0	11.2
Other	4.8	3.7	10.7	2.9	3.8
Intergovernment Revenue	12.3	16.2	26.2	27.0	28.0
For School Construction and Debt Service	-	2.4	7.0	8.0	9.0
Other	-	13.8	19.2	19.0	19.0
Charges for Services	0.9	1.6	1.0	2.8	3.4
Miscellaneous	0.5	-	-	-	-
TOTAL	57.2	94.3	113.9	152.3	185.4
Funds Restricted to Debt Service	10.6	32.3	53.1	88.2	120.6
Other Funds	46.6	62.0	60.8	64.1	64.8

- Not available.

^aTotals may not add exactly due to rounding.

SOURCE: North Slope Borough, Budget Document, FY 1982-83, p. 10.

Table 8 provides selected comparisons of 1981 property values, taxes, and debt for the North Slope Borough, the Municipality of Anchorage, and the Fairbanks North Star Borough. This table provides some perspective on the magnitude of North Slope Borough property values, revenues, and debt. The full property value of the North Slope Borough in 1981 was almost as high as that in Anchorage and more than double the full value of all property in Fairbanks. Oil and gas property accounted for 93 percent of the total North Slope property value, compared with 7 percent for Anchorage and 20 percent for Fairbanks. The per capita valuation of the North Slope Borough was more than 18 times that of either Anchorage or Fairbanks. However, North Slope Borough property owners were taxed at a rate more than twice that at which Anchorage property owners were taxed and more than three times that at which Fairbanks property owners were taxed. Per capita debt for the North Slope Borough was more than 30 times as high as for either Anchorage or Fairbanks in 1981, reflecting the tremendous scale of the borough CIP. In fact, by 1983 the borough's total bonded indebtedness was approximately equal to that of the State of Alaska--one billion dollars (Brenneman, 1983).

BOND REVENUES

The primary funding source for the North Slope Borough's long-range CIP has been general obligation bonds. As of June 30, 1981, the borough had raised \$489,300,000 from bond sales. An additional \$21,728,000 had been approved but had yet to be issued. In the fall

TABLE 8. PROPERTY VALUE, PROPERTY TAXES, AND DEBT:
 SELECTED COMPARISONS OF NORTH SLOPE BOROUGH,
 MUNICIPALITY OF ANCHORAGE, AND FAIRBANKS
 NORTH STAR BOROUGH, 1981

	<u>North Slope Borough</u>	<u>Municipality of Anchorage</u>	<u>Fairbanks North Star Borough</u>
Population	7,098	180,740	51,659
Full Value Determination (millions of dollars)	6,705	8,003	2,607
Total Property Taxes (millions of dollars)	110.3	59.5	12.8
General Obligation Bonded Debt (Millions of Dollars)	454	266	98
Per Capita Valuation	944,596	44,280	50,463
Per Capita Debt	63,990	1,473	1,894
Debt Percentage of Valuation	6.77	3.33	3.75
Property Taxes as % of Full Value	1.65	0.74	0.49
Oil and Gas Property Taxes as Percent of Total	92.6	6.8	26.1

SOURCE: Alaska Department of Community and Regional Affairs, Alaska Taxable 1981, January 1982, pp. 33, 61.

of 1981, North Slope voters approved \$392,058,000 in additional bond issues, and they approved an additional \$199,969,000 in bond issues in the fall of 1982 (North Slope Borough, 1982, Official Statement, pp. 21, 27).

There is no debt limit imposed upon the borough by statute or by the state constitution. The general obligation bonds are authorized by vote of the borough assembly and ratified by a simple majority of voters. The full faith and credit of the borough is pledged to guarantee payment of the bonds.

NORTH SLOPE BOROUGH EXPENDITURES

North Slope Borough expenditures fall into three general categories: operating expenditures, debt service, and capital expenditures. The borough finances its operating expenditures and debt service primarily with property tax revenues. It finances virtually all of its capital expenditures with general obligation bonds. Table 9 summarizes borough expenditures for fiscal years 1979-1983. Expenditures in all three categories rose dramatically over this period. Table 10 summarizes North Slope Borough operating expenditures. Education consumes the largest share of the operating budget, followed by general government and community services. The share of education expenditures in the total operating budget declined from 44 percent in 1978-1979 to 33 percent in 1982-1983.

TABLE 9. NORTH SLOPE BOROUGH EXPENDITURES
(thousands of dollars)

<u>Fiscal Year</u>	<u>Operating Expenditures</u>	<u>Debt Service</u>	<u>Capital Expenditures</u>
1979 ^a	28,962	10,865	69,143
1980 ^a	39,360	29,152	90,524
1981 ^a	48,362	32,820	128,921
1982 ^b	62,611	74,150	NA
1983 ^b	69,327	100,370	NA

NA - Not available

^aActual expenditures

^bBudgeted expenditures

SOURCE: North Slope Borough, Official Statement Relating to the Original Issuance of \$80,000,000 General Obligation Bonds, Series P: Part II: Information Statement (March 31, 1982), p. 39.

TABLE 10. NORTH SLOPE BOROUGH OPERATING EXPENDITURES
(thousands of dollars)

<u>Activity</u>	<u>1978-79^a</u>	<u>1979-80^a</u>	<u>1980-81^a</u>	<u>1981-82^b</u>	<u>1982-83^b</u>
General Government	6,038	7,651	10,900	13,550	17,639
Community Issues	5,862	8,372	7,302	13,574	13,894
Roads	NA	NA	2,783	NA	NA
Health/Social Svcs.	1,687	2,100	3,414	5,144	5,602
Miscellaneous	500	NA	34	NA	NA
Housing	537	1,016	2,320	3,830	4,093
Public Safety	1,702	3,180	3,011	5,486	5,359
Education	<u>12,636</u>	<u>17,041</u>	<u>18,598</u>	<u>21,027</u>	<u>23,010</u>
TOTAL	28,962	39,360	48,362	62,611	69,327

NA - Not available.

^aActual expenditures.

^bBudgeted expenditures.

SOURCE: North Slope Borough, Official Statement Relating to the Original Issuance of \$80,000,000 General Obligation Bonds, Series P: Part II: Information Statement (March 31, 1982), p. 39.

Debt service on the general obligation bonds used to finance the Capital Improvement Program increased by a factor of nine over the five-year period. Beginning in fiscal year 1982, debt service expenditures exceeded operating expenditures. Over the three-year period 1978/79-1980/81, capital expenditures nearly doubled. By 1980-81, capital expenditures exceeded operating expenditures by over 250 percent. Although capital expenditure data for the most recent two years are not available, as of June 30, 1981, the borough had authorized the expenditure of an additional \$546 million in capital improvements over a six-year period, or an average of \$90 million/year. Thus, it is likely that capital expenditures will continue to exceed operating expenditures for several more years.

Table 11 summarizes capital expenditures by activity for the years 1978/79-1980/81. Community services (roads, utilities, and transportation facilities), educational facilities, and housing accounted for the largest shares of capital expenditures in these years. Table 12 provides a breakdown of CIP project authorization and expenditures as of June 30, 1981.

TABLE 11. NORTH SLOPE BOROUGH CAPITAL EXPENDITURES
(thousands of dollars)

<u>Category</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>
General Government	321	495	269
Community Services	10,128	22,027	55,525
Roads	3,916	6,608	9,433
Health/Social Services	37	1,722	644
Miscellaneous	13,181	-	10,339
Housing	19,352	33,281	23,989
Public Safety	253	1,990	3,627
Education	<u>21,955</u>	<u>24,401</u>	<u>25,095</u>
Total	69,143	90,524	128,921

SOURCE: North Slope Borough, Official Statement Relating to the Original Issuance of \$80,000,000 General Obligation Bonds, Series P: Part II: Information Statement (March 31, 1982), p. 39.

TABLE 12. CAPITAL IMPROVEMENTS PROGRAM STATUS
AS OF JUNE 30, 1981

(dollars)

	<u>Authorized</u>	<u>Expended</u>
School facilities	\$169,074,000	\$82,662,933
Roads	69,667,000	17,973,309
Public housing	145,875,000	39,729,287
Water facilities	73,049,000	26,953,895
Sewage treatment	82,534,000	27,263,016
Airports	17,394,000	5,578,957
Urban renewal and development	3,800,000	2,870,923
Light, power, and heating facility	57,726,000	18,964,597
Public safety facilities	29,931,000	4,506,864
Sanitary facilities	83,697,000	35,570,802
Industrial parks	48,043,000	175,000
Communications	3,168,000	2,323,838
General capital projects	3,234,000	904,236
Health facilities	19,980,000	2,402,301
Library facilities	2,800,000	46,197
Administration facilities	3,850,000	180,384
Totals	\$813,822,000	\$268,106,539

SOURCE: North Slope Borough, Official Statement Relating to the Original Issuance of \$80,000,000 General Obligation Bonds, Series P: Part II: Information Statement (March 31, 1982), p. 27.

NORTH SLOPE BOROUGH OIL FIELD FACILITIES

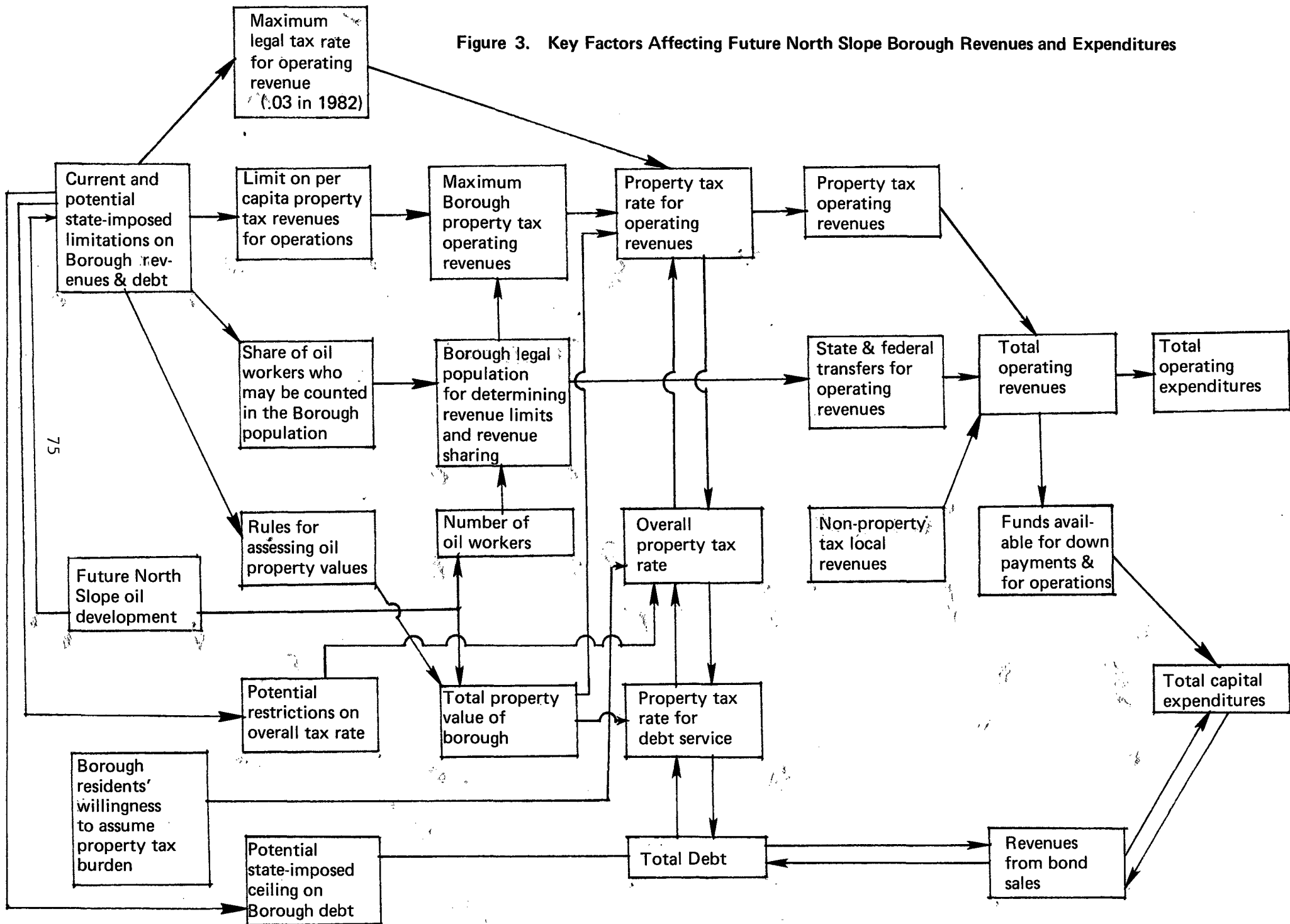
In addition to its activities in North Slope villages, the North Slope Borough operates a comprehensive sanitary facility at Prudhoe Bay that provides water, sewage treatment, solid waste incineration, and landfill to the industrial area. The borough also operates an environmental protection office at Prudhoe Bay and provides police service and search and rescue services. The borough is also planning to construct an industrial center at Kuparuk, west of the Prudhoe Bay field. The bonds used to finance both of these facilities are expected to be self-liquidating, and operating revenues should approximately cover operating costs. Since the costs and revenues of these projects approximately balance each other and these projects differ in this respect from most other borough activities, we will not include them in this discussion of borough revenues and expenditures.

Future North Slope Borough Revenues and Expenditures

Figure 3 summarizes key factors affecting future North Slope Borough revenues and expenditures. There are three primary factors potentially limiting future borough revenues and expenditures:

- Current and potential state-imposed limits on borough revenues and debt
- Future North Slope oil development (through its effects on borough property values and population)
- Borough residents' willingness to assume property tax burdens

Figure 3. Key Factors Affecting Future North Slope Borough Revenues and Expenditures



In this section, we show that it is the first of these factors--state-imposed limits on borough revenues and debt--which is likely to be the primary factor limiting North Slope Borough revenues and expenditures over the next twenty years. Due to the huge property tax base of the borough from present and projected future oil development, neither the borough property value nor the property tax burden upon borough residents is likely to constrain borough revenues.

We begin by examining the kinds of limits to borough revenues which the state has imposed or might impose. We project a range of future revenues which the borough might receive under different limitations. Next, we project a range for future borough property values. We then project a range for future property tax rates, given our projected ranges for revenues and property values. Our projected tax rates are low enough for us to conclude that property values are unlikely to constrain borough revenues over the next two decades.

STATE-IMPOSED LIMITATIONS TO NORTH SLOPE BOROUGH REVENUES

The reasons for state-imposed limitations on North Slope Borough revenues are to be found in the direct tradeoff between revenues received by the North Slope Borough and revenues received by the State of Alaska and by other municipalities throughout the state. Oil developments on the North Slope represent an enormous property

tax base. However, there are economic and political limits to the total property taxes which can be raised from this tax base. To the extent that these limits are not reached by the North Slope Borough, property taxes can be collected on North Slope oil properties by the state and indirectly by other municipalities through state revenue-sharing programs. Limitations on borough revenues may be understood as attempts by residents of other areas of the state to limit the share of the total North Slope property "tax pie" which is taken by the North Slope Borough in order to obtain more for themselves.

At present, the division of the property tax pie works as follows. The State of Alaska taxes oil and gas property at a rate of 20 mills (2 percent). Property taxes collected by municipalities (such as the North Slope Borough) are subtracted from this tax obligation. Thus, up to a tax rate of 20 mills, any increase in borough oil and gas property tax revenues (which account for almost all borough property tax revenues) results in a decrease in state revenues. Above a tax rate of 20 mills, further increases in borough property tax revenues would no longer directly translate into lowered state revenues. However, they might have other indirect statewide effects such as potentially discouraging future North Slope oil development.

In 1981, the assessed value of oil and gas property within the North Slope Borough was approximately \$6.3 billion (see Table 8). At a tax rate of 20 mills, this would permit a total property tax pie of \$126 million. Total borough property taxes in 1981 were

\$110 million. Thus, the borough received 87 percent of the property tax pie in that year. Since the borough was taxing at a rate of less than 20 mills, there was a direct tradeoff between state and borough revenues.

The most important state limitation upon borough revenues at present is the restriction upon borough property taxes for operating revenues, as discussed above. This restriction may be most simply expressed as follows:

$$\begin{array}{l} \text{maximum per capita} \\ \text{property tax} \\ \text{operating revenues} \end{array} = .0675 \times \begin{array}{l} \text{per capita assessed} \\ \text{value of property} \\ \text{in Alaska} \end{array}$$

As we noted above, this formula is not tied to borough property values, except indirectly in that these values constitute a significant share of the total property value of the state. The formula is tied to the population of the borough. Thus, the procedure for determining the population of the borough--in particular the number of oil workers who may be counted in the borough's population--has become a subject of political dispute (see Table 13).

The current formula restricting operating revenues is not necessarily a good indicator of future state limitations on borough revenues. Ever since the incorporation of the borough, the struggle over the oil property tax pie has continued in the political and

TABLE 13. LEGAL AND POLITICAL BATTLES OVER NORTH SLOPE
BOROUGH REVENUES: A BRIEF SUMMARY

July 1972	Borough formally incorporated
1973	Special legislative session establishes per capita limit on municipalities' ability to tax as well as ceiling on property tax rate
1973-1974	Oil company suit attempts to exclude Prudhoe Bay area from North Slope Borough
1976	Legislature increases municipalities' per capita property tax revenue limit from \$1,000 to \$1,500
1976	Oil company suit argues borough cannot tax property above limit for debt service; borough bonding delayed
1978	State Supreme Court rules borough not limited in debt service bonding
1982	Bill which would increase the share of oil workers included in borough population, thereby increasing borough property tax revenues, fails to pass legislature
November 1983	Outgoing Hammond administration signs emergency regulation to raise borough's legal population
May 1983	Legislation introduced in Alaska legislature to limit bond debt of local governments
August 1983	Alaska Commissioner of Community and Regional Affairs certifies borough population at 5,118 for revenue sharing purposes and 10,427 for tax-ceiling purposes, thus lowering borough revenue sharing receipts but raising property tax revenues

judicial arena, both over new legislation restricting revenues and in the proper interpretation of existing legislation. Nor are property taxes for operating revenues the only area in which efforts have been made to limit borough revenues; efforts have also been made to restrict sales taxes, state revenue sharing receipts, and property taxes for debt service. Table 13 provides a brief summary of past and current attempts to limit borough revenues.

Given the history of attempts to limit North Slope Borough revenues, it appears likely that the state will continue to limit borough revenues in the future and that new kinds of limitations may appear. Below, we briefly summarize six different kinds of limitations which might be introduced and their possible effects. Figure 3 also traces through these effects.

1. A tax rate ceiling on the property tax rate for operating revenues. Such a ceiling is already in effect. As we discussed above, state law prohibits the borough from taxing property for operating revenue at a rate of more than 30 mills (3 percent). However, this law is not currently restricting borough revenues since the limit on total property tax operating revenues is more restrictive.
2. A limit on per capita property tax revenues for operations. This is the limit currently restricting borough per capita operating revenues to 6.75 percent of the per capita value of property statewide. In FY 1983, it restricted borough property tax operating revenues to \$4,761 per capita. The formula could be changed in the future, conceivably to a lower share of per capita statewide property value as a maximum for per capita revenues or to an altogether different basis for the limit than the per capita statewide property value.

3. Limits on the number of oil workers who may be included in the borough population in determining revenue-sharing allocations and revenues permitted under the per capita operating revenue limit. The number of oil workers who may be included in the borough's legal population has been the subject of both legislative battles and court cases. Since both revenue-sharing allocations and property tax revenue limits are determined on the basis of population, the legal definition of the borough's population directly affects the revenues of not only the borough but also other municipalities. Therefore, it is likely to remain a subject of contention.
4. Rules for Assessing Oil Property Values. The procedure used to assess oil property--in particular depreciation formulas--can greatly affect its value. The borough is likely to attempt to change these procedures in order to increase the assessed value of oil property in the future, especially after new investment has peaked and property values begin to decline. In this area, state and borough interests may be similar.
5. Potential restrictions on overall tax rate. At present, the state does not restrict the borough property tax rate for debt service revenues (or the overall property tax rate). However, such limits could be imposed in the future. Such restrictions could limit future borough borrowing for capital projects, thus restricting capital expenditures. Alternatively, given debt service requirements, they could limit operating revenues.
6. Potential state-imposed restrictions on borough debt. Such restrictions have been proposed but do not currently exist. They could limit future borough capital expenditures with significant implications for borough employment.

PROJECTIONS OF FUTURE BOROUGH PROPERTY TAX REVENUES

Given the kinds of revenue restrictions which the state has imposed on the borough in the past and which it might impose in the future, what is a reasonable range for future borough revenues, assuming state restrictions are the primary limiting factor? We believe that

there are three main factors to consider in projecting future state limitations on borough revenues. First, current state limitations were imposed at a time of high and rising state revenues. In the future, state petroleum revenues are likely to decline, with per capita petroleum revenues declining even faster as the state population rises. Property taxes are likely to become a larger share of the declining state oil revenue pie. As a result, political competition for limited revenues between municipalities is likely to become more intense, particularly for oil and gas property tax revenues. It is likely that other regions of the state, in attempting to keep an equal share of that pie, will continue to try to limit the share of oil industry property taxes going to the North Slope Borough.⁵ They are likely to be increasingly successful since the political power of urban areas of the state is likely to increase as relatively more population growth takes place there. Thus, current revenue limitations rules are not fixed for the indefinite future. If anything, they are likely to become less favorable to the borough. More generally, we believe that it is unlikely that the share of the total municipal revenue pie received

⁵A reviewer has offered the following comment on the discussion in this paragraph: "You are editorializing the motives of those who would change the rules of the game for local greed, envy, and indeed racial prejudice. Before the Eskimo area had an industry, there was no equalizing the pie of the richer urban Alaska. The name of the game was that those that had a tax base did not share, and those with the most population got additional state aid and capital projects. The state majority is trying to do with the North Slope Borough what the eastern states are trying to do with the western states--steal their tax and resource revenues. If they have the political power, they will do so" (Robert Dupere, personal communication, February 22, 1983).

by the North Slope Borough will increase in the future; it is possible that it will decline.

Secondly, we suggest that state-imposed limits on North Slope Borough property tax revenues for operations should be considered in terms of per capita property tax revenues, with the population base being resident population. Much of the debate over North Slope Borough revenues is likely to be carried out indirectly over issues such as who should be included in the population when calculating revenue limits. However, the underlying issue will remain: how much money is the borough receiving compared to other municipalities in terms of the number of people who actually live there?

Thirdly, we feel that North Slope Borough borrowing and expenditures for the Capital Improvements Program are likely to be cut back sharply due to increased uneasiness among private lenders as well as legislators about the size of the borough's debt and the costs of operating CIP facilities.

Given these considerations, we have developed low, medium, and high cases for maximum North Slope Borough property tax revenues which might be permitted under state limitations to borough revenues and debt. These projections are shown in Table 14.

TABLE 14. LOW, MEDIUM, AND HIGH CASES FOR NORTH SLOPE BOROUGH
PROPERTY TAX REVENUES PERMITTED UNDER
STATE-IMPOSED LIMITATIONS

(millions of 1982 dollars)

Year(a)	Operating Revenues			Debt Service Revenues			Total Revenues		
	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case
1982(b)	35	35	35	87	87	87	122	122	122
1983	36	37	38	124	132	134	160	169	172
1984	36	38	40	137	150	154	173	188	194
1985	36	39	43	159	180	186	195	219	229
1986	35	39	44	173	203	213	208	242	257
1987	35	40	46	176	216	231	211	256	277
1988	34	41	49	166	217	237	200	258	286
1989	34	42	52	159	220	245	193	262	297
1990	34	43	54	124	193	223	158	236	277
1991	34	44	57	93	164	199	127	208	260
1992	33	45	60	62	133	170	95	178	234
1993	33	46	64	41	110	151	74	156	219
1994	33	47	67	31	96	139	64	143	210
1995	33	48	70	22	82	127	55	130	202
1996	32	49	71	18	74	120	50	123	199
1997	32	50	78	15	67	113	47	117	196
1998	32	51	82	14	61	108	46	112	195
1999	32	53	88	13	56	104	45	109	197
2000	32	54	92	13	52	99	45	106	197
2001	31	55	96	12	48	95	43	108	197
2002	31	56	101	12	44	90	43	100	197
2003	31	57	106	12	41	86	43	98	198
2004	31	59	113	12	38	83	43	97	203
2005	30	60	118	12	35	79	42	95	205
2006	30	61	124	11	33	76	41	94	208
2007	30	62	130	11	31	72	41	93	210
2008	30	64	138	11	29	69	41	93	231
2009	29	64	144	11	27	67	40	92	211
2010	28	65	149	11	25	64	39	90	213

(a) Projections are for calendar years. Historic data which are basis for projections were obtained by averaging fiscal year data.

(b) The 1982 values were obtained by averaging data for FY 1982 and FY 1983.

Assumptions

Low Case: Limit on per capita operating revenues declines at 3 percent per year after 1982; CIP expenditures decline at 30 percent per year after 1980.

Medium Case: Limit on per capita operating revenues remains constant; CIP expenditures decline at 10 percent per year after 1980.

High Case: Limit on per capita operating revenues increases at 3 percent per year after 1982; CIP expenditures decline at 5 percent per year after 1980.

In all cases, population projections for calculations of operating revenues are those of the base case (see Appendix C, Table C.1)

Source: 1982 values are averages of data for FY 1982 and FY 1983 reported in Table 7. Debt service revenue projections were calculated by the North Slope Model (variable RVPYDB, DSETS NSLP.2, NS.BC.MD, NSLP.3).

In the medium case, we assume that the limit on per capita operating revenues remains the same as in 1982. We develop our operating revenue projections by multiplying this limit by resident population, as projected in our North Slope Model "base case." Our medium case projections for property taxes permitted for operating revenues rises from \$36 million in 1982 to \$65 million in 2010. This growth is entirely due to increases in population.

In the low and high cases, we assume that the limit on per capita operating revenues decreases or increases by 3 percent per year, respectively. In these cases, property taxes permitted for operating revenues fall to as little as \$28 million or rise to as high as \$149 million by 2010.

Property tax revenues for debt service are more difficult to project. We based our projections on debt service requirements for past and future borrowing, given a standard debt repayment schedule and assuming three different levels of future CIP expenditures. In all cases, we assumed that future CIP expenditures would decline from current levels, due to future state restrictions on borough debt as well as increased costs of borrowing and the costs of maintaining CIP facilities. For the low, medium, and high cases, we assumed that CIP expenditures would decline at rates of 30 percent, 10 percent, and 5 percent from their 1980 levels. Obviously, none of these cases is likely to describe exactly the pattern of CIP

expenditures over time, but we believe that on average, CIP expenditures are likely to fall within this range.

Given the very large debt repayment requirements for past borough borrowing, in all of our cases, we project that borough property tax revenues for debt service will continue to rise for a number of years before eventually declining. In the medium case, they reach a peak of \$220 million in 1989 and then decline steadily to \$25 million by 2010. In the low case, they peak at \$176 million in 1987 and decline to \$11 million by 2010. In the high case, they peak at \$245 million in 1989 and decline to \$64 million by 2010.

By adding our projections for operating revenues and debt service revenues, we obtain low, medium, and high projections of the maximum North Slope Borough property tax revenues which might be permitted under state limitations to borough operating revenues and debt. In the medium case, total borough property taxes rise from \$164 million in 1982 to a high of \$262 million in 1989 and then decline steadily to \$90 million by 2010. In the low case, total revenues peak at \$211 million in 1987 and decline to \$39 million in 2010. In the high case, total revenues peak at \$297 million in 1989 and decline to \$213 million in 2010.

This range of projections serves as a bound for the level of revenues which the state might permit the borough to raise from property taxes. Below, we will examine the extent to which the

property values of the borough might constitute a constraint to revenues within this range.

PROJECTIONS OF FUTURE NORTH SLOPE
BOROUGH PROPERTY VALUES

Table 15 shows the property tax base of the North Slope Borough from 1973 to 1982. Assessed property values increased by a factor of more than 40 over this period. In 1982, the borough's property tax base was over \$8 billion. Oil and gas property accounted for over 90 percent of this value.

TABLE 15. THE NORTH SLOPE BOROUGH PROPERTY TAX BASE
(millions of dollars)

Year	Oil and Gas Property	Other Property	Total
1973	-	-	203
1974	-	-	256
1975	-	-	561
1976	-	-	1,794
1977	-	-	3,570
1978	-	-	4,716
1979	4,818	214	5,032
1980	5,451	367	5,818
1981	6,298	407	6,705
1982	7,722	547	8,269

- Not Available

SOURCE: Alaska Department of Community and Regional Affairs,
Alaska Taxable, 1977-1982.

How are borough property values likely to change in the future? Adding to property values will be the construction of new facilities. Even without any new oil discoveries, a great deal of additional investments will take place on the North Slope, including additional production wells and enhanced recovery projects. The value of facilities delivered in the 1983 sealift alone totaled over \$2 billion. Additional discoveries may result in further development, which would further add to the North Slope Borough tax base. In the distant future, development of the North Slope's extensive coal resources might also add to property values. Offsetting increases in value due to new facilities, however, will be the depreciation of existing facilities.

Oil and gas properties are assessed by the state, which uses different procedures for valuing exploration facilities, production facilities, and pipelines. Production facilities and pipelines account for all but a small share of North Slope oil and gas property values. Production facilities are valued at replacement cost, with straight-line depreciation over the field life. Pipelines are valued using a complicated formula based on the present discounted value of expected future pipeline earnings. A rough approximation of future pipeline values may be gained from straight-line depreciation of construction cost over the expected life of the pipeline. However, new discoveries of oil, by expanding the expected life of a pipeline, may cause its assessed value to increase.

In order to examine the future property tax base of the North Slope Borough, we projected the future property value under several conservative assumptions about new oil discoveries. In Table 16, we provide four different projections of North Slope property values. All of the values are in 1982 dollars. We discuss our calculation of these projections in detail in Appendix D. In general, our projections are conservative and are most likely to underestimate future property values. For example, we did not include the costs of secondary recovery expenditures in our assumptions. For federal OCS developments, we only calculated the value of onshore facilities. We assumed no new trans-Alaska oil or gas pipelines will be constructed. We depreciated the current value of the Trans-Alaska Pipeline Service (TAPS) pipeline, approximately \$2 billion, over a 30-year period, without taking into account any increase in value which might result from an extension of the life of the pipeline through new discoveries. In addition, we assumed that the real value of non-oil and gas property remains constant at \$450 million.

For our first projection, we assumed that there is no additional oil development on the North Slope beyond that which is currently scheduled. In this case, real property values reach a maximum of \$16 billion, or twice their current level, in 1987 and begin to decline gradually thereafter as the increase in value from construction of new facilities begins to be offset by the depreciation of existing facilities. However, property values do

TABLE 16. PROJECTIONS OF NORTH SLOPE BOROUGH PROPERTY
VALUES UNDER ALTERNATIVE ASSUMPTIONS ABOUT
NEW OIL RESOURCE DEVELOPMENT

(millions of 1982 dollars)

Volume and Location of New Resources Discovered

<u>Year</u>	<u>No New Discoveries</u>	<u>4 Bbb1 Federal OCS</u>	<u>4 Bbb1 NPRA</u>	<u>4 Bbb1 State Offshore</u>
1982	8177	8177	8177	8177
1983	10320	10320	10320	10320
1984	12195	12195	12195	12195
1985	13814	13814	13814	13814
1986	15192	15192	15192	15192
1987	16342	16342	16342	16342
1988	15930	15930	15930	36570
1989	15480	15480	15480	35432
1990	14992	14992	14992	34256
1991	14190	16770	33721	32766
1992	13388	15882	32267	31276
1993	12586	14994	30814	29786
1994	11783	14105	29361	28295
1995	10981	13217	27908	26805
1996	10179	12329	26455	25315
1997	9377	11441	25001	23825
1998	8575	10553	23548	22335
1999	7773	9665	22095	20845
2000	6971	8777	20642	19355
2001	6169	7889	19189	17865
2002	5367	7001	17736	16375
2003	4564	6112	16283	14884
2004	3762	5224	14830	13394
2005	2960	4336	13377	11904
2006	2158	3448	11924	10414
2007	1356	2560	10471	8924
2008	1175	2293	9638	8055
2009	994	2026	8806	7186
2010	813	1759	7974	6317

SOURCE: See text.

not decline to their present value until 1998. Subsequently, they continue to decline rapidly, due to the assumed rapid depreciation of property values in the mostly depleted oil fields.

For the remaining three cases, we assume that an additional four billion barrels of oil are discovered and developed on the North Slope. We believe that this is a conservative estimate. The National Petroleum Council's mean estimate of North Slope onshore and offshore economically recoverable oil was 16.3 billion barrels (National Petroleum Council, 1981, p. C-23).

The differences in property values in the three cases arise from differences in our assumptions about the location of the discoveries, resulting in different estimates of the value of new onshore facilities constructed. We projected future property values, given development of an additional four billion barrels for three different locations: the National Petroleum Reserve Alaska (NPR), offshore state leases, and offshore federal leases from Lease Sale 71.

Discovery and development of an additional four billion barrels of oil on federal offshore (OCS) leases has relatively little effect upon borough property values since most development is offshore. At their peak in 1991, values are about \$16.8 billion, or about \$2.6 billion higher than in the case in which there are no new discoveries. The main effect of new oil development is to delay by

about two years the decline in property values. Borough property values fall below their 1982 level after 2000.

Discovery and development of an additional four billion barrels on the NPRA or on state offshore leases would have a much more significant effect upon property values. At their peak, property values would considerably exceed \$32 million--more than four times current levels--and they would not fall below current levels before 2007. These very high property values are due to the extremely high cost of offshore development, in the case of offshore state leases development, and somewhat lower development costs combined with high pipeline costs, in the case of NPRA development.

Table 16 suggests that property values would jump abruptly in 1991 in the NPRA case and in 1998 in the state offshore case. This is because we did not assume any increase in property values until a field was actually brought on line, and we assumed that all development would be completed at once. In fact, the increase in property values, although steep, would be more gradual.

In our subsequent discussion, we will use the "no-new discoveries" case as a "low case" projection of borough property values. We use the "4 BBBL OCS case" as a "medium case," and we use the "4 BBBL NPRA case" as a "high case."

We emphasize again that these projections are only rough approximations based on a great many assumptions. However, they do illustrate the fact that the North Slope Borough's property tax base will be very large for at least 15 years, even if no new oil discoveries are made, and that new oil developments--especially onshore developments--would add significantly to this already large tax base. The conservative assumptions used in developing the property value projections tend to reinforce this conclusion.

PROJECTED NORTH SLOPE BOROUGH PROPERTY TAX RATES

In this section, we discuss current and potential limits to North Slope Borough property tax rates and compare these limits to projections of tax rates based on our revenue and property value projections. There are several current or potential limits to borough property tax rates:

1. The legal limit on the tax rate for operating revenues. This limit is currently set at 30 mills (3 percent).
2. A potential limit on the total property tax rate for operating and debt service revenues. Although such a limit does not currently exist, it might conceivably be imposed. For example, it is highly unlikely that the state would ever permit the borough to tax property at a rate exceeding 50 mills (5 percent).
3. The willingness of local taxpayers to accept a property tax burden. In most municipalities, property taxes are limited not by legal limits upon operating revenues, but rather by the willingness of the residents to tax themselves. Until recently, this has probably not been a significant factor in determining borough revenues since borough residents own only a small share of the borough property tax base. However, in 1982, the borough announced a two-month extension of the borough property tax payment deadline

to give residents having difficulty paying their taxes extra time to make these payments. This suggests that the borough property tax rate has already reached a burdensome level for local residents. As Table 17 shows, the total borough mill rate rose sharply in fiscal year 1982, reflecting the rapid growth in the collection of revenues for payment of debt service. The effective tax rate for fiscal year 1982 was 16.70 mills--over twice the average rate for Anchorage. Thus, even though residents pay only a small proportion of the total property taxes collected, the borough's revenue requirements are so high that taxes are beginning to be a burden for local residents. A reasonable upper limit on the tax rate acceptable to borough residents might be 30 mills, or 3 percent.

TABLE 17. NORTH SLOPE BOROUGH EFFECTIVE TAX RATES

<u>Fiscal Year</u>	<u>Mill Rate</u>
1976	12.3
1977	10.3
1978	7.52
1979	7.28
1980	10.35
1981	10.33
1982	16.70
1983	16.42

SOURCE: North Slope Borough, Official Statement Relating to the Original Issuance of \$80,000,000 General Obligation Bonds, Series P: Part II: Information Statement (March 31, 1982), page 14.

Of the three limits to property tax rates discussed above, the most significant may not be a state-imposed limit, but rather borough residents' willingness to accept a high tax burden. In general, it appears that the upper limit on the borough's overall tax rate in the future will be somewhere between 20 mills and 40 mills.

How does this range compare with the tax rates that would prevail, given our projected revenues permitted under state limitations and our projected borough property values? In Table 18, we have projected tax rates for three different cases. For the medium case, we assume our medium case revenue projections and our medium case property values. For the low case, we assume our low case revenues and our high case property values. For the high case, we assume our high case revenues and our low case property values.

In the medium case, our projected total tax rate on property in the North Slope Borough rises slightly, to just below 17 mills in 1989. This is because borough property tax revenues are increasing faster than the borough property value, due to high debt service payments. By 1993, tax rates decline to about 10 mills, as debt service payments decline. After 2000, tax rates rise steadily, climbing above 20 mills by 2005 and above 30 mills by 2007. This rapid increase in tax rates at the end of the projection period is due to the assumed rapid decline in property values due to depreciation and is probably unrealistically steep.

TABLE 18. PROJECTED NORTH SLOPE BOROUGH PROPERTY TAX RATES:
LOW, MEDIUM, AND HIGH CASES

Year	Rate for Operating Revenues			Rate for Debt Service Revenues			Total Rate		
	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case
1982	.0043	.0043	.0043	.0106	.0106	.0106	.0149	.0149	.0149
1983	.0035	.0036	.0037	.0120	.0128	.0130	.0155	.0163	.0167
1984	.0030	.0031	.0033	.0112	.0123	.0126	.0142	.0154	.0159
1985	.0026	.0028	.0031	.0115	.0130	.0135	.0141	.0158	.0166
1986	.0023	.0026	.0029	.0114	.0133	.0140	.0137	.0159	.0169
1987	.0021	.0025	.0028	.0108	.0132	.0141	.0129	.0157	.0170
1988	.0021	.0026	.0031	.0104	.0136	.0145	.0122	.0162	.0175
1989	.0022	.0027	.0034	.0103	.0142	.0158	.0125	.0169	.0192
1990	.0023	.0029	.0036	.0083	.0129	.0149	.0105	.0158	.0185
1991	.0010	.0026	.0040	.0028	.0098	.0140	.0038	.0124	.0180
1992	.0010	.0028	.0045	.0019	.0083	.0127	.0029	.0112	.0172
1993	.0011	.0031	.0051	.0013	.0073	.0120	.0024	.0104	.0171
1994	.0011	.0033	.0057	.0011	.0068	.0118	.0022	.0102	.0175
1995	.0012	.0036	.0064	.0008	.0063	.0116	.0020	.0099	.0180
1996	.0012	.0040	.0070	.0007	.0060	.0118	.0019	.0100	.0188
1997	.0013	.0044	.0083	.0006	.0059	.0121	.0019	.0102	.0204
1998	.0014	.0049	.0096	.0006	.0058	.0126	.0020	.0107	.0222
1999	.0014	.0054	.0113	.0006	.0058	.0134	.0020	.0113	.0247
2000	.0016	.0061	.0132	.0006	.0059	.0142	.0022	.0120	.0274
2001	.1106	.0070	.0156	.0006	.0061	.0154	.0022	.0130	.0310
2002	.0017	.0080	.0188	.0007	.0063	.0168	.0024	.0143	.0356
2003	.0019	.0094	.0232	.0007	.0067	.0188	.0026	.0161	.0420
2004	.0021	.0112	.0300	.0008	.0073	.0221	.0029	.0185	.0521
2005	.0022	.0138	.0399	.0009	.0081	.0267	.0031	.0219	.0666
2006	.0025	.0177	.0575	.0009	.0095	.0352	.0034	.0273	.0927
2007	.0029	.0244	.0959	.0011	.0120	.0531	.0040	.0364	.1490
2008	.0031	.0278	.1174	.0011	.0125	.0587	.0042	.0404	.1761
2009	.0033	.0321	.1449	.0012	.0133	.0677	.0045	.0454	.2123
2010	.0035	.0370	.1833	.0014	.0145	.0787	.0049	.0512	.2620

Assumptions

Low Case: High property value projections, low revenue projections

Medium Case: Medium property value projections, medium revenue projections

High Case: Low property value projections, high revenue projections

Tax rates calculated based on property value projections from Table 16 and revenue projections from Table 14.

In the low case, tax rates decline steadily, with an abrupt drop in 1991 due to the assumed jump in property values. Subsequently, tax rates remain below 5 mills. In the high case, tax rates increase gradually to 20 mills in 1997, 30 mills in 2001, and very high rates by the end of the period due to the sharp drop-off in property values. Again, the very steep increase in rates at the end of the period is probably unrealistic due to our conservative property value assumptions.

In all of these cases, including the high case where high revenue requirements are combined with low property values, the tax rate does not rise above 20 mills before 1997. Thus, we believe it is reasonable to conclude that property values are highly unlikely to be a constraint on North Slope Borough revenues for at least the next fifteen years. Only under the extreme assumptions of our high case are property values likely to become a constraint to borough revenues in the subsequent years. In our medium case, property tax rates would not become unreasonably high before 2005.

In summary, it appears likely that borough property values will not be the limiting factor upon borough revenues over the next two decades, but rather state-imposed limits on borough revenues. Only in the distant future, when the enormous property values from current oil developments have largely depreciated, are increases in borough property values likely to again have a significant effect upon borough revenues.

In projecting future borough revenues and expenditures, the kinds of limitations imposed by the state are the key factor. The borough's revenues will depend primarily upon its success in the political and legal arena. Our "medium" projections in Table 14 represent a case in which the borough neither gains nor loses ground in this arena while the low and high cases provide a wide range for the level of revenues and expenditures which may actually occur.

Effects of OCS Development upon North Slope Borough Revenues

Our preceding discussion of North Slope Borough revenues suggested that future borough revenues are likely to be limited primarily by politically determined limits rather than by the size of the borough's tax base. This suggests that expansion of the borough tax base as a result of OCS development would not have a significant effect upon North Slope Borough revenues. This conclusion is reinforced by the fact that a large share of the total value of OCS facilities would be located offshore and would not be taxable by the borough.

The greatest contribution of OCS development to property values would occur in the 1990s, at a time when property values from developments which are already in place or planned would be at their highest. By the time these values had depreciated significantly, the value of OCS-related onshore developments would have also begun to depreciate. In general, the sooner OCS development takes place,

the smaller the relative effect it will have upon North Slope Borough property values. In effect, the borough's benefits from high oil and gas property values are reduced if these high values all occur at once. The borough could reap much higher property tax benefits if oil development were spaced over a longer period.

There are several ways in which OCS development might have indirect effects upon borough revenues. However, these effects are likely to be fairly small.

One such indirect effect might result from expansion of the state's total tax base, which is the basis for the current rule limiting operating revenues. Assuming 1981 population figures, the increase in revenues would be given by the following formula:

$$\begin{aligned}
 \text{Increase in Borough Revenues} &= .0675 \times \frac{\text{Borough Population}}{\text{State Population}} \times \text{Taxable Value of OCS Developments} \\
 &= .0675 \times \frac{7,098}{422,187} \times \text{Taxable Value of OCS Developments} \\
 &= .00113 \times \text{Taxable Value of OCS Developments}
 \end{aligned}$$

Thus, for every \$1 billion increase in borough property values, borough operating revenues would increase by about \$1 million. Using very approximate cost figures, development of a one billion barrel OCS oil field might add approximately \$1.7 billion to the tax base of the North Slope Borough, with this value declining over time due to depreciation. This would result in an increase of approximately \$2 million in borough revenues.

Another possible source of borough revenues from OCS development is future federal OCS revenue sharing. Legislation has been proposed which would provide a share of federal OCS revenues to the State of Alaska and to local communities. However, it is unlikely that this OCS revenue sharing would contribute more than \$5 million to borough revenues. We discuss proposed OCS revenue sharing legislation in Appendix H.

Future North Slope Borough Expenditures

We may divide future borough expenditures into three categories: operating expenditures, capital expenditures, and debt service expenditures. In this section, we will discuss the first two of these categories since these directly affect North Slope Borough employment--the subject of our next chapter. It appears likely that operating expenditures will increase gradually over time. However, capital expenditures are likely to decline significantly.

Future borough operating expenditures will be constrained by operating revenues. These include both property tax revenues and other revenues, primarily from state revenue sharing. Assuming constant per capita nonproperty tax revenues and adding these to our low, medium, and high case projections of property tax revenues, we obtain the low, medium, and high projections of total operating expenditures, shown in Table 19. In our medium case, operating expenditures increase from \$55 million in 1982 to \$99 million in 2010. In our low case, total operating expenditures increase only slightly, to \$62 million in 2010. In our high case, total operating expenditures increase very rapidly, to \$183 million in 2010.

There are two important potential constraints to future capital expenditures by the borough. One potential constraint is a state-imposed limit on future borough borrowing or indebtedness. There is currently no limit on borough indebtedness, but one has been proposed (Brenneman, 1983). The attractiveness of borough bonds to investors is also affected by the size of the borough's total debt, and this factor may also serve to slow future borough borrowing.

A second constraint is imposed by the level of funds available to operate new facilities. The borough has not systematically studied the future operating costs associated with the numerous CIP projects already under construction or planned, but it is apparent that these will be considerable.

TABLE 19. PROJECTED NORTH SLOPE BOROUGH EXPENDITURES;
LOW, MEDIUM, AND HIGH CASES
(millions of 1982 dollars)

Year	Operating Expenditures			Capital Expenditures			Total Expenditures		
	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case	Low Case	Medium Case	High Case
1982	55	55	55	54	89	99	109	144	154
1983	55	56	58	38	80	94	93	136	152
1984	56	58	60	26	72	89	82	130	149
1985	56	59	63	18	65	85	74	124	148
1986	56	60	65	13	58	81	69	118	146
1987	56	62	67	9	52	77	65	114	144
1988	56	63	71	6	47	73	62	110	144
1989	56	64	74	4	43	69	60	107	143
1990	57	66	77	3	38	66	59	104	143
1991	57	67	80	2	34	62	59	101	142
1992	57	69	84	2	31	59	59	100	143
1993	57	70	88	1	28	56	58	98	144
1994	58	72	92	1	25	54	59	97	146
1995	58	73	95	1	23	51	59	96	146
1996	58	75	97	0	20	48	58	95	145
1997	58	77	104	0	18	46	58	95	150
1998	59	78	109	0	16	44	59	94	153
1999	60	80	116	0	15	41	60	95	157
2000	60	82	120	0	13	39	60	95	159
2001	60	84	125	0	12	37	60	96	162
2002	60	85	130	0	11	35	60	96	165
2003	61	87	136	0	10	34	61	97	170
2004	62	87	144	0	9	32	62	98	176
2005	61	91	149	0	8	30	61	99	179
2006	62	93	156	0	7	29	62	100	185
2007	63	95	163	0	6	27	63	101	190
2008	63	97	171	0	6	26	63	103	197
2009	63	99	178	0	5	25	63	104	203
2010	62	99	183	0	5	24	62	104	207

Assumptions

Operating revenue assumptions are the sum of base case nonproperty tax operating revenue projections and the property tax operating revenue projections given in Table 14. Construction expenditures for the low, medium, and high cases assume rates of decrease in construction spending of 30 percent, 10 percent, and 5 percent, respectively, from a 1980 level of \$110 million.

Our North Slope model base case projections in Table 20 provide an illustration of the potential shortfall in borough operating revenues compared to costs, under fairly conservative assumptions about future borough construction expenditures. We assumed that 1980 operating revenues were just adequate to cover operating costs and that operating costs for new capital projects are 10 percent of the costs of construction. Because our projections of operating revenues increase much more slowly than do operating costs, a revenue shortfall arises which increases to over \$50 million by 1993. These are funds which would be needed to adequately operate all facilities, but which are not expended due to lack of revenues.

The borough could conceivably continue to build facilities even if it did not have the funds to operate them. However, it is likely that the constraint imposed by limited operating revenues will serve to limit construction expenditures to some extent.

In sum, we believe that borough CIP expenditures are likely to decline considerably from their current levels. In Table 19, we present low, medium, and high projections of borough construction expenditures which assume annual rates of decline of 30 percent, 10 percent, and 5 percent, respectively, from their 1980 levels. These assumptions will not necessarily reflect borough construction expenditure patterns well in the immediate future; for example, expenditures could conceivably rise for several years. However, we feel that they provide a reasonable range for longer-run projections

TABLE 20. NORTH SLOPE MODEL PROJECTIONS FOR BOROUGH OPERATING REVENUES, OPERATING COSTS, AND REVENUE SHORTFALLS

Year	Borough Operating Revenues	Borough Operating Costs	Revenue Surplus or Shortfall
1980	43861	43861	0
1981	50031	49073	958
1982	54922	56507	-1584
1983	56211	65940	-9729
1984	57522	74430	-16908
1985	58854	82071	-23217
1986	60206	88948	-28742
1987	61578	95137	-33559
1988	62971	100707	-37737
1989	64386	105720	-41335
1990	65824	110232	-44409
1991	67287	114293	-47006
1992	68776	117948	-49172
1993	70293	121237	-50944
1994	71839	124197	-52358
1995	73416	126861	-53445
1996	75025	129259	-54234
1997	76667	131417	-54749
1998	78345	133359	-55014
1999	80058	135107	-55048
2000	81809	136680	-54870
2001	83599	138096	-54497
2002	85428	139370	-53942
2003	87298	140516	-53218
2004	89210	141549	-52338
2005	91165	142477	-51312
2006	93164	143313	-50149
2007	95208	144066	-48857
2008	97299	144743	-47444
2009	94791	145352	-50561
2010	87112	145900	-58788

SOURCE: North Slope Model Simulation NSLP.1--8/16/83

VARIABLES: RVOPTO, CSOP, AND DFOPPT

of construction expenditures. (The projections formed the basis for our debt service revenue projections in Table 14).

Adding together our projections of operating expenditures and construction expenditures, we have the range of projections for total borough expenditures shown in Table 19. In the medium case, borough expenditures would initially decline from about \$140 million in 1982 to \$95 million in 1996, due to a sharp decline in construction expenditures. Subsequently, expenditures would gradually rise, to about \$104 million in 2010, due to increases in operating expenditures. In our low case, expenditures would be about half this high while in our high case, expenditures would be about twice as high.

The most significant point to be gained from these projections is that future total North Slope Borough expenditures are likely to decline considerably from present levels--perhaps by about one-third--due to reductions in capital expenditures. Even in a high expenditure case, borough expenditures would not be likely to be much higher than current levels for the next twenty years. As we discuss in the next chapter, the decline in borough expenditures is likely to reduce North Slope Borough employment opportunities for Inupiat.

EFFECTS OF OCS DEVELOPMENT UPON
NORTH SLOPE BOROUGH EXPENDITURES

Since borough expenditures are directly and indirectly constrained by borough revenues, the impacts of OCS development upon borough expenditures will reflect the impacts of OCS upon borough revenues. Since effects upon revenues are likely to be small, as discussed in the above section, effects upon expenditures are also likely to be small.