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ST. GEORGE BASIN AND NORTH ALEUTIAN BASIN
ECONOMIC AND DEMOGRAPHIC SYSTEMS IMPACTS ANALYSIS

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ABSTRACT

In this report, we present descriptions and "base case" projections
of population and employment for the communities of Unalaska and
Cold Bay. We also present projections of the impacts on population
and employment in these communities which might result from the
proposed St. George Basin and North Aleutian Shelf OCS lease
offerings.

The future development of Unalaska is highly uncertain. Our
projections suggest that the population of Unalaska in the year 2000
could range from as low as 900--only a little larger than the 1980
resident population--to as high as 4,600. Future development of the
crab and bottomfish industries will be the key factor affecting the
future size of the community.

Unalaska is envisioned primarily as a marine support base for future
OCS development. Our projections suggest that the relative impacts
of development resulting from the proposed lease sales would be
relatively small. Development of both sale areas might increase
population and employment by approximately 15 percent during the
peak year of 1993. These projections are based on the assumption
that only workers associated with the shore base would become
residents of Unalaska.

Cold Bay is primarily a transient community based around aviation
and communication facilities. In the "base case," the resident
population may fall by about one-third due to future cutbacks in
employment by the FAA, the U.S. Air Force, and RCA. However, OCS
development in the Navarin Basin might reverse this decline,
bringing population back to approximately current levels.
Additional development from development of the St. George Basin or
North Aleutian Shelf OCS sale areas could further increase
population by as much as 40 percent, but Cold Bay would still remain
a small community of approximately the same size as it was during
the Vietnam war years.

In addition to our descriptions and projections for Unalaska and
Cold Bay, we have provided descriptions for Sand Point, St. Paul,
St. George, and Nelson Lagoon. However, we do not expect these
communities to be directly affected by future OCS development in the
St. George or North Aleutian Shelf lease sale areas.

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        Case D: Sale 92 Medium Base Case
        Case E: Sale 89 Impact Case
        Case F: Sale 92 Impact Case
        Case G: Sales 89 and 92 Combined Impact Case

The chart on the following page shows the tables prepared for each
case.

TABLE NUMBER BY CASE							VARIABLES IN TABLE
A	B	C	D	E	F	G	
1	14	27	40	53	66	79	Resident Population, Nonproject Enclave Population, Project Enclave Population, Military Enclave Population, Total Population Including Enclaves and Military
2	15	28	41	54	67	80	Resident Population, Native Population, Non-Native Population, Native Male Population, Native Female Population, Non-Native Male Population, Non-Native Female Population
3	16	29	42	55	68	81	Resident Population, Preschool Age, School Age, Adult, Senior
4	17	30	43	56	69	82	Resident Population, Change in Resident Population, Natural Increase, Net Migration, Net Migration of Workers, Net Migration of Dependents
5	18	31	44	57	70	83	Resident Employment, Nonproject Enclave Employment, Project Enclave Employment, Military Enclave Employment, Total Employment Including Enclaves and Military
6	19	32	45	58	71	84	Total Resident Employment, Resident Basic Employment, Resident Support Employment, Resident Government Employment, Resident Project Employment
7	20	33	46	59	72	85	Total Resident Employment, Resident Fishing Employment, Resident Fish Processing Employment, Other Resident Basic Employment
8	21	34	47	60	73	86	Total Resident Support Employment, Endogenous Resident Support Employment, Government Sponsored Resident Support Employment, Exogenous Resident Support Employment, Enclave Sponsored Resident Support Employment
9	22	35	48	61	74	87	Total Civilian Government Employment, Endogenous Civilian Government Employment, Exogenous Civilian Government Employment
10	23	36	49	62	75	88	Onshore Short-term Skilled Project Employment, Onshore Short-term Nonskilled Project Employment, Onshore Long-term Skilled Project Employment, Onshore Long-term Nonskilled Project Employment, Total Onshore Project Employment
11	24	37	50	63	76	89	Offshore Short-term Skilled Project Employment, Offshore Short-term Nonskilled Project Employment, Offshore Long-term Skilled Project Employment, Offshore Long-term Nonskilled Project Employment, Total Offshore Project Employment
12	25	38	51	64	77	90	Resident Project Employment, Enclave Project Employment, Commuter Project EMployment, Total Project Employment
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I. INTRODUCTION

In this study, we examine the impacts of the proposed St. George Basin and North Aleutian Shelf OCS lease offerings, scheduled for December of 1984 and April of 1985, upon population and employment in the communities of Unalaska and Cold Bay. We also describe the populations and economies of the communties of Sand Point, St. Paul, St. George, and Nelson Lagoon.

In order to examine the impacts of development in the two lease areas, we use a model to project a number of economic and demographic variables for Unalaska and Cold Bay. The model is the Rural Alaska Model, or "RAM" model, which was developed at ISER with the support of the Social and Economic Studies Program for use in projecting impacts of OCS development. Appendixes A through C provide a detailed description and documentation of the RAM model.

We prepared model projections for development in the absence of the lease sales (the base cases) and development with the lease sales (the impact cases). The differences between these cases are the projected impacts of the lease sales.

The RAM model has several hundred equations and is calculated by computer, but it actually uses a relatively simple procedure in projecting various economic and demographic variables. Essentially,

we first develop assumptions about basic employment—employment which serves markets external to the community—for each year of the projection period. We also make assumptions about how many local-oriented jobs are generated by each basic job. Based on these assumptions, the model calculates total employment in the community.

We also make assumptions about population growth rates, labor force participation rates, and the extent to which people move into the community in response to the new employment opportunities or leave the community in response to lack of employment opportunities. Based on these assumptions, the model calculates population variables for each year of the projection period.

Finally, in order to project impacts of OCS development, we make assumptions about total OCS-related employment broken down by skill level, duration of employment, and whether or not jobs are located onshore or offshore. These assumptions are provided by the Alaska OCS office. We make additional assumptions about the extent to which local residents could fill OCS jobs and the extent to which new OCS workers would become residents of the community. Based upon all of these assumptions, the model projects total employment and population that would occur with OCS development.

The primary advantage of the RAM model over simple hand calculations is that the model can systematically and rapidly perform a great

number of calculations. However, as with any projection of the future, the RAM model's projections are only as good as the underlying assumptions. There are considerable difficulties in developing these assumptions for small communities such as Unalaska and Cold Bay.

For example, we have attempted to base our assumptions upon data which describe current conditions in the communities. However, in some cases data are several years out of date, are available only at highly aggregated levels, or are simply not available at all. Even where data do exist, they may not accurately reflect year-round population and employment conditions, which can vary significantly from season to season.

An even more difficult problem than the lack of data arises from the difficulty of making assumptions about conditions in future years. Even where reliable data are available on current conditions, these conditions are not necessarily a reliable guide to the future.

Because of the uncertainty associated with several key assumptions of the RAM model—in particular, our assumptions about exogenous employment—we have prepared low, medium, and high base case projections for each community. The low and high case projections illustrate the sensitivity of our RAM model projections to these key assumptions.

We do not discuss the social changes that might accompany the changes in population and employment which we project. We also do not discuss possible impacts upon demands for land, housing, or public services or the ability of the communities to meet these demands. While these kinds of impacts may be more significant than might be suggested by population or employment projections, they are beyond the scope of this study.

Models such as the RAM model are sometimes criticized as unrealistic simplifications of complicated demographic and economic systems. We are well aware of these deficiencies. Nevertheless, we feel that these models may serve a useful purpose in that they provide at least a starting point for projecting how communities may change. In addition, they impose a discipline upon projections of the future by requiring the underlying assumptions of the projections to be fully stated.

Organization of This Study

In Chapters II and III, we present descriptions of local history, population, and employment in Unalaska and Cold Bay, as well as our RAM model base case and impact projections for these communities. Our community descriptions are based upon published sources rather than extensive original research. We have attempted to avoid duplicating the large amount of research on these communities which has been undertaken in recent years, much of which has been funded

by the Minerals Management Service's Social and Economic Studies Program.

In Chapters IV-VII, we present descriptions of four other communities which might be affected by the proposed lease sales: Sand Point, St. George, St. Paul, and Nelson Lagoon. We provide only base case RAM model projections for Sand Point, and we do not include RAM model projections for the other communities. This is because it is unlikely that OCS facilities would be located within or adjacent to these communities, and we would therefore not expect significant direct impacts upon local population or employment, which we could project using the RAM model.

We review our major conclusions in Chapter VII.

Appendixes A through C document the RAM model. Appendixes D through I are technical appendixes which present data from a variety of sources on each community, and which discuss how we used these data to prepare our community descriptions and RAM model assumptions. Appendixes J through N document our RAM model assumptions, and Appendixes O through Q present our RAM model projections for Unalaska, Cold Bay, and Sand Point.

II. UNALASKA

In this chapter, we briefly describe the history, population, and economy of Unalaska. We then present base case RAM model projections of the population and economy of Unalaska in the absence of development from the St. George and North Aleutian Basin lease sales. Because we do not know the future scale of fish processing activity and development from other OCS activity, our base case projections for Unalaska are highly uncertain. Therefore, we also present low and high base case projections in addition to our medium base case projections. Finally, we present RAM model projections of the impacts of development from only the St. George lease sale, development from only the North Aleutian Shelf lease sale, and development from both sales together.

Our description of Unalaska in this chapter is intended to provide a brief introduction to the community as well as a starting point for our projections. We refer those readers desiring a more complete description of Unalaska to Social and Economic Studies Program Technical Report No. 92, prepared by Impact Assessment, Inc., entitled "Unalaska: Ethnographic Study and Impact Analysis" (Petterson et al., 1983). This study includes a detailed discussion of many aspects of the community of Unalaska including its history, population, economy, and infrastructure.

History

Unalaska is located in the Aleutian Islands about 800 air miles southwest of Anchorage. It is strategically situated in a protected harbor. It is only 80 miles from Unimak Pass, the first navigable pass between the Alaska Peninsula and the Aleutian Islands. This pass is also used by ocean vessels traversing a circular route from the northwest coast of the Lower 48 and Canada to the Orient.

The first people to inhabit the Unalaska region were those thought to have crossed from Siberia to Alaska on the Bering Land Bridge. These early inhabitants depended on the sea for their food, clothing, and other needs. In 1741, Russian explorers reached the Aleutian Islands and found an abundance of fur seals and sea otters to enhance their fur trade. After years of exploiting the resources of the Aleutians, enslaving the Aleuts for the cause of trade, and devastating the Native population through exposure to new diseases, the Russians moved eastward in search of better pelts in the late 1700s. However, they did retain several strategic outposts until about 1850. One of these was Iliuliuk Harbor, the site of Unalaska today.

After the United States purchased Alaska in 1867, the area attracted fur traders again, and fishermen and whalers as well. Unalaska became a coaling station and commercial trade center in the 1880s. During the gold rush days, many ships stopped at Dutch Harbor on

their way through Unimak Pass. By the early 1900s, the Unalaska
community had several seafood processing plants which handled
herring, salmon, and whale meat.

As oil replaced coal as the fuel for ships, Unalaska's coal trade
diminished. Fox farming then sustained the area until the
depression of the 1930s.

With World War II and increased Japanese aggression, Unalaska became
a strategic port in the defense of the North Pacific. Dutch Harbor
Naval Station and Fort Mears army base were established at Unalaska
at the beginning of the war. In 1942, many Native residents were
evacuated from Unalaska to Burnett Inlet north of Ketchikan where
they remained until the end of the war. On June 3, 1942,
carrier-based Japanese aircraft bombed Dutch Harbor. As a result,
the military intensified their fortification efforts and engaged in
major heavy construction. During World War II, the military
population of the area reached a peak of 65,000. However, the
military posts were abandoned in 1947, and by 1950 the population of
Unalaska was only 173.

In the 1950s, there was renewed interest in harvesting the
seas—this time for halibut, salmon, and king crab. Unalaska began
a period of continued growth in the commercial fishing and fish
processing industries. The number of operating fish processing
plants increased from one in 1962 to five in 1967 and fifteen in

1980. The growth of Unalaska as a seafood processing center was largely due to the development of the Aleutian/Bering Sea king crab and tanner crab fisheries. However, with the abrupt decline in king crab stocks between 1980 and 1983, fish processing activity in Unalaska dropped sharply. Unalaska's potential for future growth lies in the harvesting and processing of bottomfish, service to ocean vessels, and in staging and supply activities for outer continental shelf oil development.

Population

A primary problem in discussing the population of Unalaska is the lack of reliable data. According to Petterson et al., "great caution must be taken when examining (Unalaska population statistics). Given the oftentimes haphazard nature with which population surveys have been obtained in Unalaska in the past, none of these figures, with the exception of the most recent population surveys, can be relied upon with any definite certainty" (p. 82).

Given these problems, Petterson et al. summarized post-war population trends in Unalaska as follows:

> During the post-war period, the population of Unalaska declined as economic opportunities were minimal. It was not until the late 1950s and early 1960s that the population began to display any noticeable increase. The community experienced another dramatic influx of outsiders in the early 1970s with the economic boom created by the crab fishery. The population increased almost fourfold in less than 10 years. With the recent economic downturn, the population has begun to level off (p. 81).

Table II-1 summarizes these trends. The total population of Unalaska increased from about 340 in 1970 to over 1900 in 1981.

Table II-2 shows estimates of the ethnic breakdown of the total population of Unalaska for 1970, 1977, and 1980. In 1970, the majority of the population were Native Alaskans, primarily Aleuts. By 1980, the share of Aleuts in total population had fallen to 15 percent. About 64 percent were White, and most of the remainder of the population were Asian or Pacific Islanders (primarily Vietnamese and Filipinos).

The population of Unalaska is highly diverse with respect to the length of time that they have lived in the community and the extent to which they consider themselves permanent residents of Unalaska. Most Aleuts have lived in Unalaska for much, if not all, of their lives and consider themselves permanent residents. Most Vietnamese and Filipinos, in contrast, are nonresidents; that is, they are employed in fish processing plants, live in quarters provided by the fish processing companies, and are only working in Unalaska for a brief period of time. Whites, who constitute the majority of the population, include permanent residents, short-term processing employees, and an intermediate group who may live in Unalaska for a number of years but do not really have strong ties to the community and consider their true home to be elsewhere.

TABLE II-1
POPULATION OF UNALASKA,
1939-1981

Year	Total Population	Residents	Non-Residents	Data Source
1939	298	–	–	Alaska Consultants 1981
1950	173	–	–	U.S. Bureau of the Census
1960	218	–	–	U.S. Bureau of the Census
1967	254	–	–	Unalaska City Council Files
1970	342	178	164	U.S. Bureau of the Census
1972	548	430	118	Unalaska City Council Census
1973	510	–	–	Unalaska City Council Census
1977	1,971	615	1,256	Tryck, Nyman and Hayes, 1977
1980	–	724[a]	–	U.S. Bureau of the Census
1981	1,944	1,054	890	Department of Labor, State Demographer, State of Alaska: Special Census of Unalaska

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[a]Arrived at by subtracting 598 persons living in group quarters from total population of 1,322.

NOTE: Adapted from John Petterson et al., Unalaska: Ethnographic Study and Impact Analysis. Social and Economic Studies Program Technical Report Number 92. Anchorage Minerals Management Service, August 1983, page 83.

TABLE II-2
ETHNIC COMPOSITION OF POPULATION
OF UNALASKA, 1970-1980

Ethnic Group	1970[a]		1977[b]		1980[c]	
	Number	Percent	Number	Percent	Number	Percent
Caucasian	56	31.0	387	62.9	848	64.1
Black	0	0	7	1.1	19	1.5
Native Alaskan	113	63.4	178	28.9	200	15.1
Aleut	107	60.1	166	27.0	--	--
Eskimo	5	2.8	8	1.3	--	--
Indian	1	0.5	4	0.6	--	--
Other	9	5.6	35	5.7	255	19.3
Unknown	--	--	8	1.3	--	--
TOTAL	178	100.0	615	99.9	1,322	100.0

SOURCES: [a]University of Alaska, 1973.

           [b]Tryck, Nyman and Hayes, 1977.

           [c]U.S. Bureau of the Census, 1980.

NOTE: Adapted from John Petterson et al., Unalaska: Ethnographic
           Study and Impact Analysis, Social and Economic Studies
           Program Technical Report No. 92 (Anchorage, Minerals
           Management Service, August 1983), p. 85.

For our RAM model projections, we attempt to distinguish between two population groups--"resident population" and "enclave population." We define those persons who live in the community year-round as residents.

It is difficult to estimate the number of persons who should be considered "residents" as opposed to "nonresidents" or "enclave residents." Table II-1 provides estimates of the breakdown of population between residents and nonresidents for selected years. The figures in Table II-1 suggest that the population of both residents and nonresidents increased from about 200 to 1,000 during the 1980s.

We base our RAM model population breakdown on the 1980 Census figures shown in Table II-3 (this table also includes census data for 1970 and 1960). The census measured 1980 population as 1,322. However, this figure included 598 persons living in group quarters whom we assume to be nonresident or enclave fish processing workers. By subtracting these persons, we obtain a total resident population of 724. To obtain a breakdown of resident population by age, sex, and race, we subtracted 598 persons from the non-Native population of 946 in the 20-34 and 35-64 age groups. To do this, we multiplied the census population for non-Native males and females in each of these two age groups by (946-598)/946, or .368. Our resident population assumptions are shown in Table II-4.

TABLE II-3
POPULATION OF UNALASKA AS COUNTED BY
U.S. CENSUS, 1980, 1970, AND 1960,
BY AGE, SEX, AND RACE

| | AGE | | | | | | |
	0-4	5-14	15-19	20-34	35-64	65+	Total
1980							
Total	46	102	99	795	268	12	1,322
Male	29	44	60	534	184	7	858
Female	17	58	39	261	84	5	464
Native	11	40	26	75	42	6	200
Male	8	19	16	46	28	3	120
Female	3	21	10	29	14	3	80
Non-Native	35	62	73	720	226	6	1,122
Male	21	25	44	488	156	4	738
Female	14	37	29	232	70	2	384
1970							
Total[a]	32	75	29	81	119	6	342
Male	17	37	15	44	73	2	188
Female	15	38	14	37	46	4	154
Native[b]	23	56		54	80	5	218
Male	10	27		25	50	2	114
Female	13	29		29	30	3	104
Non-Native	9	19		56	39	1	124
Male	7	10		34	23	0	74
Female	2	9		22	16	1	50
1960 Total							218

Table II-3 Notes

[a]Many documents and publications give 178 as Unalaska/Dutch Harbor's population for 1970 as reported by the U.S. Bureau of the Census. In the mid-1970s, the Bureau revised this figure to 342. It gave no specific explanation for the change. The Bureau does give this general explanation in the 1980 publication Number of Inhabitants for these instances: "The count has been revised since publication of 1970 census reports, or the area was erroneously omitted, or the area was not shown in the correct geographic relationship in the 1970 census reports."

Since the age-sex breakdown was not available for the revised figure, but was available for the earlier count of 178, we applied the percentages for each age-sex cohort for the 178 count to the 342 count to obtain the age-sex cohort figures for the total 1970 population. (No military establishments existed at Unalaska/Dutch Harbor at this time, so a disproportionately larger population in the male cohorts aged 15-19 or 20-34 would not be expected.)

[b]For the total number of Natives residing at Unalaska in 1970, we used the estimated percentage of total population that was Native obtained from D. Jones in a personal communication on June 2, 1983. This percentage was 63.8. We applied this to the revised total population count of 342 which gave us the result of 218 total Natives.

An age-sex breakdown was not available for just Natives, but the 1970 unrevised data is broken down by age and by sex for "other races," i.e., those other than Black or White. We applied these percentages for each age-sex cohort to the figure of 218 to obtain the breakdown of Natives for 1970 given in the table. This last procedure may over-state the number of Natives because the percentages were obtained from data that included all races other than Black or White.

SOURCES: U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

TABLE II-4
UNALASKA 1980 RESIDENT POPULATION
ASSUMPTIONS USED AS BASE FOR
RAM MODEL PROJECTIONS

Age Group	Native Male	Native Female	Non-Native Male	Non-Native Female	Total
0-4	8	3	21	14	46
5-14	19	21	25	37	102
15-19	16	10	44	29	99
20-34	46	29	179	85	339
35-64	28	14	58	26	126
65+	3	3	4	2	12
TOTAL	120	80	331	193	724

SOURCE: See Table II-3 and text.

Our resident population assumptions suggest that in 1980, out of a total resident population of 724, twelve persons were older than 65 and 148 were younger than 16. Natives accounted for 28 percent of the resident population and for 34 percent of the children under 16.

Employment

For several reasons, it is difficult to describe employment in Unalaska. One reason is that there has been rapid change in the economy of Unalaska over time. Fishing-related employment grew rapidly as Bering Sea crab harvests expanded during the 1970s. However, crab harvests have declined dramatically since their 1980 peak.

Secondly, employment varies considerably over the course of the year. Employment in fish processing may be several times higher at the peak of crab fishing seasons than at other times.

Thirdly, the majority of jobs in Unalaska are not held by residents of Unalaska, but rather by short-term transients who work in Unalaska for periods of several months, living in processor-provided housing and interacting only minimally with the local economy. For the purposes of our RAM model projections, it is important to distinguish between resident and nonresident or "enclave" employment. However, most employment data do not separate nonresident workers from resident workers.

Table II-5 shows the 1980 Unalaska employment assumptions on which we based our RAM model projections. We considered several different data sources in arriving at these employment assumptions. We present these data and discuss our employment assumptions in detail in Appendix D. Here, we will only briefly review our assumptions.

We assumed total full-time equivalent employment of 1,500, of which 392 jobs were held by residents and 1,108 were held by nonresidents or enclave workers. All enclave workers were employed in fish processing.

We assumed that only 58 residents of Unalaska were employed in fish processing, and only 50 residents were employed in fishing (we did not include the many fishermen who deliver fish to Unalaska-based processors, but who do not reside in Unalaska in our employment figures).

We assumed total support employment of 200, which is divided roughly, equally between support employment serving markets extended to Unalaska (exogenous employment), support employment serving the local fish processing industry (enclave-generated employment), and support employment serving local residents (endogenous employment). Finally, we assumed government employment of 82.

TABLE II-5
UNALASKA 1980 EMPLOYMENT ASSUMPTIONS[a]

	Resident Employment	Nonresident or Enclave Employment	Total Employment
Basic Employment	<u>110</u>	<u>1,108</u>	<u>1,218</u>
Fishing	50	–	50
Fish Processing	58	1,108	1,166
Other	2	–	2
Support Employment	<u>200</u>	–	<u>200</u>
Exogenous	59	–	59
Endogenous-Sponsored by Residents	82	–	82
Endogenous-Sponsored by Enclave Workers	59	–	59
Government Employment	<u>82</u>	–	<u>82</u>
Exogenous	6	–	6
Endogenous	<u>76</u>	<u>–</u>	<u>79</u>
TOTAL	392	1,108	1,500

– Assumed to be zero.

[a]Assumptions are for full-time equivalent employment.

SOURCE: Table D-5; based on discussion of various data sources in Appendix D.

Assumptions for Ram Model Projections

A large number of assumptions are required in order to run the RAM model. Table II-6 summarizes the assumptions which we used for our Unalaska projections. We document our Unalaska RAM model assumptions fully in Appendixes K and N. In this section, we briefly review some of these assumptions.

TABLE II-6
SUMMARY OF RAM MODEL ASSUMPTIONS FOR
UNALASKA PROJECTIONS

Population Assumptions

1982 Resident Population	724 (1980 Census figure of 1,322 minus 598 persons living in group quarters).
Age, Sex, Race Breakdown of Population	Based on 1980 census (persons living in group quarters subtracted from non-Natives aged 20-64); age, sex, race distribution constant for non-Natives.

Non-OCS Employment Assumptions

1980 Resident Employment	392
Basic Employment	110
Support Employment	200
Government Employment	82
1980 Enclave Fish Processing Employment	1,108

Exogenous Resident Basic Employment

Medium Case	Rises to 170 by 1990 and 408 by 2000.
Low Case	Rises to 152 by 1990 and 185 by 2000.
High Case	Rises to 760 by 1990 and 1,310 by 2000.

Enclave Fish Processing Employment

Medium Case	Falls from 1,108 in 1980 to 609 in 1983, rises to 699 in 1990 and 1,776 in 2000.
Low Case	Rises to 417 in 1990 and 582 in 2000.
High Case	Rises to 1,136 in 1990 and 3,108 in 2000.

TABLE II-6
SUMMARY OF RAM MODEL ASSUMPTIONS FOR
UNALASKA PROJECTIONS
(continued)

Endogenous Support Employment	Increases by 1 for every $93 thousand increase in resident income.
Endogenous Government Employment	Increases in response to population growth; response varies depending upon level of per capita state revenues. In 1984, projected government employment is 1 for every 6.6 residents. In 2000, government employment is 1 for every 10.7 residents.
Fish Processing Enclave-generated Support Employment	Increases by 1 for every increase of 19 in enclave employment.
OCS Enclave-generated Support Employment	Increases by 1 for every increase of 20 in OCS enclave population.

OCS Employment Assumptions

All offshore workers assumed to be commuters who only pass through Unalaska.

All skilled short-term onshore jobs held by enclave residents.

Some nonskilled short-term jobs held by residents.

All long-term onshore workers assumed to be residents of Unalaska.

	First year of Onshore Long-term Employment	Peak Onshore Long-term Employment
Sale 89 Low Base Case	–	none
Sale 89 Medium and High Base Cases	1996	217
Sale 92 Medium Base Case	1996	217
Sale 89 Impact Case	1994	235
Sale 92 Impact Case	1992	255
Sales 89 and 92 Combined Impact Case	1992	273

Base and Impact Cases

We prepared seven different sets, projections, or "cases" for Unalaska. These include four sets of "base case" projections and three sets of "impact projections." Our standard base case is the "Sale 89 Medium Base Case." This case includes what we consider to be the most likely assumptions for non-OCS-related employment as well as the pre-Sale 89 OCS employment assumptions which we have been instructed to use by the Alaska OCS office.

Our exogenous employment assumptions, in particular our fishing and fish processing employment assumptions, are very important for the model's projections of future population and employment in Unalaska. However, future levels of fishing and fish processing employment in Unalaska are highly uncertain because of fluctuations in stocks of species traditionally processed in Unalaska, such as crab, and because of the uncertain prospects for establishment of large-scale onshore bottomfish processing operations in Unalaska.

In order to examine the sensitivity of our standard base case to our employment assumptions, we prepared the "Sale 89 Low Base Case" and the "Sale 89 High Base Case." For the Sale 89 Low Base Case we assumed relatively low levels of fishing employment—slow recovery of traditional fish processing and development of only a small bottomfish industry—as well as no OCS-related employment. In contrast, for the Sale 89 High Base Case, we assumed relatively high levels of fishing employment—rapid recovery of traditional

processing and development of a large bottomfish industry, together with our Medium Case OCS employment assumptions.

The Low and High Base Case projections indicate a reasonable range within which future population and employment in Unalaska might actually fall. We do not assign any statistical significance to these cases because we do not have sufficient information about the relative probabilities of different levels of fishing industry or OCS development. Nevertheless, we believe that these different base case projections are useful in indicating the uncertainty which should be attributed to our projections for Unalaska.

For the Sale 92 Medium Base Case, we assumed exploration but no development of the Sale 89 lease area. Thus, we assume identical levels of non-OCS employment as for the Sale 89 Medium Base Case, but we assumed slightly higher levels of OCS employment to account for exploration-only employment from Sale 89.

We prepared three impact case projections: the "Sale 89 Impact Case," the "Sale 92 Impact Case," and the "Sales 89 and 92 Combined Impact Case." For our Sale 89 Impact Case, we added employment assumptions provided by the OCS office for development of the Sale 89 lease area to the Sale 89 Medium Base Case OCS employment assumptions. For the Sale 92 Impact Case, we added OCS employment assumptions for Sale 92 to the Sale 92 Medium Base Case OCS employment assumptions. Finally, for the Sales 89 and 92 Combined

Impact Case, we added OCS employment assumptions for both sales to the Sale 89 Medium Base Case OCS employment assumptions. The projected impacts of the individual and the combined sales were the differences between the impact case projections and the corresponding base case projections. For all of the impact cases, the non-OCS employment assumptions are the "Medium Case" assumptions.

RAM Model Age Distribution Assumptions for Non-Natives

We assumed a rapid turnover in Unalaska's non-Native population, resulting in a relatively constant age distribution over time. The assumption of rapid turnover is not necessarily valid for all non-Natives. We might think of the non-Native population as consisting of two groups. One group may consist of employees who are based in Unalaska for relatively short periods of time. This group would have a relatively constant age of distribution. Another group may be more permanent residents who might be expected to have a changing age distribution over time. However, because of the difficulties involved in modeling population age distribution for both groups simultaneously, we assumed that all non-Natives fall into the first group and, therefore, that the age distribution of non-Natives remains relatively constant over time.

Base Case Projections

Based on the assumptions presented in the previous section and in Appendix K, we used the RAM model to prepare projections of a number of variables describing the economy and population of Unalaska for

the years 1981-2010. Our complete model projections are presented in Appendix O, which includes 115 tables of projections. In this section, we summarize our base case projections, which are included as Tables O-1 through O-52 and Tables O-110 through O-115 in Appendix O.

In this section, we primarily discuss the Sale 89 medium base case. We only briefly discuss how the other cases--the Sale 89 low base case, the Sale 89 high base case, and the Sale 92 medium base case--differ from the Sale 89 medium base case. However, the tables in Appendix O provide complete projections for each case, which may be used for comparison.

Table II-7 summarizes our Sale 89 medium base case population projections for Unalaska. Resident population is projected to fall from 724 in 1980 to 652 in 1983, and then climb gradually to a peak of 2,275 in 1999. The decline in resident population during the early years of the projection period is the result of declining fishing and fish processing activity. However, subsequently a long period of stable growth takes place due to the gradual regrowth of the crab industry accompanied by expansion in bottomfishing activities.

Table II-8 illustrates the sensitivity of these projections to our exogenous employment assumptions, particularly our bottomfishing

TABLE II-7
SUMMARY OF SALE 89 MEDIUM BASE CASE
POPULATION PROJECTIONS FOR UNALASKA

	Resident Population	Native Population	Non-Native Population	School-Age Population (5-18)	Non-OCS Enclave Population	OCS Enclave Population	Total Population Including Enclaves
1980	724	200	524	181	1,108	0	1,832
1981	687	206	481	168	609	0	1,296
1982	665	212	454	160	233	0	898
1983	652	217	435	155	166	0	818
1984	791	223	569	186	186	119	1,097
1985	756	228	528	177	262	60	1,079
1986	788	234	555	184	337	52	1,177
1987	901	239	662	211	412	164	1,477
1988	888	244	644	208	488	37	1,413
1989	910	250	660	214	593	3	1,506
1990	974	255	719	230	699	6	1,679
1991	1,089	260	829	257	854	10	1,953
1992	1,139	265	873	269	1,009	10	2,158
1993	1,223	271	952	290	1,165	8	2,396
1994	1,313	276	1,037	311	1,320	6	2,639
1995	1,427	281	1,146	338	1,476	79	2,982
1996	1,579	287	1,292	374	1,576	159	3,314
1997	1,808	292	1,516	427	1,676	253	3,737
1998	1,985	298	1,687	468	1,776	163	3,924
1999	2,275	304	1,971	535	1,776	66	4,117
2000	2,235	310	1,926	527	1,776	0	4,011
2001	2,233	316	1,917	527	1,776	0	4,009
2002	2,229	322	1,907	527	1,776	0	4,005
2003	2,227	328	1,899	527	1,776	0	4,003
2004	2,226	334	1,891	527	1,776	0	4,002
2005	2,224	341	1,883	528	1,776	0	4,000
2006	2,223	347	1,876	528	1,776	0	3,999
2007	2,222	354	1,868	528	1,776	0	3,998
2008	2,221	361	1,860	529	1,776	0	3,997
2009	2,221	368	1,853	529	1,776	0	3,997
2010	2,220	376	1,845	530	1,776	0	3,996

NOTE: Appendix O tables refer to OCS population as "project population."

SOURCE: Population variables PO, PONA, PONN, POSL, EMENNOPJ, EMENPJ, POTO DSET UN.89MBC, created 11/30/83.

TABLE II-8
SENSITIVITY OF PROJECTIONS TO ASSUMPTIONS: UNALASKA
RESIDENT POPULATION
COMPARISON OF LOW, MEDIUM, AND HIGH SALE 89 BASE CASES

	Projections With Low-Growth Assumptions	Projections With Assumptions Used in Study	Projections With High-Growth Assumptions
1980	724	724	724
1981	687	687	687
1982	665	665	665
1983	652	652	652
1984	707	791	791
1985	732	756	780
1986	758	788	848
1987	764	901	1030
1988	822	888	1109
1989	844	910	1183
1990	878	974	1297
1991	912	1089	1552
1992	888	1139	1709
1993	894	1223	1895
1994	907	1313	2090
1995	913	1427	2292
1996	911	1579	2541
1997	912	1808	3077
1998	911	1985	3564
1999	915	2275	4383
2000	918	2235	4618
2001	920	2233	4608
2002	921	2229	4595
2003	924	2227	4585
2004	926	2226	4576
2005	929	2224	4568
2006	932	2223	4559
2007	935	2222	4551
2008	938	2221	4544
2009	941	2221	4537
2010	944	2220	4529

SOURCE: Variable PO, study case DSET UN.89MBC, low and high case DSETS UN.89LBC and UN.89HBC

assumptions. In the Sale 89 low base case, resident population grows much more slowly than in the medium case projections, rising to only 915 by 1999—or only 40 percent of the medium-case level. In contrast, in the high case, population rises very rapidly, to nearly double the medium case levels. Thus, our population projections are highly sensitive to uncertain employment assumptions, and our "medium" projections should be viewed only as illustrative of one possible growth path for Unalaska.

As shown in Table II-7, in the medium case the share of Natives in total resident population falls from 28 percent in 1980 to 13 percent in 1999. The model projects gradual growth in the Native population due to natural increase, while the non-Native population fluctuates depending upon economic opportunities.

Our projections incorporate our assumptions of a substantial decline in the nonresident or enclave fish processing population prior to 1984, followed by a period of steady increase. In addition, we assume OCS-related enclave employment associated primarily with Navarin Basin development peaking at 253 in 1997.

Table II-9 summarizes our Sale 89 medium base case employment projections, and Table II-10 compares our low, medium, and high base case employment projections. In the medium base case, resident basic employment rises steadily through 1998. Support employment falls through 1983 and then rises until 1991. Government employment

TABLE II-9
SUMMARY OF SALE 89 MEDIUM BASE CASE
EMPLOYMENT PROJECTIONS FOR UNALASKA

	Total Resident Employment	Resident Basic Employment	Resident Support Employment	Resident Government Employment	Resident OCS Employment	Non-OCS Enclave Employment	OCS Enclave Employment (Onshore Only)	Total Employment Including Enclaves
1980	392	110	200	82	0	1108	0	1500
1981	368	110	167	91	0	609	0	977
1982	352	110	143	99	0	233	0	585
1983	341	110	137	94	0	166	0	507
1984	426	116	164	125	21	186	119	731
1985	401	122	158	120	2	262	60	724
1986	419	128	165	124	2	337	52	808
1987	486	134	192	133	28	412	164	1,062
1988	476	140	184	144	7	488	37	1,000
1989	487	155	190	142	0	593	3	1,083
1990	524	170	203	151	0	699	6	1,229
1991	593	200	225	168	0	854	10	1,457
1992	621	230	239	152	0	1,009	10	1,640
1993	671	260	258	153	0	1,165	8	1,844
1994	724	290	277	158	0	1,320	6	2,050
1995	793	320	304	160	9	1,476	79	2,347
1996	885	350	335	164	35	1,576	159	2,619
1997	1025	380	379	183	82	1,676	253	2,954
1998	1133	410	407	195	120	1,776	163	3,071
1999	1311	410	451	222	227	1,776	66	3,153
2000	1284	410	441	215	217	1,776	0	3,060
2001	1279	410	440	212	217	1,776	0	3,055
2002	1274	410	439	208	217	1,776	0	3,050
2003	1270	410	439	204	217	1,776	0	3,046
2004	1266	410	438	201	217	1,776	0	3,042
2005	1262	410	437	198	217	1,776	0	3,038
2006	1259	410	436	195	217	1,776	0	3,035
2007	1255	410	436	192	217	1,776	0	3,031
2008	1252	410	435	190	217	1,776	0	3,028
2009	1248	410	434	187	217	1,776	0	3,024
2010	1245	410	434	184	217	1,776	0	3,021

SOURCE: Variables EMRETO, EMBA, EMSU, EMGO, EMREPJ, EMENNOPJ, EMENPJ, and EMTO.   DSET UN.89MBC created 11/30/83.

NOTE: Appendix O tables refer to OCS employment as "project" employment.

TABLE II-10
SENSITIVITY OF PROJECTIONS TO ASSUMPTIONS: UNALASKA
RESIDENT EMPLOYMENT
COMPARISON OF LOW, MEDIUM, AND HIGH SALE 89 BASE CASES

	Projections With Low-Growth Assumptions	Projections With Assumptions Used in Study	Projections With High-Growth Assumptions
1980	392	392	392
1981	368	368	368
1982	352	352	352
1983	341	341	341
1984	373	426	426
1985	386	401	416
1986	400	419	456
1987	401	486	567
1988	435	476	613
1989	446	487	657
1990	464	524	725
1991	482	593	882
1992	464	621	977
1993	466	671	1090
1994	471	724	1209
1995	472	793	1333
1996	468	885	1485
1997	465	1025	1816
1998	462	1133	2118
1999	462	1311	2626
2000	461	1284	2771
2001	459	1279	2762
2002	458	1274	2751
2003	456	1270	2742
2004	455	1266	2733
2005	454	1262	2725
2006	453	1259	2717
2007	452	1255	2709
2008	450	1252	2701
2009	449	1248	2694
2010	448	1245	2686

SOURCE: Variable EMRETO, study case DSET N.89MBC, low and high case
         DSETs UN.89LBC and UN.89HBC.

peaks in 1999 and declines thereafter due to declining government spending. Finally, we assumed substantial resident OCS employment after 1997, associated with the production stage of Navarin Basin OCS development.

As shown in Table II-10, our projections for base case resident employment are highly sensitive to our exogenous employment assumptions. In the low case, peak resident employment in 1995 would be only about 20 percent higher than in 1980. Again, we emphasize that our "medium" projections represent only one possible growth path for Unalaska, and that actual employment could be much lower or higher than in our medium case.

Our Sale 92 medium base case projections differ only slightly from our Sale 89 medium base case projections. Resident population is slightly higher for the years 1986-1990 due to slightly higher assumed levels of OCS resident employment during exploration for Sale 89 (Table O-40).

OCS Impact Projections

We prepared three sets of impact projections. These are for OCS Sale 88, for OCS Sale 92, and for Sales 89 and 92 combined. Appendix O includes tables of projections for each of these three cases as well as three sets of tables comparing these impact cases with their respective base cases.

Table II-11 summarizes these impact projections for selected variables. In general, the projected impacts of Sales 88 and 92 are relatively small in percentage terms. The projected maximum impacts of Sale 89 are a little less than half as great as those of Sale 92. The projected maximum impacts of both sales combined are about 15 percent of base case levels of population and employment.

For example, both sales together are projected to increase the total population of Unalaska by a maximum of 348 in 1993. This would represent a 14.5 percent increase in total population in that year.

Table II-12 shows the projected effects of the combined sales on total population for the entire projection period. Impacts begin in 1986 and peak in 1993. Table II-13 shows the impacts on resident population. After 1994, resident workers associated with the production phase of OCS development account for most of the impacts on total population. Prior to 1994, nonresident enclave workers associated with the construction phase account for most of the impacts.

In general, the impact projections show a similar pattern for other variables. The projected impacts are smaller for either of the two sales alone than for the combined sales.

The relative magnitude of projected impacts depends on the base case as well as the impact cases. As shown in Table II-14, absolute

TABLE II-11
SUMMARY OF PROJECTED IMPACTS OF OCS SALES ON UNALASKA

	Maximum Absolute Impact	% Impact In Year of Maximum Absolute Impact	Year of Maximum Absolute Impact
Sale 88			
Total Population (Including Enclaves)	117	4.9	1993
Resident Population	55	4.1	1994
School-age Population	12	4.0	1994
Total Resident Employment	34	4.7	1994
Support Employment	11	4.1	1993
Civilian Government Employment	6	4.0	1994
Sale 92			
Total Population (Including Enclaves)	236	9.8	1993
Resident Population	141	11.5	1993
School-age Population	32	11.1	1993
Total Resident Employment	88	13.1	1993
Support Employment	28	10.9	1993
Civilian Government Employment	17	11.0	1993
Sales 89 and 92 Combined			
Total Population (Including Enclaves)	348	14.5	1993
Resident Population	178	14.5	1993
School-age Population	41	14.1	1993
Total Resident Employment	111	16.6	1993
Support Employment	38	14.7	1993
Civilian Government Employment	21	14.0	1993

SOURCE: RAM Model Projections given in Appendix O.

TABLE II-12
RURAL ALASKA MODEL IMPACT PROJECTIONS
UNALASKA TOTAL POPULATION
SALES 89 AND 92 COMBINED IMPACT CASES

	Base Case	Impact Case	Difference	Percent Difference
1980	1832	1832	0	0.00
1981	1296	1296	0	0.00
1982	898	898	0	0.00
1983	818	818	0	0.00
1984	1097	1097	0	0.00
1985	1079	1079	0	0.00
1986	1177	1297	119	10.15
1987	1477	1501	24	1.64
1988	1413	1448	35	2.50
1989	1506	1537	31	2.04
1990	1679	1786	107	6.35
1991	1953	2033	80	4.07
1992	2158	2418	260	12.06
1993	2396	2744	348	14.52
1994	2639	2830	191	7.24
1995	2982	3160	179	5.99
1996	3314	3472	158	4.76
1997	3737	3894	157	4.20
1998	3924	4080	156	3.98
1999	4117	4273	156	3.80
2000	4011	4168	156	3.89
2001	4009	4164	156	3.88
2002	4005	4160	155	3.86
2003	4003	4157	155	3.86
2004	4002	4155	154	3.85
2005	4000	4154	154	3.84
2006	3999	4152	153	3.82
2007	3998	4151	153	3.82
2008	3997	4149	152	3.80
2009	3997	4148	152	3.79
2010	3996	4147	151	3.77

Variable: POTO

SOURCE: DSETs UN.89MBC--created 12/2/83 and UN.COMIC--created 12/2/83

TABLE II-13
RURAL ALASKA MODEL IMPACT PROJECTIONS
UNALASKA RESIDENT POPULATION
SALES 89 AND 92 COMBINED

	Base Case	Impact Case	Difference	Percent Difference
1980	724	724	724	0.00
1981	687	687	0	0.00
1982	665	665	0	0.00
1983	652	652	0	0.00
1984	791	791	0	0.00
1985	756	756	0	0.00
1986	788	845	57	7.25
1987	901	910	10	1.08
1988	888	902	13	1.51
1989	910	923	13	1.42
1990	974	1011	37	3.80
1991	1089	1117	28	2.55
1992	1139	1280	141	12.40
1993	1223	1401	178	14.54
1994	1313	1478	165	12.55
1995	1427	1586	159	11.12
1996	1579	1737	157	9.97
1997	1808	1964	156	8.65
1998	1985	2141	156	7.84
1999	2275	2431	156	6.86
2000	2235	2392	156	6.98
2001	2233	2388	156	6.97
2002	2229	2384	155	6.93
2003	2227	2381	155	6.94
2004	2226	2379	154	6.91
2005	2224	2378	154	6.90
2006	2223	2376	153	6.88
2007	2222	2375	153	6.87
2008	2221	2373	152	6.84
2009	2221	2372	152	6.82
2010	2220	2371	151	6.79

Variable: PO
Source: DSETs UN.89MBC--created 12/2/83 and UN.COMIC--
created 12/2/83

TABLE II-14

COMPARISON OF PROJECTED 1993 IMPACTS OF OCS SALES
ON UNALASKA WITH DIFFERENT BASE CASE ASSUMPTIONS

	Total Population Including Enclaves	Resident Population	Resident Employment
Sale 89 Low Base Case	1,426	894	466
Sale 89 Medium Base Case	2,396	1,223	671
Sale 89 High Base Case	3,636	1,895	1,090
Combined Impacts of Sales 89 and 92[a]	348	178	111
Combined Impacts as Percentage of Sale 89 Low Base Case	24	20	24
Combined Impacts as Percentage of Sale 89 Medium Base Case	15	15	17
Combined Impacts as Percentage of Sale 89 High Base Case	10	9	10

_____

[a]The impact projections used Sale 89 medium base case assumptions for non-OCS assumptions. They might have differed slightly had the low or high base cases been used for non-OCS assumptions.

projected impacts are as high as 24 percent if we use the Sale 89 medium base case. Nevertheless, the projected impacts of the two sales on population and employment in Unalaska remain relatively low.

Our relatively low impact projections for these two sales result directly from our assumptions. As we showed in Table II-6, we assumed that no offshore workers would live in or be based in Unalaska and that all short-term skilled onshore jobs would be held by nonlocal residents who would live in enclaves. Only long-term onshore workers would become residents of Unalaska. Given that the peak assumed increase in onshore long-term OCS employment for the combined sales is only 56, we would expect the sales to result in only a relatively small increase in total population and employment, which is what the model projected.

In sum, under the assumptions provided us by the OCS office, Unalaska would be a support base for exploration, development, and production activities associated with OCS Sales 89 and 92. Substantial numbers of OCS-related personnel would already be based in Unalaska as a result of Navarin Basin development and production activities. Our model projections suggest that the additional personnel associated with Sales 89 and 92 would have a relatively small effect on Unalaska.

III. COLD BAY

In this chapter, we briefly describe the history, population, and economy of Cold Bay. We then discuss the assumptions which we use for our RAM model projections for the community. Next, we present low, medium, and high base case projections of the population and economy of Cold Bay in the absence of development from the St. George Basin and North Aleutian Shelf lease sales. Finally, we present projections of population and employment if development occurs in these two lease areas, and we discuss the projected impacts of the sales.

Our description of Cold Bay in this chapter is intended to provide a brief introduction to the community as well as a starting point for our projections. We refer readers desiring a more detailed description of Cold Bay to Social and Economic Studies Program Technical Report Number 93, prepared by Impact Assessment, Inc., entitled "Cold Bay: Ethnographic Study and Impact Analysis" (Petterson et al., 1983a). This study includes a detailed discussion of many aspects of the community of Cold Bay, including its history, infrastructure, population, and economy. We have based our description of the community primarily upon this study.

History

Cold Bay lies near the western tip of the Alaska Peninsula
approximately 630 air miles from Anchorage. Although there are
indications that Aleuts once lived in the area, the fate of these
early inhabitants is unknown. Russians ventured into the territory
in the 18th and 19th centuries. Izembek Lagoon, just north of Cold
Bay, was named in honor of Karl Izembek, a surgeon in the Peter
Krenitzin party which wintered near Cold Bay in 1768. Trappers and
subsistence hunters visited the area, but little about the Cold Bay
region is recorded in history until World War II.

In January 1942, the U.S. Army established Fort Randall at Cold
Bay. Fort Randall was one of a series of military bases established
in Alaska by the United States during World War II. After Japan
attacked Dutch Harbor and occupied the outer Aleutian Islands of
Attu and Kiska, the U.S. military launched a massive buildup in the
region. At the peak of its activity, Fort Randall reportedly housed
40,000 troops. The base was abandoned at the close of the war, but
the airstrip was maintained by the army through the early 1950s.
Later the airstrip was transferred to Reeve Aleutian Airways, then
to the Federal Aviation Administration, and most recently to the
Alaska Department of Transportation and Public Facilities.

A Distant Early Warning (DEW) line station was established in 1958
at nearby Grant Point, and today Grant Point Air Force Base operates
from this post. A large area bordering the northern edge of Cold

Bay is the Izembek National Wildlife Refuge, created in 1960 by a Public Land Order. The U.S. Fish and Wildlife Service manages the refuge. In 1960, Flying Tigers, Inc., a private air freight company, leased land adjacent to the airstrip at Cold Bay and built facilities there. Flying Tigers, Inc., continues to operate the only retail facilities in Cold Bay, although their aircraft use the Cold Bay airport only rarely.

During the 1960s while the war in Southeast Asia was taking place, Cold Bay was a refueling and servicing stop for aircraft enroute to the Aleutians and the Orient. Airport activity decreased in the 1970s as U.S. involvement in the war was reduced and as aircraft capable of flying nonstop to the Orient were introduced.

During its relatively short history, Cold Bay has been a transportation and communications center for the Aleutian/Pribilof Islands region. It remains today a unique community comprised of a transient population focused on the operation and maintenance of the airport and its related services.

Population

Table III-1 presents information on the population of Cold Bay from the 1970 and 1980 U.S. Censuses. Cold Bay had a total population of 228 in 1980, a decrease of 10.9 percent from 1970. This decrease was due, primarily, to the decline in activity of the Cold Bay airport during the Vietnam war years. The 1980 census figure of 228 is very close to the field estimate of 226 reported in Petterson

TABLE III-1:
COLD BAY POPULATION, 1980 AND 1970

AGE

	0-4	5-14	15-19	20-34	35-64	65+	Total
1980							
Total	18	19	17	94	79	1	228
Male	7	9	11	64	55	1	147
Female	11	10	6	30	24	0	81
Native	1	1	1	4	3	0	10
Male	0	0	1	3	2	0	6
Female	1	1	0	1	1	0	4
Non-Native	17	18	16	90	76	1	218
Male	7	9	10	61	53	1	141
Female	10	9	6	29	23	0	77
1970							
Total	18	30	12	121	75	0	256
Male	8	18	8	105	54	0	193
Female	10	12	4	16	21	0	63
Native[a]	5	4		10	7	0	26
Male	1	3		5	5	0	14
Female	4	1		5	2	0	12
Non-Native	13	26		123	68	0	230
Male	7	15		108	49	0	179
Female	6	11		15	19	0	51
1960 Total							86

[a]The 1970 Native age/sex breakdown is an estimate based on two sources: (1) the Census Bureau's age/sex breakdown of "Other Races," excluding the Black and White races; and (2) ISER's census-based publication (Alaska Review of Business and Economic Conditions, September 1973) giving total number of males and females of the Aleut, Eskimo, and Indian races.

SOURCES:

U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

et al. (1983, p. 63). In this study, we assume that the 1982 population was the same as that reported by the census for 1980.

Cold Bay has a high proportion of adults. In 1980, 76.3 percent of the population were over 20 years old. Virtually all of these were less than 65 years old. Thus, we find a relatively large labor force at Cold Bay.

The proportion of children (persons less than 15 years of age) decreased slightly between the two target years. Children accounted for 18.8 percent of the population in 1970, while they comprised 16.2 percent in 1980. The proportion of youths aged 15 to 19 years increased from 4.7 percent to 7.5 percent between 1970 and 1980.

The Native population comprised 10.2 percent of the population in 1970. By 1980, the proportion of the total population that was Native decreased to 4.4 percent.

In 1980, over three-quarters of the population were between the ages of 20 and 65. Over two-thirds of the adult population was male. Less than 5 percent of the population of Cold Bay was Native. According to Petterson et al., the small Native population is "essentially assimilated to Euro-American culture, so that effectively, from a cultural standpoint, there is no Native population in Cold Bay" (page 64).

The population of Cold Bay is essentially transient. According to

Petterson:

> An individual migrates to the town, remains there with only
> short absences for two to five years, [and] then leaves
> town....   This pattern of immigration, residence,
> emigration is a result of the fact that the town is
> dominated by outside employers, particularly large
> governmental agencies and private transportation and
> communications corporations. Most of these companies and
> agencies . . . send people to Cold Bay for a specific tour
> of duty, and very few of these people ultimately become
> permanent residents, preferring rather to leave at the end
> of their tour than to stay.. . .

Our RAM model population projections for Cold Bay are based upon the

assumption that the population remains transient.

Employment

Table III-2 presents estimates of employment in Cold Bay in 1982

developed by Petterson et al. Total employment was 154, of which

41 percent were government employees.   The Federal Aviation

Administration and the U.S. Air Force accounted for half of

government employment. Of the 91 employees of private firms, over

four-fifths worked for Reeve Aleutian Airways, RCA, Flying Tiger

Lines, or Peninsula Airlines. Of the eight other private businesses

in Cold Bay, none had more than five employees.

A particularly important aspect of employment in Cold Bay is that

very little of it is endogenous, or generated locally to provide

services to residents of Cold Bay. Endogenous government employment

TABLE III-2.
COLD BAY LABOR FORCE BY SECTOR: 1982

Industry	Total Employees		Percent of Total Labor Force	
Government	63		40.9	
Federal	43		27.9	
Federal Aviation Admin.		16		10.4
National Weather Service		5		3.2
Fish & Wildlife Service		4		2.6
U.S. Post Office		2		1.3
Federal Military (USAF)		16		10.4
State	19		12.3	
Dept. of Transportation		6		3.9
Dept. of Fish & Game		7		4.5
R.E.A.A. (School System)		5		3.2
Magistrate		1		0.7
Municipal	1		0.7	
Clerk		1		0.7
Private Employers	91		59.1	
Transportation	34		22.1	
Reeve Aleutian Airways		22		14.3
Peninsula Airlines		10		6.5
Cold Bay Truck Rental		2		1.3
Communications	31		20.1	
R.C.A.		28		18.2
Alascom		2		1.3
Interior Telephone Co.		1		0.7
Service	18		11.7	
Flying Tigers Lines		16		10.4
Northern Power Co.		2		1.3
Manufacturing/Processing	6		3.9	
Northern Peninsula Fisheries		5		3.2
Seawest		1		0.7
Construction	2		1.3	
Well Digger		1		0.7
Laborer		1		0.7
TOTAL	154		100.0	

SOURCE: John S. Petterson, et al., Cold Bay: Ethnographic Study and Impact Analysis, Social and Economic Studies Program, Technical Report Number 93 (Anchorage, Minerals Management Service, Alaska OCS Office, August 1983), p. 88.

would include one Postal Service employee, the five school system employees, the magistrate, the municipal clerk, and perhaps one Department of Transportation employee for a total of nine jobs. Endogenous private employment would include perhaps eight of the employees of Flying Tiger Lines, the two Cold Bay truck rental employees, one Interior telephone company employee, one Northern Power Company employee, one well digger, and one laborer for a total of 14 jobs. In total, these 23 jobs represent only 15 percent of total employment. Thus, most of the economy of Cold Bay is based on providing transportation, communication, or government services to markets external to Cold Bay. These activities generate very little additional employment within Cold Bay.

Assumptions for RAM Model Projections

A large number of assumptions are required in order to run the RAM model. We document our Cold Bay RAM model assumptions fully in Appendixes L and N. In this section, we briefly review these assumptions.

We prepared seven different sets of projections, or "cases" for Cold Bay. These include four sets of "base case" projections, and three sets of "impact projections." Our standard base case is the "Sale 89 Medium Base Case." This case includes what we consider to be the most likely assumptions for non-OCS related employment, as well as the pre-Sale 89 OCS employment assumptions which we have been instructed to use by the Alaska OCS office.

In order to examine the sensitivity of this standard base case to our employment assumptions, we prepared the "Sale 89 Low Base Case" and the "Sale 89 High Base Case." For the Sale 89 Low Base Case we assumed lower levels of non-OCS exogenous employment, as well as no OCS-related employment. Therefore, the low case suggests a lower bound for future population and employment in Cold Bay. In contrast, for the Sale 89 High Base Case, we assumed relatively high levels of non-OCS employment (no decline from current levels in existing industries, as well as an expansion of fish processing employment), together with the Medium Case OCS employment assumptions. This case therefore suggests an upper bound for future population and employment in Cold Bay, in the absence of OCS Sales 89 or 92.

For the Sale 92 Medium Base Case, we assumed exploration but no development of the Sale 89 lease area. THus we assume identical levels of non-OCS employment as for the Sale 89 Medium Base Case, but we assumed slightly higher levels of OCS employment to account for exploration-only employment from Sale 89.

We prepared three impact case projections: the "Sale 89 Impact Case," the "Sale 92 Impact Case," and the "Sales 89 and 92 Combined Impact Case." For our Sale 89 Impact Case, we added employment assumptions provided by the OCS office for development of the Sale 89 lease area to the Sale 89 Medium Base Case OCS employment assumptions. For the Sale 92 Impact Case, we added OCS employment

assumptions for Sale 92 to the Sale 92 Medium Base Case OCS employment assumptions. Finally, for the Sale 89 and 92 Combined Impact cases, we added OCS employment assumptions for both sales to the Sale 89 Medium Base Case OCS employment assumptions. The projected impacts of the individual and the combined sales were the differences between the impact case projections and the corresponding base case projections.

Table III-3 summarizes our RAM model assumptions for these seven cases. For all of the impact cases, the non-OCS employment assumptions are the "Medium Case" assumptions. These assumptions are based for the most part on the study by Petterson et al, and are documented in Appendix L. Our OCS employment assumptions were provided by the Minerals Management Service and are discussed in detail in Appendix N.

Because of the transient nature of the population of Cold Bay, we assume that the age-sex-race distribution of the population remains constant. For our RAM model projections, we assume that most of the population leaves every year, to be replaced by people with similar characteristics to those of the population in 1982. As a result, the population does not age over time.

We assumed declines in exogenous support and government employment based on the discussion of the primary (base case) scenario in Petterson et al. (pages 125-135). According to this scenario,

TABLE III-3:   SUMMARY OF RAM MODEL ASSUMPTIONS
FOR COLD BAY PROJECTIONS

Population Assumptions

1982 population	228
Age, sex,race breakdown of population	Based on 1980 census; constant age-sex-race distribution.

Non-OCS Employment Assumptions

1982 resident employment	154
Basic employment	6
Support employment	85
Government employment	63
Exogenous basic employment	Remains constant at 6 in low and medium cases; increases steadily due to increases in fish processing in high case.
Exogenous support employment	Decreases from 71 to 40 in low case; decreases to 50 in medium case; remains constant at 71 in high case
Exogenous government employment	Decreases from 54 to 31 in low case, decreases to 35 in medium case; remains constant at 54 in high case
Endogenous support employment	Increases by 1 for every $217 thousand increase in resident income.
Endogenous government employment	Increases by 1 for every increase of 25 in population. With future cuts in government revenues, response to increase in population declines.

TABLE III-3: SUMMARY OF RAM MODEL ASSUMPTIONS
   FOR COLD BAY PROJECTIONS (continued)

OCS enclave-generated support
   employment

Increases by 1 for every
increase of 20 in the OCS
enclave population.

OCS Employment Assumptions

All offshore workers assumed to be commuters who only pass through
   Cold Bay.
All short-term onshore workers assumed to be enclave residents.
All long-term onshore workers assumed to be residents of Cold Bay

	First year of resident employment	Peak resident employment
Sale 89 Low Base Case	–	none
Sale 89 Medium and High Base Cases	1996	32
Sale 92 Medium Base Case	1996	36
Sale 89 Impact Case	1994	56
Sale 92 Impact Case	1992	51
Sales 89 and 92 Combined Impact Case	1992	75

The immediate outlook for the Cold Bay economic structure appears bleak . . .. Currently the employment picture is dominated by communications, transportation, and government. The next decade will see a severe contraction of both communications and government as employers. . .. The Federal Aviation Administration has continuing plans for retrenchment of its Cold Bay personnel . . .. Within seven years, plans call for a reduction of the FAA personnel from 16 to 2 . . .. Remoting will also be the cause of major reductions in the number of personnel employed at the Air Force Base. Within two years it is projected that there will be no military personnel at the base, a reduction of 16 to 0 by 1985 . . .. RCA is (also) heavily implicated in the retrenchment occurring at the Air Force Base . . .. RCA plans to cut its work force from approximately 28 . . . to less than fifteen within two years. Between government, particularly federal, and cummunications, particularly RCA, cutbacks, . . . Cold Bay is confronted with massive employment reductions. From a total of 94 jobs in these two sectors, or over 60 percent of total employment, the end of the decade will see them accounting for approximately 38 jobs, a reduction of 60 percent. This will represent an overall reduction of employment in Cold Bay from a total of 154 in 1982 to approximately 98, a drop of more than one-third, from these two areas alone (pp. 125-132).

For our low case, we assumed that the cutbacks in exogenous employment discussed by Petterson et al. would occur, and that further cutbacks would continue for several years before exogenous employment stabilized. For our medium case, we assumed that only those cutbacks specifically mentioned by Petterson et al. would occur. For our high case, we assumed that there would be no cutback from current levels of employment, and that in addition employment in fish processing would rise from the current low level of 6 to 62 by 2010.

We assumed that basic employment in Cold Bay generates relatively little endogenous support employment, and that future OCS

employment, whether from resident or enclave workers, would also generate relatively little new employment. Similarly, we assumed a low level of endogenous government employment, and only small increases in government employment as a result of future population increases.

We assumed that offshore OCS workers will only pass through the Cold Bay airport, and that no offshore workers will become residents of Cold Bay or live in enclaves at Cold Bay. Similarly, we assumed that all short-term onshore OCS workers will be based in enclaves, and that none of these workers will become residents of Cold Bay. In contrast, we assumed that all long-term onshore OCS workers will be residents of Cold Bay. However, like most other "residents" of Cold Bay, they will not be permanent residents, but rather personnel who are stationed in the community for relatively brief periods of only one or two years.

RAM Model Base Case Projections

Our complete base case projections are presented in Appendix P, Tables P-1--P-52. In this section, we review the most important aspects of these projections.

Tables III-4 and III-5 summarize our Sale 89 medium base case projections. In the base case, the resident populaton of Cold Bay declines steadily from 225 in 1981 to 156 in 1994 (Table III-4). This decline is due to the erosion of exogenous government and

TABLE III-4
RURAL ALASKA MODEL PROJECTIONS
COLD BAY
SALE 89 MEDIUM BASE CASE

	Resident Population	Non- Project Enclave Population	Project Enclave Population	Military Enclave Population	Total Population Including Enclaves and Military
1981	225	0	0	0	225
1982	226	0	0	0	226
1983	197	0	0	0	197
1984	198	0	97	0	295
1985	186	0	76	0	262
1986	184	0	114	0	298
1987	178	0	118	0	296
1988	168	0	50	0	218
1989	161	0	10	0	171
1990	159	0	10	0	169
1991	159	0	10	0	169
1992	157	0	10	0	167
1993	157	0	10	0	167
1994	156	0	10	0	166
1995	156	0	10	0	166
1996	164	0	10	0	174
1997	184	0	40	0	224
1998	206	0	50	0	256
1999	214	0	40	0	254
2000	211	0	0	0	211
2001	210	0	0	0	210
2002	210	0	0	0	210
2003	210	0	0	0	210
2004	210	0	0	0	210
2005	210	0	0	0	210
2006	210	0	0	0	210
2007	210	0	0	0	210
2008	209	0	0	0	209
2009	209	0	0	0	209
2010	209	0	0	0	209

SOURCE: Variables PO, EMENNOPJ, EMENPJ, POML, and POTO. DSET CB.89MBC--created 11/16/83

TABLE III-5
RURAL ALASKA MODEL PROJECTIONS
COLD BAY
SALE 89 MEDIUM BASE CASE

	Total Resident Employment	Resident Basic Employment	Resident Support Employment	Resident Government Employment	Resident Project Employment
1981	153	6	85	62	-0
1982	154	6	85	63	-0
1983	134	6	74	54	-0
1984	134	6	77	51	-0
1985	126	6	73	47	-0
1986	125	6	73	46	-0
1987	121	6	71	44	-0
1988	114	6	65	43	-0
1989	109	6	61	42	-0
1990	108	6	60	42	-0
1991	108	6	60	42	-0
1992	107	6	60	41	-0
1993	106	6	60	40	-0
1994	106	6	60	40	-0
1995	106	6	60	40	-0
1996	111	6	61	40	5
1997	125	6	64	40	15
1998	140	6	66	41	27
1999	145	6	67	41	32
2000	143	6	64	41	32
2001	143	6	64	40	32
2002	143	6	64	40	32
2003	143	6	64	40	32
2004	143	6	64	40	32
2005	143	6	64	40	32
2006	142	6	64	40	32
2007	142	6	64	40	32
2008	142	6	64	40	32
2009	142	6	64	40	32
2010	142	6	64	40	32

SOURCE: Variables EMRETO, EMBA, EMSU, EMGO, and EMREPJ. DSET
CB.89MBC--created 11/16/83

support sector employment. As shown in Table III-5, resident support employment declines from 85 in 1981 to 60 in 1990, and resident government employment declines from 62 in 1981 to 40 in 1993.

After 1995, resident population begins to rise again, stabilizing at 210 after 2001. This increase is due to an increase in OCS or "project" employment, which begins in 1996 and stabilizes at 32 after 1999.

Similarly, a considerable number of OCS-employees are based at enclaves in or near Cold Bay over the period 1984-1999. These are onshore short-term employees involved in support or construction activities during the exploration and development phase of the assumed development of the Navarin Basin Sale 83 lease area and exploration of the St. George Basin Sale 70 lease area (resident OCS employment in subsequent years is associated with the production phase of the Navarin Basin development).

As shown in these two summary tables, in the absence of Sales 89 or 92, Cold Bay is likely to undergo a significant contraction in resident population over the next decade due to contraction in traditional FAA, military, and communications activities. However, development of the Navarin Basin might lead to the enclave-type basing of a substantial number of OCS-related employees in the area

during this period, in particular during the years 1984-1987. Subsequently, about 30 OCS-related employees might become residents of the area, helping to bring the resident population back to about its current level.

We may contrast our medium case projections with our low and high case projections (See Appendix P, Tables P-14--P-39 for the low and high case projections). In the low case, resident employment declines from 154 in 1982 to 88 in 2000, due to continuing cutbacks in exogenous employment beyond those assumed by Petterson et al. This results in a decline in resident population from 226 to 130.

In contrast, in the high case, resident employment increases from 154 to 251 over the projection period, as no cutbacks take place in support or government employment, employment in fish processing increases to over 60, and OCS development occurs in the Navarin basin. The increase in employment results in an increase in resident population from 225 to 370. Thus, while our base case projection for resident population at the end of the projection period is about 210, in the low case the population would be only a little over half as great, while in the high case the population would be nearly twice as great.

In the Sale 92 Medium Base Case (see Appendix P, Tables P-40--P-52), the resident population of Cold Bay would be the same as for the Sale 89 Medium Base Case. However, the enclave population in the

short term would be somewhat higher, peaking at 137 instead of 114, due to additional employment associated with exploration in the Sale 89 lease area.

RAM Model Impact Projections

Our complete impact projections are shown in Appendix P, Tables P-53--P-91. In this section, we briefly summarize these projections.

Tables III-6, III-7 and III-8 show the projected effects of development of the OCS Sale 89 lease area upon total population, resident population and resident employment in Cold Bay. As shown in Table III-6, Sale 89 increases total population by a maximum of 91 in 1993. However, almost all of the projected impact on total population prior to 1994 is due to additional enclave employment based in Cold Bay, beginning in 1986. After 1994, the impacts of Sale 89 are felt mostly as increased resident population due to the basing of additional long-term onshore OCS employees in Cold Bay. These employees increase the population after 1994 by 43, or about 20 percent, to a level approximately 20 persons greater than the current population level. Resident employment increases by a maximum of 29, or about 20 percent. Almost all of this is OCS employment (government employment increases by only 1 and support employment increases by a maximum of 5).

TABLE III-6
RURAL ALASKA MODEL IMPACT PROJECTIONS
COLD BAY TOTAL POPULATION
COMPARISON OF SALE 89 BASE AND IMPACT CASES

	Base Case	Impact Case	Difference	Percent Difference
1981	225	225	0	0.00
1982	226	226	0	0.00
1983	197	197	0	0.00
1984	295	295	0	0.00
1985	262	262	0	0.00
1986	298	325	27	9.14
1987	296	305	9	2.94
1988	218	234	16	7.48
1989	171	183	12	7.01
1990	169	198	29	17.38
1991	169	191	22	12.89
1992	167	228	61	36.35
1993	167	258	91	54.72
1994	166	226	59	35.72
1995	166	223	57	34.46
1996	174	217	43	24.52
1997	224	267	43	19.01
1998	256	299	43	16.62
1999	254	297	43	16.75
2000	211	253	43	20.20
2001	210	253	43	20.20
2002	210	253	42	20.20
2003	210	253	42	20.20
2004	210	252	42	20.20
2005	210	252	42	20.20
2006	210	252	42	20.20
2007	210	252	42	20.20
2008	209	252	42	20.20
2009	209	252	42	20.20
2010	209	252	42	20.20

Variable: POTO

SOURCE: DSETs CB.89MBC--created 11/17/83 and CB.89IIC--created 11/17/83

TABLE III-7
RURAL ALASKA MODEL IMPACT PROJECTIONS
COLD BAY RESIDENT POPULATION
COMPARISON OF SALE 89 BASE AND IMPACT CASES

	Base Case	Impact Case	Difference	Percent Difference
1981	225	225	0	0.00
1982	226	226	0	0.00
1983	197	197	0	0.00
1984	198	198	0	0.00
1985	186	186	0	0.00
1986	184	186	2	1.21
1987	178	179	1	0.39
1988	168	169	1	0.78
1989	161	162	1	0.60
1990	159	161	2	1.48
1991	159	161	2	1.11
1992	157	162	5	3.05
1993	157	164	7	4.61
1994	156	191	34	22.03
1995	156	190	34	21.91
1996	164	207	43	26.01
1997	184	227	43	23.13
1998	206	249	43	20.65
1999	214	257	43	19.88
2000	211	253	43	20.20
2001	210	253	43	20.20
2002	210	253	42	20.20
2003	210	253	42	20.20
2004	210	252	42	20.20
2005	210	252	42	20.20
2006	210	252	42	20.20
2007	210	252	42	20.20
2008	209	252	42	20.20
2009	209	252	42	20.20
2010	209	252	42	20.20

Variable: PO

SOURCE: DSETs CB.89MBC--created 11/17/83 and CB.89IIC-- created 11/17/83

TABLE III-8
RURAL ALASKA MODEL IMPACT PROJECTIONS
COLD BAY RESIDENT EMPLOYMENT
COMPARISON OF SALE 89 BASE AND IMPACT CASES

	Base Case	Impact Case	Difference	Percent Difference
1981	153	153	0	0.00
1982	154	154	0	0.00
1983	134	134	0	0.00
1984	134	134	0	0.00
1985	126	126	0	0.00
1986	125	126	1	1.20
1987	121	121	0	0.39
1988	114	115	1	0.78
1989	109	110	1	0.60
1990	108	110	2	1.48
1991	108	109	1	1.10
1992	107	110	3	3.07
1993	106	111	5	4.62
1994	106	130	23	22.00
1995	106	129	23	21.90
1996	111	140	29	26.01
1997	125	154	29	23.14
1998	140	169	29	20.65
1999	145	174	29	19.88
2000	143	172	29	20.20
2001	143	172	29	20.20
2002	143	172	29	20.20
2003	143	172	29	20.20
2004	143	171	29	20.20
2005	143	171	29	20.20
2006	142	171	29	20.20
2007	142	171	29	20.20
2008	142	171	29	20.20
2009	142	171	29	20.20
2010	142	171	29	20.20

Variable: EMRETO

SOURCE: DSETs CB.89MBC--created 11/17/83 and CB.89IIC--created 11/17/83

The projected impacts of Sale 92 alone are somewhat smaller, increasing resident population and employment by only about 15 percent (see Appendix P, Tables P-53—P-65 and P-98—P-103).

In the combined impact case, which assumes development of both the Sale 89 and the Sale 92 lease areas (See Appendix P, Tables P-79—P-91 for these projections), the resident population of Cold Bay rises to 287 in the late 1990s, and enclave employment during the 1990's is as high as 190. The projected impacts in this case are the sum of those for Sale 89 and Sale 92 alone, or approximately double the impacts of only one of the sales. The combined sales would increase the resident population of Cold Bay by approximately 30 percent.

Conclusions

Cold Bay differs from most other communities which have been studied under the Social and Economic Studies Program in that it is primarily a transient community, with very few residents who might be considered "permanent." In the absence of OCS development, the community will probably decline to a population about two-thirds of its current level due to future cutbacks in employment by the FAA, the U.S. Air Force, and RCA.

OCS development in the Bering Sea may partially reverse this decline or even cause Cold Bay to increase in size, but this increase is not likely to be dramatic. With development of the Navarin Basin, the

resident population of the community might be expected to fall from about 225 to about 170, and then rise gradually to about 210 by the late 1990s. In addition, as many as 115 enclave employees might be based in Cold Bay during the mid 1980s during the exploration and development of the Navarin Basin.

If development of either Sale 89 (the St. George Basin) or Sale 92 (the North Aleutian Shelf) occurs as well, OCS-related employment and population would be somewhat higher. Enclave employment might be as high as 140 during the mid 1980s and the resident population of Cold Bay might rise to about 250 by the late 1990s.

By themselves, development from either of these sales is unlikely to result in drastic changes in either the size or the character of Cold Bay. The assumed development of the Navarin Basin would have a more significant effect, in that it would reverse the decline of the community. With development from Sale 89 or 92 the community would still be only slightly larger than it is at present--approximately the same size as during the Vietnam War period.

A more significant effect of OCS development upon the community might be the introduction of a different kind of employment and different kinds of workers than have previously resided in Cold Bay, as suggested by Petterson et al.:

Economic class distinctions will begin to emerge in Cold
Bay gradually over the next decade if oil-related
development occurs. THe major developments will begin
following the onset of oprations at the facilities because
it is then that certain elements of the oil-related work
force will establish residence in Cold Bay. With the
growth in population, the arrival of both a managerial and
a laboring class, and the expansion of available local
social settings such as restaurants and bars public
behavior will begin to sort by economic class . . .. This
will not result in a pervasive and rigid system of
economic class distinctions, but will be a gradual
tendency throughout the forecast period (page 163).

IV. DESCRIPTION AND PROJECTIONS: SAND POINT

History

Sand Point is located on Popof Island, one of the Shumagin Islands which are situated near the southern coast of the Alaska Peninsula. Sand Point is 570 air miles southwest of Anchorage. The nearest population center is Kodiak, 350 air miles away.

The Shumagin Islands were named by Vitus Bering for one of his sailors, Nikita Shumagin, who died of scurvy and was buried in the area in 1741. Popof Island is believed to be named after Sila and Ivan Popof who traded and hunted furs on the island during 1762-63.

Aleuts were early residents of the region of present-day Sand Point, but the site was uninhabited when, in 1887, Lynde and Hough, a San Francisco fishing firm, established a station there. The complex consisted of a trading post, a salmon fishing station, and a supply post for cod fishing.

Fox farming and gold mining have influenced Sand Point's history. In 1888, Andrew Grosvold, a gold miner from Nome, bought fox farms and later acquired the store. Early residents of Sand Point worked mainly for Mr. Grosvold on the fox farms and built and repaired dories for cod fishermen. The fox industry existed until the 1930s. Sand Point had a brief rendezvous with gold mining in 1904 and 1905 when 40 to 50 men worked the beaches.

Sand Point's dominant industry, though, has been and continues to be fishing and fish processing. During the 1930s, the Alaska Pacific Salmon Company established a salmon cannery two miles from Sand Point on the spit across Humbolt Harbor. New England Fisheries purchased this establishment about 1960. Aleutian Cold Storage bought Andrew Grosvold's holdings in 1947 and established a halibut plant in 1948.

In 1954, Wakefield Fisheries began processing king crab, leasing part of Aleutian Cold Storage facilities. Later, in 1966, Wakefield purchased Aleutian Cold Storage facilities and established a year-round king crab processing plant. The king crab industry flourished from 1954 into the early 1960s. In 1967, the catch of king crab declined dramatically, and the state established quotas on future catches. The quotas imposed may have cut Sand Point's king crab industry in half.

In 1969, Norton Simon bought controlling interest in Wakefield Fisheries and the firm diversified into tanner crab and shrimp processing. Both species were significant elements in the seafood processing operations of the plant until the late 1970s. Currently the facilities are owned by Aleutian Cold Storage Company. The firm freezes king crab, tanner crab, halibut, and salmon, and has a canning line for crab and shrimp. This is the only seafood processing facility in Sand Point today.

Sand Point is home to a fishing fleet that harvests the surrounding waters for king crab, salmon, halibut, tanner crab, herring, and cod.

Population

Sand Point's population totaled 625 in 1980 according to the U.S. census (Table IV-1). Although the community has experienced significant growth over the past two decades, it grew more between 1970 and 1980 than it did between 1960 and 1970. In the latter decade, Sand Point had a 41.7 percent increase with an average annual growth rate of 3.5 percent. Between 1970 and 1980, it had an increase of 73.6 percent and an average annual growth rate of 5.8 percent.

Over the past decade, Sand Point has remained a town with a young population. Three-fourths of its population has been less than 35 years of age (72.8 percent in 1970 and 74.1 percent in 1980). It is within this major age category that shifts have occurred. In 1970, children (persons less than 15 years of age) accounted for 39.8 percent of the total population, while in 1980 they comprised a fourth (25.1 percent) of the population. The 15- to 19-year olds represented 8.1 percent of the population in 1970 and 12.6 percent in 1980. The proportion of young adults (20 to 34 years old) also grew in the past decade, from 25 percent of the population in 1970 to 36.3 percent in 1980.

TABLE IV-1.
SAND POINT POPULATION

AGE

	0-4	5-14	15-19	20-34	35-64	65+	Total
1980							
Total	57	100	79	227	148	14	625
Male	25	55	37	134	83	6	340
Female	32	45	42	93	65	8	285
Native	34	72	48	98	92	13	357
Male	15	39	20	60	50	5	189
Female	19	33	28	38	42	8	168
Non-Native	23	28	31	129	56	1	268
Male	10	16	17	74	33	1	151
Female	13	12	14	55	23	0	117
1970							
Total	56	87	29	90	90	8	360
Male	38	39	11	46	49	4	187
Female	18	48	18	44	41	4	173
Native[a]	48	74		82	52	4	260
Male	33	34		39	28	1	135
Female	15	40		43	24	3	125
Non-Native	8	13		37	38	4	100
Male	5	5		18	21	3	52
Female	3	8		19	17	1	48
1960 Total							254

[a]The 1970 Native age/sex breakdown is an estimate based on two sources: (1) the Census Bureau's age/sex breakdown of "Other Races," excluding the Black and White races; and (2) ISER's census-based publication (Alaska Review of Business and Economic Conditions, September 1973) giving total number of males and females of the Aleut, Eskimo, and Indian races.

Sources:

U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

Stability at the other end of the spectrum is evident from the figures also. Adults aged 35 to 64 accounted for 25.0 percent of the population in 1970 and 23.7 percent in 1980. Elders, 65 years of age or older, made up 2.2 percent of the population in 1970 and in 1980.

In analyzing the ethnic composition of Sand Point, we found that the proportion of Natives decreased significantly over the decade. In 1970, 72.2 percent of the population was Native, while in 1980, 57.1 percent was Native.

In the past ten years, Sand Point's proportion of males has increased from 51.9 percent in 1970 to 54.4 percent in 1980.

Employment

Our estimates of employment and income in Sand Point in 1980 are based on a number of data sources and a variety of different assumptions. We describe how we developed these estimates in Appendix F.

EMPLOYMENT BY SECTOR

Table IV-2 provides a breakdown of estimated full-time equivalent resident employment for Sand Point in 1980. Full-time equivalent (FTE) employment is a measure of total person-years of work. While FTE employment provides the best measure of work done over an entire year, actual employment at any time during the year may vary greatly from FTE employment.

TABLE IV-2.
ESTIMATED FULL-TIME EQUIVALENT
EMPLOYMENT IN ST. PAUL, 1980

<u>Resident Basic Employment</u>	<u>165</u>
Harvesting	107
Fish Processing	47
Mining	11
<u>Resident Support Employment</u>	<u>68</u>
Exogenous	11
Endogenous	35
Government-sponsored	21
Enclave-sponsored	1
<u>Resident Government Employment</u>	<u>16</u>
Exogenous	2
Endogenous	14
<u>Total Resident</u>	<u>249</u>
Total Exogenous	178
Total Endogenous	71
<u>Nonresident (Enclave) Employment</u>	54
<u>Total Resident and Nonresident</u>	303

Our estimates suggest total resident FTE employment of 249 jobs. We may break these jobs down into three sectors: basic, support, and government. Nonresident enclave employment totals FTE employment of 54 jobs.

Basic sector jobs are private sector jobs in the production of raw materials and manufactured goods including jobs in agriculture, forestry, fisheries, mining, and manufacturing. We estimate that there were 165 FTE basic sector jobs in 1980, 65 percent of which were in fish harvesting, the remainder in fish processing and mining. In total, basic sector jobs account for 66 percent of resident FTE employment.

Support sector jobs are nonbasic private-sector jobs. We estimated 1980 FTE employment of 68 in support sector jobs, or 27 percent of total employment. These jobs were in the school and clinic, in transportation services, and in other local services.

We estimated total government employment of 16 FTE jobs or 6 percent of total employment. Eighty-eight percent of government jobs serve the local community. There is no military employment in Sand Point.

EMPLOYMENT BY MARKET SERVED

Another way to view employment is in terms of the market that it serves. Employment that provides goods or services to markets outside of a community is referred to as "exogenous," while

employment that provides goods or services to markets within a community is referred to as "endogenous."[1] This distinction is important for purposes of economic modeling and projections because exogenous employment is not directly affected by changes in the population or income of the community; whereas, endogenous employment is directly related to population and income. In general, the smaller a community, the larger a share of total employment which may be characterized as exogenous.

Of total FTE employment in Sand Point, 178 jobs, or 71 percent, were exogenous, while 71 jobs, or 29 percent, were endogenous. All 165 basic sector jobs may be considered exogenous. In addition, we estimated that 11 support sector jobs and 2 government jobs are exogenous. Exogenous support jobs are primarily in the transportation sector.

We estimated that there were 57 endogenous support jobs and 14 endogenous government jobs. Of the endogenous support jobs, we assumed that 36, or 63 percent, were generated by private spending and that the rest were generated by government spending.

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[1]Some authors use the term "basic" employment to refer to "exogenous" employment. This can cause confusion. In general, all basic employment is exogenous, but not all exogenous employment is basic (some government and support sector employment may also be characterized as exogenous).

INCOME

We assume that total personal income in Sand Point is made up of both wage and nonwage income. We estimate an annual per capita level of $7,424 for wage income and $952 for nonwage income for a total per capita level of $8,376 or $5.24 million for the city.

Base Case Projections

PROJECTION METHODOLOGY

Based on our estimates of Sand Point's population and employment, we prepared projections of a number of variables describing the economy and population of Sand Point for the years 1981-2010. The projections were prepared using a model developed at ISER for studying rural Alaskan communities called the Rural Alaska Model (RAM). A detailed description of the model is provided in Knapp, The Rural Alaska Model (Anchorage: ISER, March 1983).

The Rural Alaska Model tracks population in six age cohorts for male and female Natives and non-Natives. It projects births, deaths, and migration for each group to determine total population. Migration is calculated as a function of the difference between the labor force and employment. Future levels of exogenous employment are assumed, while endogenous employment is calculated as a function of income and population.

The model's projections are the direct result of a variety of assumptions. The most important assumptions are summarized in Table IV-3. A complete list of the assumptions used and their documentation is provided as a set of worksheets in Appendix M.

PROJECTIONS

Table IV-4 presents a summary of all projections for the Kenai Market Area. Appendix P presents the complete set of projections. As shown in Table IV-4, population rises steadily to a high of 1,037 in 2010. Total employment rises to an initial high of 306 in 1991, drops some, and remains relatively stable until 1999 when it starts to rise again to a level of 324 in 2010.

Full-time equivalent employment as a percentage of the population falls from 40.5 percent to 31.2 percent over the 30-year projection period. Basic employment increases steadily from 166 to 191. Support employment increases to a peak of 110 in 1991, stabilizes between 99 and 104 until 2002 when it rises again to a high in 2010 of 115. Government employment rises from 16 to a high of 23 in 1988-1991 and then gradually declines to 17 by 1997 and holds that level through 2010. Project employment is assumed to remain zero throughout the projection period.

TABLE IV-3.
MAJOR ASSUMPTIONS USED IN
SAND POINT PROJECTIONS

Resident
Basic
Employment   Resident fish processing employment grows 1.5 percent
                per year. We assumed values for fishing and all other
                resident basic sector employment remain constant
                throughout the projection period.

Exogenous
Support
Employment   Exogenous support employment remains constant.

Exogenous
Government
Employment   We   assume   exogenous   government   employment   remains
                constant.

Endogenous
Support
Employment   Endogenous support employment rises by 1 for every
                $87,720   increase   in   income.   This   implies   that   in
                1980, every new basic sector job generates .201 new
                support jobs, every new support sector job generates
                .244   new   support   jobs,   and   every   government   job
                generates .197 new support jobs. We assume that wages
                rise at roughly 1 percent per year, which causes these
                multipliers to increase.

Endogenous
Government
Employment   Endogenous government employment rises by 1 for every
                increase in population of 45.   Put differently, if
                population rises by 100 in 1980, government employment
                rises by 2.2.   However, due to declines in state and
                local government per capita revenues, by 2010 an
                increase of 100 in population results in only an
                increase of 1.42 in government employment.

Migration   If the ratio of working-aged population to available
                jobs declines by more than 5 percent from its 1980
                level, new workers will move to Sand Point bringing
                dependents.   If   this   ratio   rises   by   more   than
                5 percent, some workers will leave, taking dependents
                with them.   However, as a share of the population,
                relatively fewer Natives will leave than non-Natives.

TABLE IV-4.
RURAL ALASKA MODEL BASE CASE PROJECTIONS
SAND POINT

	Population	Total Resident Employment	Resident Basic Employment	Resident Support Employment	Resident Government Employment	Resident Project Employment
1981	640	259	166	77	16	0
1982	654	270	166	85	18	0
1983	668	263	167	78	18	0
1984	682	273	168	85	21	0
1985	695	267	169	78	21	0
1986	724	291	169	100	22	0
1987	737	289	170	98	21	0
1988	757	300	171	106	23	0
1989	769	300	172	106	23	0
1990	782	203	173	108	23	0
1991	797	306	173	110	23	0
1992	809	298	174	104	21	0
1993	821	297	175	102	20	0
1994	833	298	176	102	20	0
1995	845	296	177	100	18	0
1996	856	294	178	99	18	0
1997	868	296	179	100	17	0
1998	880	297	179	100	17	0
1999	892	300	180	102	17	0
2000	904	302	181	103	17	0
2001	917	303	182	104	17	0
2002	927	305	183	105	17	0
2003	942	307	184	106	17	0
2004	955	310	185	107	17	0
2005	968	312	186	109	17	0
2006	981	314	187	110	17	0
2007	995	317	188	111	17	0
2008	1,009	319	189	113	17	0
2009	1,023	321	190	114	17	0
2010	1,037	324	191	115	17	0

SOURCE: Variables PO, EMRETO, EMBA, EMSU, EMGO, and EMREPJ. DSET SD.BC.MD.
Created September 19, 1983.

Table P.1 is used to show estimates of nonresident population in different categories. Nonproject enclave population increases steadily from 55 in 1981 to 73 in 2010. We did not estimate population for project and military enclave populations; hence, the values appear as zeros.

Table P.2 provides breakdowns of population among different groups. The share of Natives in the total population decreases from 43 percent in 1981 to 38 percent in 2010.

Table P.3 provides breakdowns of population among age groups. The percentage of persons under 19 will grow from 35 percent in 1981 to 41 percent in 2010. Seniors will double as a percentage of population from 3 percent to 6 percent by 2010.

Table P.4 traces the cause of the changes in population. Population increases steadily due to natural growth. A steady low-level emigration of workers and dependents throughout the projection period occurs.

Table P.5 is used to show estimates of nonresident employment. Nonproject enclave employment increases steadily from 55 in 1981 to 73 in 2010. Project and military enclave employment remains constant at zero.

Table P.7 shows the breakdown of basic employment. Fish processing employment increases steadily from 48 in 1981 to 73 in 2010.

Fishing and other basic employment remains at 1981 levels throughout the projection period.

Table P.8 shows an increase in support employment to a high of 110 in 1991 followed by a reduction to 99 in 1996, and subsequent steady increase to 115 in 2010. Endogenous support employment increases steadily from 42 to 75 over the projection period while exogenous and enclave-sponsored support employment remains constant.

Table P.9 shows changes in endogenous government employment during the projection period starting with a level of 14 in 1981, increasing to a high of 21 from 1988 to 1991 followed by a steady decrease to 15 in 2010. Exogenous government employment remains constant.

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V. DESCRIPTION AND PROJECTIONS: ST. GEORGE

History[1]

St. George is located on the northeast shore of the 36-square-mile St. George Island, the southernmost island of the Pribilof Island group near the edge of the southeast Bering Sea shelf. Archaeological records reveal no signs of habitation of the Pribilof Islands prior to their occupancy by Russian fur hunters in 1786. The Russians, dependent upon the hunting skills of the Natives, immediately imported Aleuts from Unalaska and Atka and founded St. George and St. Paul. United States interests in the Pribilofs have consistently centered on the fur seal harvest. From 1867 to 1909, the United States contracted private companies to harvest seals and process pelts. From 1910 to 1983, the federal government was the sole operator and administrator of the islands. Management and regulatory responsibilities in recent years were vested in the Secretary of Commerce through the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service. This relationship between the federal government and the Pribilof Islands terminated in October 1983. Legislation in Congress is being enacted to establish a trust fund for the two Pribilof communities to ease their transition to independence.

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[1]Excerpted from the community profile prepared by the Arctic Environmental Information and Data Center, University of Alaska, for the Alaska Department of Community and Regional Affairs. May 1978. Updated by ISER.

The social and political status of individual Pribilof Aleuts has been confusing since the days of Russian administration. Many citizenship rights such as voting were unavailable until the late 1940s. In fact, residents were consistently regarded in federal statutes as "wards of the government" from about 1869 until the early 1960s. A "Special Reservation Status" for the Pribilofs, established in 1869, gave the U.S. Government full control over the employment, welfare, education, and daily lives of the islanders. During World War II (from June 1942 to May 1944), the entire Aleut population of St. George and St. Paul was evacuated and restricted to an abandoned cannery and mine camp at Funter Bay about 16 air miles due west of Juneau, whereas other evacuated Aleuts had freedom of movement.

On July 17, 1950, the islanders adopted a constitution and charter under the Indian Reorganization Act of 1934. The first community council was subsequently elected. The Pribilof Aleuts filed a claim in 1951 for Native land rights and compensations for past injustices with the Indian Claims Commission. The Fur Seal Act of 1966 established the St. Paul townsite and provided for self-government. The act did not provide for the establishment of a St. George townsite because of the continuing government policy of pressuring the St. George villagers to relocate at St. Paul. The islanders' decision to participate in the Alaska Native Claims Settlement Act (ANCSA) of 1971 effectively extinguished the 1951 land claim, but

the suit for past injustices was pursued. In 1979, the two communities won a judgment from the Indian Claims Commission and settled for a monetary award. Eighty percent is to be distributed to enrolled members of the communities and 20 percent is to be used for community development.

Population

St. George had a population of 158 persons in 1980, according to the U.S. Bureau of the Census (Table V-1). This is a decline of 3.1 percent from the 1970 count. The community experienced an average annual rate of decline of .3 percent during this decade.

Between 1960 and 1970, St. George's population decreased by 38.3 percent. This dramatic loss of population was likely due to the U.S. Government's policy in the mid-1960s to consolidate the two Pribilof Islands communities at St. Paul and to eventually resettle the Pribilovians elsewhere.

Between 1970 and 1980, St. George experienced some shifts in its population distribution. In 1970, children (persons less than 15 years old) comprised 46.6 percent of the population, while in 1980, they represented 31.0 percent. It appears that the community had an older labor force in 1970 than it did in 1980. In 1970, young adults (persons 20 to 34 years old) comprised only 10.4 percent of the population. In 1980, this age group represented a fourth (24.7 percent) of the population. Adults 35 to 64 years

TABLE V-1.
ST. GEORGE POPULATION

AGE

1980	0-4	5-14	15-19	20-34	35-64	65+	Total
Total	16	33	24	39	34	12	158
Male	6	22	12	22	19	6	87
Female	10	11	12	17	15	6	71
Native	16	33	23	36	33	12	153
Male	6	22	12	20	18	6	84
Female	10	11	11	16	15	6	69
Non-Native[a]	0	0	1	3	1	0	5
Male	0	0	0	2	1	0	3
Female	0	0	1	1	0	0	2

1970	0-4	5-14	15-19	20-34	35-64	65+	Total
Total	19	57	21	17	43	6	163
Male	10	31	11	7	22	6	87
Female	9	26	10	10	21	0	76
Native[b]	17	57	34		41	6	155
Male	9	31	16		22	6	84
Female	8	26	18		19	0	71
Non-Native	2	0	4		2	0	8
Male	1	0	2		0	0	3
Female	1	0	2		2	0	5

| 1960 Total | | | | | | | 264 |

[a]Age-sex distribution is an estimate. The total number of Non-Natives given by the Census Bureau was five.

[b]The 1970 Native age/sex breakdown is an estimate based on two sources: (1) the Census Bureau's age/sex breakdown of "Other Races," excluding the Black and White races; and (2) ISER's census-based publication (Alaska Review of Business and Economic Conditions, September 1973) giving total number of males and females of the Aleut, Eskimo, and Indian races.

Source: U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

TABLE V-2.
ESTIMATED FULL-TIME EQUIVALENT
EMPLOYMENT IN ST. GEORGE, 1980

Resident Basic Employment	3
Fishing	0
Seal Processing	3
Other (Primarily Mining)	0
Resident Support Employment	12
Exogenous	0
Endogenous	5
Government-sponsored	7
Enclave-sponsored	0
Resident Government Employment	21
Exogenous	0
Endogenous	21
Total Resident	36
Total Exogenous	3
Total Endogenous	33
Nonresident (Enclave) Employment	0
Total Resident and Nonresident	36

SOURCE: Table G.4, Appendix G.

old made up 26.4 percent of the population in 1970, while they comprised 21.5 percent in 1980. Persons 65 years and older accounted for 3.7 percent of the population in 1970. They represented 7.6 percent in 1980.

St. George maintained its ethnic composition over the two decades. In 1970, Natives represented 95.7 percent of the population. In 1980, they comprised 96.8 percent.

Males accounted for 53.3 percent of the population in 1970 and for 55.1 percent in 1980.

Employment

Our estimates of employment and income in St. George for 1980 are based on a number of data sources and a variety of different assumptions. We describe how we developed these estimates in Appendix G.

EMPLOYMENT BY SECTOR

Table V-2 provides a breakdown of estimated full-time equivalent resident employment in St. George for 1980. Full-time equivalent (FTE) employment is a measure of total person-years of work. While FTE employment provides the best measure of work done over an entire year, actual employment at any time during the year may vary greatly from FTE employment.

Our estimates suggest total FTE employment of 36 jobs. We may break these jobs down into three sectors: basic, support, and government. Basic sector jobs are private sector jobs in the production of raw materials and manufactured goods including jobs in agriculture, forestry, fisheries, mining, and manufacturing. We estimate that there were 3 FTE basic sector jobs in 1980, all of which were in seal processing. In total, basic sector jobs account for 8 percent of FTE employment.

Support sector jobs are nonbasic private sector jobs. We estimated 1980 FTE employment of 12 in support sector jobs, or 33 percent of total employment. These jobs were in the school, clinic, store, and canteen.

We estimated total government employment of 21 FTE jobs including National Marine Fisheries Service employees and local government workers. There is no military employment in St. George.

INCOME

Total personal income in St. George is made up of both wage and nonwage income. We estimate an annual per capita level of $5,696 for wage income and $985 for nonwage income for a total per capita level of $6,681 or $1,055,600 for the city.

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U.S. Bureau of the Census. Census for 1960, 1970, and 1980.

VI. DESCRIPTION AND PROJECTIONS: ST. PAUL

History[1]

St. Paul is located on a narrow peninsula on the southern tip of the 44-square-mile St. Paul Island, the northernmost island of the Pribilof Island group, near the southeast margin of the extensive Bering Sea shelf. Archaeological records reveal no signs of habitation of the Pribilofs prior to their occupancy by Russian fur hunters in 1786. The Russians, dependent upon the hunting skills of the Natives, immediately imported Aleuts from Unalaska and Atka and founded St. Paul and St. George. United States interests in the Pribilofs have consistently centered on the fur seal harvest. From 1867 to 1909, the United States contracted private companies to harvest seals and process pelts. From 1910 to 1983, the federal government was the sole operator and administrator of the islands. Management and regulatory responsibilities in recent years were vested in the Secretary of Commerce through the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS). This relationship between the federal government and the Pribilof Islands terminated in October 1983. Legislation in Congress is being enacted to establish a trust fund for the two Pribilof communities to ease their transition to independence.

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[1]Excerpted from the community profile prepared by the Arctic Environmental Information and Data Center, University of Alaska, for the Alaska Department of Community and Regional Affairs, May 1978. Updated by ISER.

The social and political status of individual Pribilof Aleuts has been confusing since the days of Russian administration. Many citizenship rights, such as voting, were unavailable until the late 1940s. In fact, residents were consistently regarded in federal statutes as "wards of the government" from about 1869 until the early 1960s. A "Special Reservation Status" for the Pribilofs, established in 1869, gave the U.S. government full control over the employment, welfare, education, and daily lives of the islanders. During World War II (from June 1942 to May 1944), the entire Aleut population of St. George and St. Paul was evacuated and restricted to an abandoned cannery and mine camp at Funter Bay about 16 air miles due west of Juneau, whereas other evacuated Aleuts had freedom of movement.

On July 17, 1950, the islanders adopted a constitution and charter under the Indian Reorganization Act of 1934. The first community council was subsequently elected. The Pribilof Aleuts filed a claim in 1951 for Native land rights and compensations for past injustices with the Indian Claims Commission. The Fur Seal Act of 1966 established the St. Paul townsite and provided for self-government. The islanders' decision to participate in the Alaska Native Claims Settlement Act (ANCSA) of 1971 effectively extinguished the 1951 land claim, but the suit for past injustices was pursued. In 1979, the two communities won a judgment from the Indian Claims Commission and settled for a monetary award, 80 percent of which is to be

distributed to enrolled members of the communities and 20 percent to be used for community development.

Population

St. Paul appears to have maintained a relatively slow but stable rate of growth between 1960 and 1980. In 1980, the U.S. Census Bureau reported a population of 551 for St. Paul (Table VI-1). This is a 22.4 percent increase over the 1970 count and an average annual growth rate of 2.0 percent. Between 1960 and 1970, the community increased by 19.0 percent and experienced an average annual growth rate of 1.8 percent.

Children (persons under 15 years of age) made up 13.3 percent of the population in 1970. In 1980, they comprised 11.4 percent. Between the two target years, there was not a significant change in the proportion of persons 15 to 19 years of age. In 1970, this group represented 10.4 percent of the population, while in 1980 they accounted for 11.8 percent.

The figures indicate that St. Paul had a younger labor force in 1980 than it had in 1970. In 1970, persons 20 to 34 years old made up 19.1 percent of the population, while in 1980, they represented 27.6 percent. Persons 35 to 64 years of age comprised 29.1 percent of the population in 1970. This same age group accounted for 24.5 percent of the population in 1980.

TABLE VI-1.
ST. PAUL POPULATION

AGE

1980

	0-4	5-14	15-19	20-34	35-64	65+	Total
Total	63	117	65	152	135	19	551
Male	35	66	36	87	81	10	315
Female	28	51	29	65	54	9	236
Native	55	111	59	116	123	19	483
Male	33	63	30	64	72	10	272
Female	22	48	29	52	51	9	211
Non-Native	8	6	6	36	12	0	68
Male	2	3	6	23	9	0	43
Female	6	3	0	13	3	0	25

1970

	0-4	5-14	15-19	20-34	35-64	65+	Total
Total	60	116	47	86	131	10	450
Male	35	55	25	41	77	6	239
Female	25	61	22	45	54	4	211
Native	56	114		126	122	10	428
Male	31	53		64	72	6	226
Female	25	61		62	50	4	202
Non-native	4	2		7	9	0	22
Male	4	2		2	5	0	13
Female	0	0		5	4	0	9

| **1960 Total** | | | | | | | 378 |

Source: U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

The number of persons 65 and older increased from 10 to 19 between 1970 and 1980, but this is only a slight percentage increase from 2.2 percent to 3.4 percent.

Considering the ethnic composition of the population of St. Paul, we found that Natives accounted for 95.1 percent of the population in 1970, and 87.7 percent in 1980.

Between the two target years, the proportion of males increased from 53.1 percent in 1970 to 57.2 percent in 1980.

Employment

Our estimates of employment and income in St. Paul for 1980 are based on a number of data sources and a variety of different assumptions. We describe how we developed these estimates in Appendix H.

EMPLOYMENT BY SECTOR

Table VI-2 provides a breakdown of estimated full-time equivalent resident employment for St. Paul in 1980. Full-time equivalent (FTE) employment is a measure of total person-years of work. While FTE employment provides the best measure of work done over an entire year, actual employment at any time during the year may vary greatly from FTE employment. In St. Paul there are approximately three times as many part-time workers as full-time workers.

Our estimates suggest total FTE employment of 97 jobs. We may break these jobs down into three sectors: basic, support, and government.

Although the total FTE employment is similar in the two different estimates in Table VI-2, the breakdown by sector differs for the two primarily due to inconsistent categorization of school employment.

Basic sector jobs are private sector jobs in the production of raw materials and manufactured goods including jobs in agriculture, forestry, fisheries, mining, and manufacturing. We estimate that there were three FTE basic sector jobs in 1980--two of which were in seal processing. Reindeer antler processing accounted for the additional basic sector job. In total, basic sector jobs account for 3 percent of FTE employment.

Support sector jobs are nonbasic private sector jobs. We estimated 1980 FTE employment of 42-52 in support sector jobs, or 43-53 percent of total employment. The majority of these jobs were in administrative positions for Tanadgusix Corporation (TDX) and in the store and tavern.

We estimated total government employment of 44-52 FTE jobs, over 80 percent of which were for the federal government in activities related to seal harvesting and processing. Total military employment was estimated at 25 FTE.

Resident Basic Employment	3	2
Seal Processing	2	1
Other (Reindeer Antler)	1	1
Resident Support Employment	42	52
Exogenous	8	9.5
Endogenous	19	19.5
Government-sponsored	15	23
Enclave-sponsored	0	0
Resident Government Employment	52	44
Exogenous	21	17
Endogenous	31	27
Total Resident	97	98
Total Exogenous	32	27.5
Total Endogenous	65	69.5
Nonresident (Enclave) Employment	0	0
Total Resident and Nonresident	97	98
Total Military Employment	25	25

SOURCE: Table H.4, Appendix H.

INCOME

Total personal income in St. Paul is made up of both wage and nonwage income. We estimate an annual per capita level of $4,306 for wage income and $972 for nonwage income for a total per capita level of $5,278 or $2,907,980 for the city.

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VII. DESCRIPTION AND PROJECTIONS: NELSON LAGOON

History[1]

The community of Nelson Lagoon is located about 30 air miles west of Port Moller on a narrow, easterly-oriented sand spit that separates the lagoon and low-lying north coastal area of the western Alaska Peninsula from the Bering Sea. The community derived its name from the lagoon, which was named in 1882 for Edward William Nelson of the U.S. Signal Corps, an explorer in the Yukon delta region between 1877 and 1920. Salmon processors became interested in the site early in this century because of the excellent fishing resources at Nelson Lagoon and nearby Bear River. The area had been a Native fish camp for years but was not permanently settled until about 1906 when a salmon saltery was built there. A salmon cannery operated periodically between 1915 and 1917, but no local processing plant has operated since. For many years, Nelson Lagoon was primarily a seasonal camp, but families began to settle there year-round, and a school was established in 1965.

Population

According to Table VII-1, Nelson Lagoon had a population of 59 in 1980. This is a 37.2 percent increase over 1970 and an average annual growth rate of 3.2 percent.

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[1]Excerpted from the community profile prepared by the Arctic Environmental Information and Data Center, University of Alaska, for the Alaska Department of Community and Regional Affairs. May 1978.

TABLE VII-1.
NELSON LAGOON POPULATION

AGE

	0-4	5-14	15-19	20-34	35-64	65+	Total
1980							
Total	4	10	9	18	15	3	59
Male	2	6	2	11	7	0	28
Female	2	4	7	7	8	3	31
Native	4	10	9	15	14	3	55
Male	2	6	2	9	7	0	26
Female	2	4	7	6	7	3	29
Non-Native[a]	0	0	0	3	1	0	4
Male	0	0	0	2	0	0	2
Female	0	0	0	1	1	0	2
1970							
Total	6	12	3	15	7	0	43
Male	5	7	2	8	3	0	25
Female	1	5	1	7	4	0	18
Native	6	12		15	6	0	39
Male	5	7		8	3	0	23
Female	1	5		7	3	0	16
Non-Native	0	0		3	1	0	4
Male	0	0		2	0	0	2
Female	0	0		1	1	0	2

[a]Age-sex distribution is an estimate. The total number of Non-Natives given by the Census Bureau was four.

Source: U.S. Census for 1960, 1970, 1980.

Institute of Social and Economic Research. "Age and Race by Sex Characteristics of Alaska's Village Population." Alaska Review of Business and Economic Conditions (September 1973).

In 1970, Nelson Lagoon had a relatively young population when compared to the 1980 figures. Children (persons less than 15 years of age) comprised 41.9 percent of the population in 1970, while in 1980 they made up 23.7 percent of the population. However, youths (15 to 19 years old) represented a higher proportion of the total in 1980 (15.3 percent) than in 1970 (7.0 percent).

The labor force remained relatively stable as the proportion of persons 20 to 64 years old comprised 51.2 percent of the population in 1970 and 55.9 percent in 1980. The elderly, those persons 65 years old or more, were not represented in 1970, while in 1980 they accounted for 5.1 percent of the population.

The ethnic composition of Nelson Lagoon has remained relatively constant over the decade. In 1970, 90.7 percent of the population was Native. In 1980, Natives comprised 93.2 percent of the population.

The proportion of males declined in the past ten years. In 1970, males represented 58.1 percent of the population. In 1980, they accounted for 47.5 percent.

Employment

Our estimates of employment and income in Nelson Lagoon in 1980 are based on a number of data sources and a variety of different assumptions. We describe how we developed these estimates in Appendix I.

EMPLOYMENT BY SECTOR

Table VII-2 provides a breakdown of estimated full-time equivalent resident employment for Nelson Lagoon in 1980. Full-time equivalent (FTE) employment is a measure of total person-years of work. While FTE employment provides the best measure of work done over an entire year, actual employment at any time during the year may vary greatly from FTE employment.

Our estimates suggest total FTE employment of 14 jobs. We may break these jobs down into three sectors: basic, support, and government.

Basic sector jobs are private sector jobs in the production of raw materials and manufactured goods including jobs in agriculture, forestry, fisheries, mining, and manufacturing. We estimate that there were 8 FTE basic sector jobs in 1980, all of which were in fishing. In total, basic sector jobs account for 57 percent of FTE employment.

Support sector jobs are nonbasic private sector jobs. We estimated 1980 FTE employment of 5 in support sector jobs, or 36 percent of total employment. These jobs were in the school system, utility management and service, and local administration. There was 1 FTE government employee and no military positions in Nelson Lagoon in 1980.

TABLE VII-2.
ESTIMATED FULL-TIME EQUIVALENT
EMPLOYMENT IN NELSON LAGOON, 1980

Resident Basic Employment	8
Fishing	8
Fish Processing	0
Petroleum Processing	0
Other (Primarily Mining)	0
Resident Support Employment	5
Exogenous	0
Endogenous	5
Government-sponsored	0
Enclave-sponsored	0
Resident Government Employment	1
Exogenous	0
Endogenous	1
Total Resident	14
Total Exogenous	8
Total Endogenous	6
Nonresident (Enclave) Employment	0
Total Resident and Nonresident	14

SOURCE: Table I.1, Appendix I.

INCOME

Total personal income in Nelson Lagoon is made up of both wage and nonwage income. We estimate an annual per capita level of $7,874 for wage income and $952 for nonwage income for a total per capita level of $8,826 or $520,746 for the community.

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VIII. CONCLUSIONS

In this report, we have presented descriptions and "base case" projections of population and employment for the communities of Unalaska and Cold Bay. We have also presented projections of the impacts on population and employment in these communities which might result from the proposed St. George Basin and North Aleutian Shelf OCS lease offerings.

The future development of Unalaska is highly uncertain. Our projections suggest that the population of Unalaska in the year 2000 could range from as low as 900—only a little larger than the 1980 resident population—to as high as 4,600. Future development of the crab and bottomfish industries will be the key factor affecting the future size of the community.

Unalaska is envisioned primarily as a marine support base for future OCS development. Our projections suggest that the relative impacts of development resulting from the proposed lease sales would be relatively small. Development of both sale areas might increase population and employment by approximately 15 percent during the peak year of 1993. These projections are based on the assumption that only workers associated with the shore base would become residents of Unalaska.

Cold Bay is primarily a transient community based around aviation and communication facilities. In the "base case," the resident population may fall by about one-third due to future cutbacks in employment by the FAA, the U.S. Air Force, and RCA. However, OCS development in the Navarin Basin might reverse this decline, bringing population back to approximately current levels. Additional development from development of the St. George Basin or North Aleutian Shelf OCS sale areas could further increase population by as much as 40 percent, but Cold Bay would still remain a small community of approximately the same size as it was during the Vietnam war years.

In addition to our descriptions and projections for Unalaska and Cold Bay, we have provided descriptions for Sand Point, St. Paul, St. George, and Nelson Lagoon. However, we do not expect these communities to be directly affected by future OCS development in the St. George or North Aleutian Shelf lease sale areas.

APPENDIX A: THE RURAL ALASKA MODEL

This appendix describes the Rural Alaska Model (RAM), which was developed at the University of Alaska, Institute of Social and Economic Research (ISER), for use in projecting population and employment in small communities in Alaska. The model may also be used to examine the impacts of a specific project, such as outer continental shelf oil development, upon population, resident employment, and separate "enclave" employment of nonresidents.

In this appendix, we first describe the structure of the base case RAM model, or the form that the model takes when no specific projects are assumed. Subsequently, we describe the "impact" model, which may be used to examine the impacts of projects. A final section summarizes assumptions required for the model.

In Appendixes B and C, we provide a glossary of RAM model variable notation and a listing of the equations in the model.

Figure A-1 illustrates the structure of the base case RAM model. From the census, starting year values are obtained for population by age group, sex, and race. Natural change in population due to births and deaths is calculated using assumed fertility rates and death rates for each group. Labor force participation rates for each group are used to calculate the labor force.

Figure A-1: Structure of the Rural Alaska Model
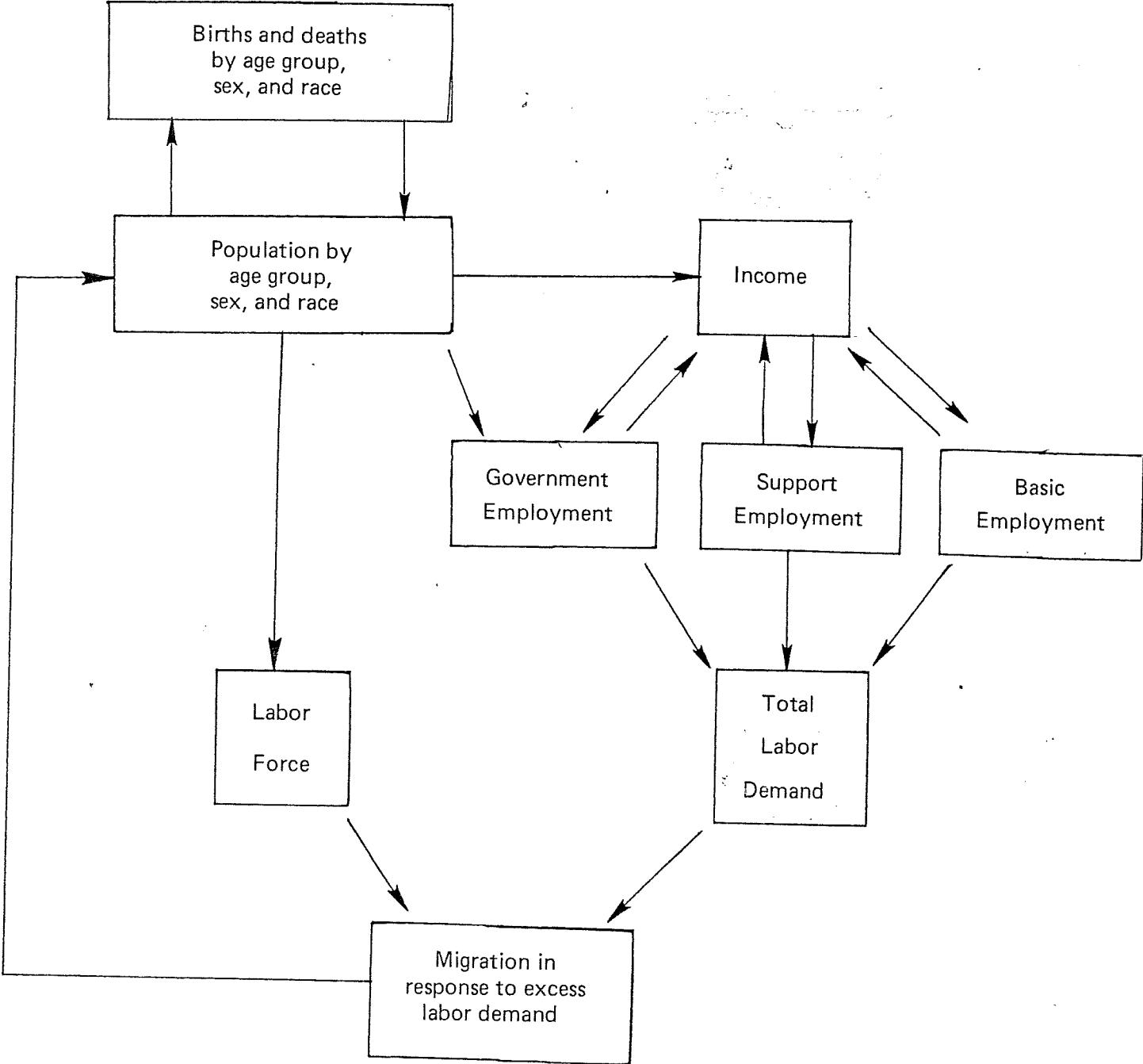
Employment is divided into basic, support, and government employment. Basic employment (in industries such as fishing and mining) is assumed independently of the model, based on factors such as resource levels and planned development projects. Government employment is projected as a function of population and total state revenues. Support employment is projected as a function of local resident income.

Total labor demand is the sum of employment in each sector. If labor demand exceeds the local labor force, additional workers are projected to move into the community, bringing dependents. If the labor force exceeds labor demand (allowing for some unemployment), some workers are projected to leave the community, bringing dependents with them. Total in-migration or out-migration is added to natural population growth in order to determine total population growth.

The following sections describe individual sections of the base case model in greater detail. These are broken down into the population model, the employment model, the income model, the labor market model, and the migration model.

The Population Model

Although the population model accounts for well over half of the equations of the RAM model, it has a very simple structure. The

population is divided into 24 cohorts corresponding to six age groups, two sexes, and two races (native and non-native). These groups are shown in Figure A-2.

For each race and each age group except the youngest, the model first calculates population before migration, using the formula

```
Population          Population      Share which      Share which
  before      =     in previous  *  does not die  *  does not advance
Migration           year                             to next age group


                    Population in                    Share of previous
              +     previous year        *             age group which
                    in next lower                     advances to next
                    age group                            age group
```

For the youngest age group, the formula is:

```
Population          Population      Share which      Share which
  before      =     in previous  *  does not die  *  advances to
Migration           year                             next age group


                                           Share of infants
              +     Total births     *     surviving first
                                               year
```

Total births are calculated as:

```
                              Female              Fertility rate
Total births    =           population in     *     for women in
                            each age group          each age group
```

A-4

Figure A-2: Cohorts in the RAM Population Model

Group	Ages	Native Male	Native Female	Non-Native Male	Non-Native Female
1	0-4				
2	5-14				
3	15-19				
4	20-34				
5	35-64				
6	65+				

Finally, for each age, sex, and race cohort, population after migration is calculated as:

$$\begin{array}{ccccc} \text{Population} & & \text{Population} & & \\ \text{after} & = & \text{before} & + & \text{Migration} \\ \text{migration} & & \text{migration} & & \end{array}$$

The Income Model

Income is defined in the model as income of local residents. It does not include income of enclave workers, nonresident fishermen, military personnel, etc., which is not calculated.

Income is calculated using the formula

$$\text{Income} \quad = \quad \text{Wage income} \quad + \quad \text{Nonwage income}$$

where

$$\begin{array}{ccccc} & \text{Basic sector} & & \text{Basic} & \text{Support} & \text{Support} \\ \text{Wage income} = & \text{employment} & * & \text{sector} + & \text{sector} & * & \text{sector} \\ & & & \text{wage} & \text{employment} & \text{wage} \end{array}$$

$$\begin{array}{ccc} & \text{Government} & \text{Government} \\ + & \text{sector} & * & \text{sector} \\ & \text{employment} & \text{wage} \end{array}$$

and where

$$\begin{array}{cccc} \text{Nonwage income} & = & \text{Population} & * & \text{Assumed per capita} \\ & & & & \text{nonwage income} \end{array}$$

Sometimes it is difficult to obtain reliable data on wage rates and on nonwage income. In this case, nonwage income may be assumed to be zero, and an arbitrary, identical wage rate assumed for all sectors. This produces an "income" variable which is proportional to resident employment, allowing for the determination of support employment using a simple multiplier. However, we have used a more elaborate structure incorporating income in the model in order to allow the use of wage and nonwage income data when these data are available.

The Employment Model

Table A-1 summarizes categories of employment in the base case model. All but three categories of employment are exogenous or assumed. Employment in these categories is thus an input to, rather than an output of, the RAM model. Thus, in order to run the RAM model, independent projections must first be made of fishing, fish processing, and other basic employment; exogenous support employment; exogenous government employment; and nonproject enclave employment. Examples of exogenous support activities are services provided by regional centers to the surrounding regions, or export shipping terminals. Examples of exogenous government employment are U.S. Forest Service, National Park Service, and Alaska Department of Fish and Game employment.

TABLE A-1.
CATEGORIES OF EMPLOYMENT IN THE BASE CASE RAM MODEL

Category of Employment	How Calculated
Basic Employment	
Fishing	Assumed
Fish processing	Assumed
Nonfishing basic	Assumed
Support Employment	
Exogenous support	Assumed
Endogenous support	Income * Multiplier
Government-sponsored support	Population * State per capita capital expenditures * multiplier
Enclave-generated support	Enclave employment * multiplier
Government Employment	
Exogenous government	Assumed
Endogenous government	Population * State per capita operating expenditures * multiplier
Nonproject Enclave Employment	
Nonresident fishermen	Assumed
Nonresident fish processing	Assumed

The four categories of employment which are not assumed--those which are endogenous--typically account for a substantial share of employment in small Alaska communities. These are endogenous support employment, endogenous government employment, government-sponsored support employment, and enclave-generated support employment.

An example of endogenous support employment is employment in providing services to local residents, such as employment in stores and bars. The model calculates this employment as a function of income.

Endogenous government employment consists of those government employees providing services to local residents, such as teachers or police. This employment is calculated as a function of population and per capita state operating expenditures. Assumptions for this latter variable are based on projections of ISER's statewide MAP model. The variable is included as a simple proxy for the availability of revenues to state and local government.

Government-sponsored support employment is support employment, primarily in construction, paid for by government. Examples are employment in construction of schools, roads, and parts. This employment is projected as a function of population and state government per capita capital expenditures. The reasoning is analogous to that for the calculation of endogenous government employment.

Enclave-generated support employment is assumed to be related to enclave employment by a simple multiplier.

The multipliers used in the calculation of endogenous employment are key assumptions of the model. For any given community, the multipliers are calculated by estimating 1980 values for employment in each category, as well as population, income and per capita state operating and capital expenditures. The multipliers are then derived algebraically, based on these 1980 figures.

The Labor Market and Migration Models

The model calculates a total labor force by applying labor force participation rates to the population in each age, sex, and race cohort. Data in this form on labor force participation rates are not available for most communities and must be assumed or inferred. Labor force participation rate assumptions are calculated using census data on native and non-native male and female employment, and then calculating rates consistent with 1980 population and employment. Labor demand is equal to total resident employment.

In order to calculate migration, the model first calculates a variable called "excess demand for labor." As long as the amount by which the labor force exceeds labor demand results in a level of unemployment which is between a threshold minimum level and a threshold maximum level, excess demand is considered to be zero.

If, however, labor demand exceeds the labor force by an amount great enough so that unemployment would be below the threshold minimum level, excess demand is measured as labor demand minus the labor force when unemployment is at the threshold minimum level. If, on the other hand, the labor force exceeds labor demand by an amount great enough so that unemployment would be above the maximum threshold level, then excess demand is negative, and is measured as labor demand minus the labor force when unemployment is at the threshold maximum level. The purpose of this method of calculation of excess demand for labor is to allow a range within which there will be no migration response to small changes in labor market conditions, which results in a more stable model.

If excess demand is negative, a certain fraction of the excess labor force is assumed to leave. A different fraction may be assumed for natives and non-natives.

In-migrating workers are assumed to bring dependents (dependents are defined as persons not in the labor force). The model calculates total immigration in each age-sex-race cohort using the formula:

$$\text{Immigration in cohort } i = \text{Number of workers immigrating} * \text{Assumed number of persons immigrating in cohort } i \text{ per immigrant worker}$$

Emigrating workers are also assumed to take dependents with them as they leave. Total emigration in each age-sex cohort for natives is calculated as follows:

$$\begin{matrix} \text{Total} \\ \text{Emigration} \\ \text{of native} \\ \text{workers} \end{matrix} = \begin{matrix} \text{Total} \\ \text{excess} \\ \text{supply} \\ \text{of labor} \end{matrix} * \begin{matrix} \text{Share of} \\ \text{natives} \\ \text{in labor} \\ \text{force} \end{matrix} * \begin{matrix} \text{Assumed share of} \\ \text{native workers} \\ \text{who leave if jobs} \\ \text{are not available} \end{matrix}$$

$$\begin{matrix} \text{Total} \\ \text{Emigration} \\ \text{of native} \\ \text{Dependents} \end{matrix} = \begin{matrix} \text{Emigration} \\ \text{of native} \\ \text{workers} \end{matrix} * \frac{\text{Total native dependents}}{\text{Total native workers}} * \begin{matrix} \text{Adjustment} \\ \text{parameter} \end{matrix}$$

$$\begin{matrix} \text{Emigration of} \\ \text{native workers} \\ \text{in age-sex} \\ \text{cohort i} \end{matrix} = \begin{matrix} \text{Total} \\ \text{emigration} \\ \text{of native} \\ \text{workers} \end{matrix} * \frac{\text{Native workers in age-sex cohort i}}{\text{total native workers}}$$

$$\begin{matrix} \text{Emigration of} \\ \text{native depen-} \\ \text{dents in age-} \\ \text{sex cohort i} \end{matrix} = \begin{matrix} \text{Total} \\ \text{emigration} \\ \text{of native} \\ \text{dependents} \end{matrix} * \frac{\text{Native dependents in age-sex cohort i}}{\text{Total native dependents}}$$

The "adjustment parameter" in the second equation is an assumed value for the ratio of dependents to workers for emigrants divided by the ratio of dependents to workers for the total population. Emigration of non-natives in each age-sex cohort is calculated in a similar fashion as for natives.

The model feeds the projected levels of immigration or emigration for each age-sex-race cohort into the population model in order to calculate total population.

The model also allows for exogenous or non-economic-related migration, which is assumed each year to be a fixed share of population in each age cohort.

The Impact Model

We designed the RAM "Impact" Model for the purpose of examining the impact on population and resident employment of special "projects," such as outer continental shelf oil development, which might take place near rural Alaskan communities. Of the employment associated with any given project, we wanted to be able to determine how many jobs might be held by community residents, how many jobs might be held by persons living in enclaves separated from the community, and how many jobs might be held by "commuters" who would pass through but not be based in the community (these would primarily be people holding offshore jobs).

A great number of factors affect the answers to these questions. These include the extent to which the industry actively seeks to hire locally, or alternatively, has a policy of hiring nonlocally; the extent to which local residents have the skills required for the special project jobs, or receive training for them; and the extent to which workers brought in to fill project jobs settle in the community as opposed to living in an enclave. Developing a model which takes account of all these factors is a complicated task requiring numerous assumptions. In the RAM impact model, we have attempted to allow for flexibility in our assumptions about these factors, while retaining a reasonably simple structure for the model. To the extent that the model structure is still too complicated for a given situation, it can be "collapsed" to a much

simpler structure by assuming zero values for various parameters and exogenous inputs.

With the exception of the labor market model, the RAM Impact Model is essentially identical to the base case model. Income and endogenous employment are calculated in the same way (except that wages from resident project employment are added to total income, and project enclave employment is assumed to contribute to enclave-generated support employment). The population and migration models are unchanged.

Figure A-3 illustrates the labor market model. Local resident labor supply, shown in the middle of the figure, is calculated in the same way as in the base case model, using assumed labor force participation rates. "Other sector" demand for labor, shown at the top right of Figure A-3, is derived from the base case employment model. The outputs "imported workers who become residents" and "outmigration of resident workers," shown at the bottom of the figure, are inputs to the base case migration model.

We assume a total level of project employment which is divided into "skilled" and "nonskilled" employment. By "skilled" employment, we refer to jobs which require previous training or experience in the project sector (i.e., oil-work related skills for OCS development). We also divide total project employment up into onshore and offshore

Figure A-3: Allocation of Project Employment between Resident and Non-Resident Workers in the RAM Impact Model
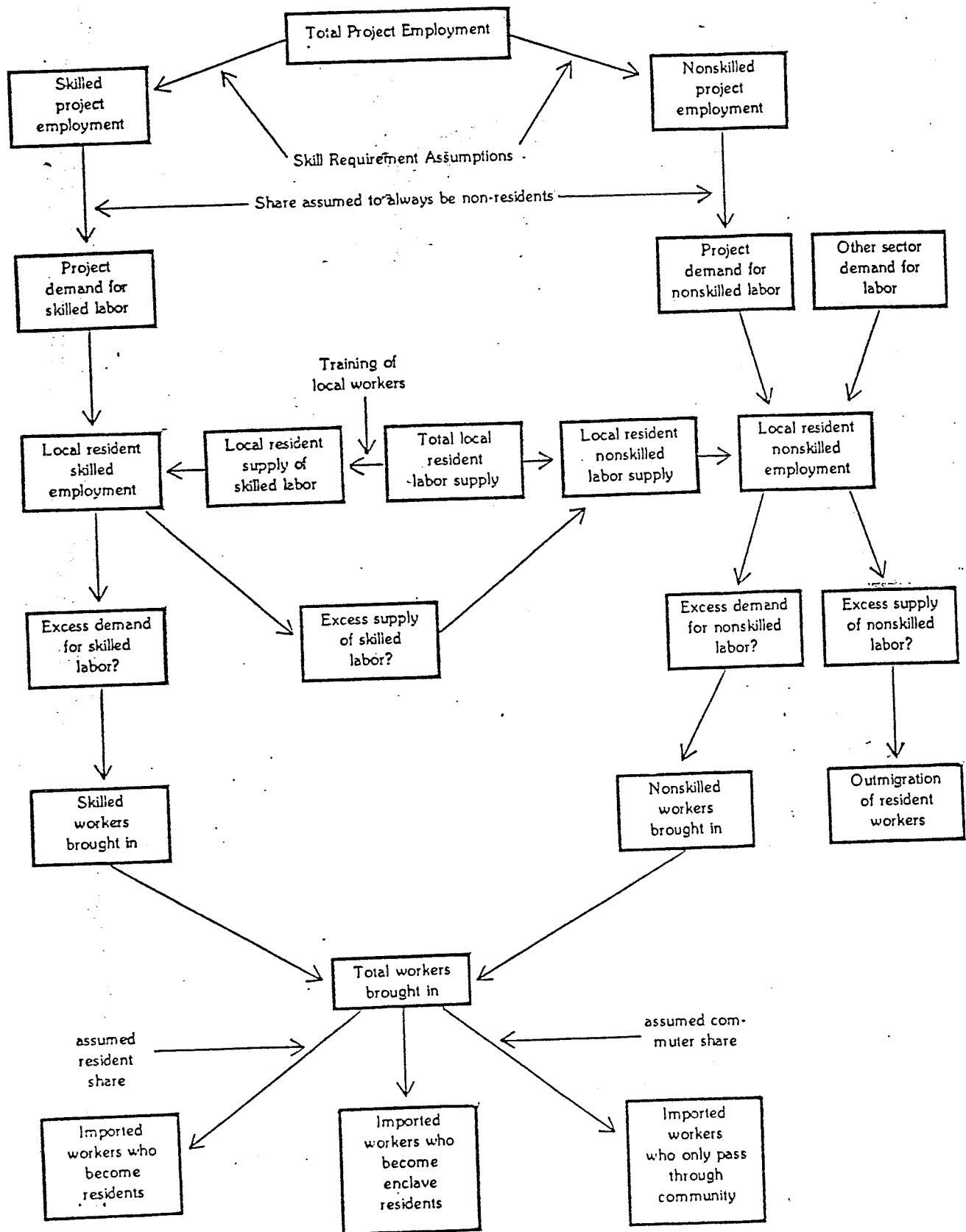
jobs and short-term and long-term jobs, because this affects the extent to which jobs not taken by current residents will be filled by persons who will become residents, and the extent to which jobs not filled by residents will be filled by "commuters" who only pass through the community. Based on these assumptions about the breakdown of project jobs as well as assumptions about the share of jobs which are reserved (for whatever reasons) for nonresidents, we calculate total demand for skilled and unskilled labor from the local community. To the extent that the local community can supply this labor, the jobs are filled by local residents. Otherwise, workers are brought in to fill the jobs.

The model first allocates jobs to local skilled labor. An initial assumption is made as to the number of workers residing in the community who have the required skills. Each year this number is adjusted to reflect new skilled workers who have settled in the community (or skilled workers who have left the community) and local residents who have been trained in the required skills. The number of residents receiving training each year is assumed to be either a given share of those skilled jobs which local skilled labor is not available to fill, or else a given share of nonskilled workers willing to accept training-- whichever is lower.

To the extent that there is excess demand for skilled labor (demand exceeds local supply), skilled workers are brought in to fill these jobs. To the extent that there is excess supply (local supply

exceeds demand), the "excess" skilled workers seek nonskilled jobs and are added to the supply of nonskilled labor.

The model next compares the total demand for nonskilled labor (which includes project jobs as well as all other jobs) with the supply of nonskilled labor. If there is excess demand for nonskilled labor, some workers are brought in; if there is excess supply, some workers leave. The nonskilled labor market is the same as base case model labor market.

If the model calculates that either skilled or unskilled workers are brought in due to excess labor demand, a certain share of these workers is assumed to become residents. All workers brought in to fill nonproject jobs are assumed to become residents, while only some (if any) of the workers brought in to fill project jobs become residents. Those imported workers who become residents also bring dependents, as in the base case model. Those imported workers who do not become residents are divided between those living in enclaves and those who are only commuters passing through the town (such as nonresident offshore workers).

A more detailed understanding of the impact model labor market is best obtained by studying the model equations in Appendix C.

Model Assumptions

This section describes the assumptions required in order to run the RAM model, as well as the procedures used to develop the assumptions. Three kinds of assumptions are required: parameters, exogenous variables, and starting values. Parameters are assumptions which remain the same for each year of the model projections. Examples are fertility rates and employment multipliers. Exogenous variables require assumptions for each year of the projection period. Examples are basic employment in fishing and fish processing, project-related employment, and per capita state government operating and capital expenditures. Starting values are variables for which historical values are needed for the year or years prior to the starting year of the projections. In particular, starting values are needed for population in each age-sex-race cohort for the year prior to the starting year of the projections, as well as the number of workers with project-related skills.

All of the model assumptions are listed in a set of 16 worksheets which are completed prior to each model run. Each worksheet includes a description of how the assumptions are developed. Table A-2 provides a summary list of model assumptions as well as an index to the worksheets.

Appendixes K and L include complete sets of worksheets for the assumptions which we used in preparing projections for Unalaska and Cold Bay.

TABLE A-2. ASSUMPTIONS REQUIRED TO RUN
THE RAM POPULATION MODEL

Assumptions	Worksheet
Population Model Assumptions	
Population in year prior to start of projection for each age/sex/race cohort	1
Share of population which survives (does not die) in any given year, for each age/sex/race cohort	2
Fertility rates for Native and Non-Native women in each age group	2
Share of population in each age group which does not advance to the next age group (shift factor)	3
Infant survival rates	3
Sex distribution of infants	3
Income and Employment Model Assumptions	
Assumptions used to calculate multipliers	4
Endogenous support employment multiplier	5
Government-sponsored support employment multiplier	5
Enclave-generated support employment multiplier	5
Endogenous government employment multiplier	5
State government per capita operating and capital expenditures for projection period	6
Per capita nonwage income for projection period	7
Basic sector, support sector, government sector, and project sector real wage rates for projection period	7

APPENDIX B: RAM MODEL VARIABLE NOTATION

All RAM model variable names are constructed out of combinations of two-letter groups. Table B-1 lists these two-letter groups, along with their definitions, in alphabetical order.

For example, the variable INNOWAPC may be divided into IN-NO-WA-PC. By referring to Table B-1, we can determine that this means "income"-"non"-"wage"-"per capita," or per capita nonwage income. Similarly, STPCOE can be divided into ST-PC-OE, which means "state"-"per capita"-"operating expenditures."

TABLE B-1. RAM (RURAL ALASKA MODEL) NOTATION CODE

AD   adjusted

An   age group n

AT   adult

BA   basic

BE   before adjustment for migration or training

BT   births

CE   capital expenditures

CH   change in

Cn   coefficient in equation used to define a variable

CO   commuter

CP   commuter parameter

CR   crude

DE   dependent

DT   deaths

EC   economic

ED   endogenous

EM   employment

EN   enclave

ES   excess supply

EX   exogenous

FE   female

FI   fishing

Fn   female, age group n

FP   fish processing

FR   fertility rate

GE   geriatric or senior

GF   federal government

GO   government

GR   growth

HG   high

HH   household

IC   increase

ID   index

IM   immigration

IN   income

KD   preschool age children or "kids"

LA   labor

LF   labor force

LO   local

LR   long run

LS   labor supply

LW   low

MA   male

MG   endogenous migration

MI   migration

ML   military

Mn   male, age group n

MU   multiplier

MX   exogenous migration

Employment

There are a variety of alternative definitions of employment. The measure we have chosen is resident full-time equivalent (FTE) employment. FTE employment is a measure of total person-years of work. We believe it is the single most useful measure of employment in a community although, in a community such as St. George, seasonal variation is also an essential measure. Care is needed in interpreting FTE employment since it may vary greatly from actual employment at any particular time of the year.

Several sources of information on 1980 employment in St. George are available. In Table G-1, 1980 census data indicates 44 employed workers by industry, the largest proportions of which work in public administration (45 percent), professional education services (18 percent), professional health services (14 percent), and the retail trade (11 percent). Only 7 of the workers are private employees, the remaining 37 (84 percent) employed by either federal, state, or local government. There is no military employment in St. George. These data were collected for a given week in the spring of 1980; therefore, they are not an accurate measure of full-time equivalent (FTE) employment since persons unemployed at the time of the count may be employed during substantial periods of time during other seasons.

TABLE G-1.
SELECTED EMPLOYMENT-RELATED DATA
FROM 1980 CENSUS: ST. GEORGE

Civilian Employed Workers by Industry	Number	Percentage
Agriculture, Forestry, Fishing and Mining	0	0
Construction	2	5
Manufacturing: Nondurables	0	0
Manufacturing: Durables	0	0
Transportation	0	0
Communication and Public Utilities	0	0
Wholesale Trade	0	0
Retail Trade	5	11
Finance, Insurance, and Real Estate	0	0
Business and Repair Services	2	5
Personal, Entertainment and Recreation Services	0	0
Professional Health Services	6	14
Professional Education Services	8	18
Other Professional Services	1	2
Public Administration	20	45
TOTAL	44	100

Employed Workers Claiming Farming, Forestry, or Fishing as Occupation	0	

Civilian Employed Workers by Kind of Employer	Number	Percentage
Government 37		
Federal	26	59
State	8	18
Local	3	7
Private other than self	7	16
Self	0	0
Unpaid (usually work for family)	0	0
TOTAL	44	100

Military Employment	0	

NOTE: Data were collected as of a given week during the spring of 1980. However, the particular week was not necessarily consistent for all households.

Source: Special Tabulations for 1980 census, from U.S. Bureau of the Census, Tape STF3A, Tabulations 55, 65, 66, and 67.

Table G-2 presents data collected by ISER for employment of Natives in St. George in 1980. To obtain employment for the entire population, the reader should add one full-time position to the clinic and two full-time positions to the school. With these additions, a total of 57 persons are identified as employed in St. George including full-time, near full-time, and part-time workers.

Table G-3 presents nonagricultural wage and salary employment data for the Aleutian Islands Census Division. These data do not provide an accurate picture of resident employment in St. George because they do not include many part-time jobs, and St. George represents only 2 percent of the population of the large area covered. The data, however, do provide an indication of the seasonality of work in many industries in the Aleutian Islands district.

In order to calculate FTE resident employment in St. George, we used the employment data in Table G-2 with the above noted additions of non-Native workers. Table G-4 presents our estimates of resident FTE employment and the distribution of this employment among several different categories of employment. The footnotes to the table describe how each figure was developed.

TABLE G-2.
EMPLOYMENT CONDITIONS IN
ST. GEORGE: NATIVES, 1980

EMPLOYER	NUMBER EMPLOYED FULL-TIME[a]	NUMBER EMPLOYED PART-TIME	AVG. NO. WEEKS PER PART-TIME WKR	TOTAL EMPLOYED	% OF TOTAL EMPLOYMENT
NMFS	12	11[b]	28	41	75.9
		18[c]	8		
Clinic	1			1	1.9
School	3			3	5.5
Store	2			2	3.7
Canteen	1			1	1.9
Corporation	1			1	1.9
Company House		1	8	1	1.9
Community Council	2			2	3.7
Phone Operator	2	—	—	2	3.7
TOTAL	24	30	NA	54	100.1

[a]Includes near full-time workers such as school personnel hired for nine or ten months of the year.

[b]"Part-time Indefinites" who worked more than six months of the year.

[c]Includes "Temporaries" and "Part-time Indefinites" who worked less than six months of the year.

Source: ISER, undated.

TABLE G-3.
NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT,
ALEUTIAN ISLANDS CENSUS DIVISION, 1980

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	1980 Average	Season-ality Factor (a)
Total Non-agricultural	2,680	3,266	3,941	3,565	3,363	.68
Mining	*	0	0	0	0	*
Construction	33	124	204	97	115	.16
Manufacturing	1,124	1,596	2,271	1,890	1,720	.49
Transportation, Utilities	80	87	88	104	90	.77
Wholesale Trade	*	*	*	*	*	*
Retail Trade	99	106	107	110	106	.90
Finance, Insurance and Real Estate	44	79	105	77	76	.42
Services	192	150	159	108	152	.56
Federal Gov't	661	672	695	677	676	.95
State & Local Government	433	423	295	480	408	.61
Miscellaneous	8	*	*	*		*
Total Undisclosed Employment	6	29	17	22	20	.21

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*Not shown to avoid disclosure of data for individual firms.

(a) Lowest quarterly employment/highest quarterly employment.

Source: Alaska Department of Labor, Statistical Quarterly, 1980 I-IV, p. 9.

We estimate a total 1980 FTE employment of 36. The largest share (58 percent) is found in resident government employment. Fifteen FTE positions, or 42 percent of the total, are held by National Marine Fisheries Service (NMFS) employees. Support employment constitutes 12 FTE positions of 33 percent of the total. The remaining three basic employment positions are held by employees working in the seal processing plant in St. Paul. Exogenous employment, or employment which provides goods and services for markets outside the local community, was 3 (8 percent of all resident employment). For every exogenous job there were 11 endogenous jobs. There were .14 endogenous support jobs for every other job in the community.

TABLE G-4.
ESTIMATED FULL-TIME EQUIVALENT
EMPLOYMENT IN ST. GEORGE, 1980

Resident Basic Employment	3
Fishing	0
Seal Processing	3[a]
Other (Primarily Mining)	0
Resident Support Employment	12
Exogenous	0
Endogenous	5[b]
Government-sponsored	7[c]
Enclave-sponsored	0
Resident Government Employment	21[d]
Exogenous	0
Endogenous	21
Total Resident	36
Total Exogenous	3
Total Endogenous	33
Nonresident (Enclave) Employment	0
Total Resident and Nonresident	36

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[a]Five of the part-time NMFS employees, working an average of 28 weeks per year, worked in 1980 in the seal processing plant located in St. Paul. These workers represent FTE employment of 3.

[b]All other employment in St. George is considered endogenous support employment.

[c]Government-sponsored employment included full-time employees in the school and the clinic.

[d]Resident government employment includes NMFS employees and local government workers. We assumed that, except for those noted in (a) above, all NMFS employees were involved in activities directly benefiting the village and therefore endogenous.

Income

One measure of personal income for St. George may be obtained by multiplying the population (158 persons) by the average per capita income for the Aleutian Islands census division. The Alaska Department of Labor measured per capita income for the division as $9,511 in 1980 (Alaska Department of Labor, Alaska Planning Information, page 92). This method provides an estimate of total personal income of $1,502,738.

An alternate method is to multiply the number of FTE employment in each sector by an average wage for that sector. In Table G-5, the average monthly wage for the basic, support, and government sectors are shown for the Aleutian Islands Census Division. Using these figures, an estimated total annual wage income for St. George in 1980 is $672,948.

Previous estimates of annual wage income fall between the figures derived by these two methods. The U.S. Bureau of the Census estimated 1979 median family income at $25,000. With a total of 36 families, total personal income would equal $900,000. Management and Planning Services (1980) estimated total salaries and wages in 1979 to be $899,500. ISER (undated) estimated 1979 total income for the Natives of St. George to be $926,652.

TABLE G-5.
CALCULATION OF AVERAGE MONTHLY EARNINGS
IN BASIC, SUPPORT, AND GOVERNMENT SECTORS,
ALEUTIAN ISLANDS CENSUS DIVISION, 1980

	Average Annual Employment	Average Monthly Wage	Average Total Monthly Earnings
Mining	0	0	
Manufacturing	1,720	1,469	2,526,680
Total Basic Sector	1,720	1,469[a]	2,526,680
Construction	115	3,845	442,175
Transportation, Communication, and Utilities	90	1,612	145,080
Wholesale Trade	*	*	*
Retail Trade	106	1,223	129,638
Finance, Insurance and Real Estate	76	1,134	86,184
Services	152	1,051	159,752
Total Support Sector	539	1,786[a]	962,829
Federal Government	676	1,306	882,856
State and Local Government	408	1,662	678,096
Government Sector	1,084	1,440[a]	1,560,952

[a]Sectoral wage rates calculated by dividing average total earnings by average employment.

*Not disclosed.

Source: Alaska Department of Labor, Statistical Quarterly, 1980 I-IV, page 9.

The range of these estimates suggests that per capita income for St. George may be low relative to other communities in the census division, that our estimate of FTE employment may be low, or that the wage rates in St. George may be higher by sector than other Aleutian Island communities.

An estimate of nonwage income was derived from the Bureau of Economic Analysis (BEA) estimates of personal income by source for Alaska Census Divisions (April, 1982). A total of $7.389 million in transfer payments were distributed to residents of the Aleutian Islands Census Division in 1980. Based on the proportion (2.03 percent) of total census division population, St. George would account for $149,997 in nonwage transfer payments. This estimate is low compared to previous estimates of $155,600 (ISER, undated) and $186,200 (Management and Planning Services, 1980, data for 1979). The discrepancy may be explained by omission of a type of nonwage income such as the longevity bonus in the BEA data. The middle estimate of $155,600 implies a per capita nonwage income of $985.

Combining nonwage income of $155,600 with $900,000 in total wage income produces $1,055,600 in total personal income or a per capita level of $6,681.

Labor Force Participation

The employment status of Native and non-Native males and females in St. George is indicated in Table G-6. In developing this table, we

estimated the age/sex distribution of non-Natives and assumed that all non-Natives are in the labor force as civilian employees. The rate of employment for Native males was almost twice that for Native females.

The labor force participation rates (Table G-7) were calculated using an adjustment factor to be consistent with our estimates of FTE employment. The calculated rate for Native males is .58 and .32 for females.

TABLE G-6.
EMPLOYMENT STATUS OF
PERSONS AGED 16 AND OVER
ST. GEORGE, 1980

	Total Male	Total Female	Non-Native[a] Male	Non-Native[a] Female	Native Male	Native Female
Civilian Employed	27	17	3	1	24	16
Armed Forces	0	0	0	0	0	0
Unemployed	7	2	0	0	7	2
Not in Labor Force	14	40	0	0	14	40
TOTAL	48	59	3	1	45	58
Employment Rate[b]	.56	.29	1.00	1.00	.53	.28

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[a]Assumed all non-Natives are civilian employed. Age-sex distribution of non-Natives is an estimate by ISER.

[b]Civilian employed/total.

Source: Bureau of the Census, 1980 Census Special Tabulation STF3A, Table 55.

Group	Number Civilian Employed (a)	Civilian Population (b)	Labor Force Participation Rate (c)	Population (d)	Calculated Number Employed (e)	Adjusted Number Employed (f)	Adjusted Labor Force Participation Rate (g)
Non-Native Males Ages 20-64	3	3	1.00	3	3	3	1.00
Non-Native Females Ages 20-64	1	1	1.00	1	1	1	1.00
Native Males Ages 20-64	24	45	.53	38	20	22	.58
Native Females Ages 20-64	16	58	.28	31	9	10	.32
Total	44	73			33	36	

(a) Assume all non-Natives are employed. Age-sex distribution of non-Natives estimated by ISER.

(b) 1980 Census data from Table G-6.

(c) Number civilian employed/civilian population.

(d) 1980 Census data from Table V-1 for ages 20-64.

(e) Labor force participation rate x population (d).

(f) We have assumed resident FTE employment of 36 (Table G-4). In order to obtain rates consistent with total estimated FTE employment, the calculated number employed (e) was multiplied by an adjustment factor of 36/33 = 1.09.

(g) Adjusted number employed (f)/population (d).

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Appendix H

Technical Appendix: St. Paul

In this appendix we develop estimates of employment, income and labor force participation in St. Paul for 1980.

Employment

There are a variety of alternative definitions of employment. The measure we have chosen is resident full-time equivalent (FTE) employment. FTE employment is a measure of total person-years of work. We believe it is the single most useful measure of employment in a community, although in a community such as St. Paul, seasonal variation is also an essential measure. Care is needed in interpreting FTE employment since it may vary greatly from actual employment at any particular time of the year.

The U.S. Bureau of the Census reports a total of 113 employed workers in St. Paul for 1980 (Table H-1). The Public Administration industry accounted for 65 percent of these jobs. Ninety-two percent of the employed worked for the government sector.

Other available data indicate higher employment figures. Census data were collected for a given week in the spring of 1980 and, therefore, may not reflect the large number of seasonal or part-time jobs available in St. Paul. Alaska Consultants, Inc. (1981), notes that there were about 220 employed persons in St. Paul in July 1980, representing close to 195 percent of the employment reported in the census. ISER (undated) reports that of the 1980 St. Paul Native population, 64 were employed full-time and 180 part-time (Table H-2). Using the reported number of weeks worked per year by each part-time worker, the part-time employment is reduced to 38 full-time equivalent positions making a total of 102 FTE employment

TABLE H-1.
SELECTED EMPLOYMENT-RELATED DATA
FROM 1980 CENSUS: ST. PAUL[a]

Civilian Employed Workers by Industry	Number	Percentage
Agriculture, Forestry, Fishing and Mining	2	2
Construction	3	3
Manufacturing: Nondurables	0	0
Manufacturing: Durables	0	0
Transportation	0	0
Communication and Public Utilities	0	0
Wholesale Trade	0	0
Retail Trade	1	1
Finance, Insurance, and Real Estate	3	3
Business and Repair Services	3	3
Personal, Entertainment and Recreation Services	0	0
Professional Health Services	2	2
Professional Education Services	25	22
Other Professional Services	0	0
Public Administration	74	65
TOTAL	113	101

Employed Workers Claiming Farming, Forestry, or Fishing as Occupation	2

Civilian Employed Workers by Kind of Employer		Number	Percentage
Government	104		
Federal		66	58
State		20	18
Local		18	16
Private other than self		7	6
Self		0	0
Unpaid (usually work for family)		2	2
TOTAL		113	100

Military Employment

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[a]Data were collected as of a given week during the spring of 1980. However, the particular week was not necessarily consistent for all households.

Source: Special Tabulations for 1980 census, from U.S. Bureau of the Census, Tape STF3A, Tabulations 55, 65, 66, and 67.

TABLE H-2.
EMPLOYMENT CONDITIONS IN ST. PAUL
NATIVES 1980

Employer	Number Employed Full-Time[a]	Part-Time	Average Number of Weeks Per Part-Time Worker	Total Weeks Per Year Part Time Workers	Total Number Employed	Percent of Total Employment
NMFS	17	22[b]	28	616	135	55.3
		96[c]	8	768		
Clinic	2	2	40	80	4	1.6
School	13				13	5.3
City	7	3	25	75	10	4.1
TDX Corporation	6				6	2.5
Seal by-products		6	4	24	6	2.5
Seal meat processing		14	6	84	14	5.7
Reindeer antler process		15	3	45	15	6.1
Hotel		4	12	48	4	1.6
Restaurant		15	12	180	15	6.1
Store	10				10	4.1
Tavern	3				3	1.2
Gas station	1				1	0.4
Reeve/PO	1	1	12	12	2	0.8
AK Tours and Marketing		2	12	24	2	0.8
Coast Guard	2				2	0.8
Weather Service	2				2	0.8
Total	64	180	NA	1,956	244	99.7

SOURCE: ISER undated.

[a] Includes near full-time workers such as school personnel hired for 9 or 10 months of the year.
[b] "Part-time Indefinites" who worked more than 6 months of the year.
[c] Includes "Temporaries" and "Part-time Indefinites" who worked less than 6 months of the year.

for Natives in 1980. The National Marine Fisheries Service (NMFS) represented 42 percent of the FTE positions with the school the next largest employer with 13 FTE positions.

In 1980, Alaska Consultants, Inc., contacted individual employers in St. Paul in a survey of employment on the island. In Table H-3, they summarize their data as FTE positions by Standard Industrial Classification Code categories. Their numbers include self-employed persons, 25 military personnel, and non-Natives as well as Natives. Seventy-five percent of the 122.5 FTE employment jobs in 1980 were in the government sector with 66 percent of these jobs with the federal government through the National Marine Fisheries Service, the Coast Guard, the Post Office, and the Public Health Service. Only one state government job, the State Trooper, was reported. Local government employment is made up of 21.5 jobs at the school and 9 in city and IRA offices.

The trade sector commands most of the remaining jobs in Table H-3 with 18.5 FTE employment or 15 percent of the total number. These jobs include restaurant, gift shop, cafe, bar, store, and gas station employment. The five jobs reported in Finance, Insurance, and Real Estate are associated with the Tanadgusix Corporation, the St. Paul Village Corporation. Other jobs include reindeer herding (Agriculture, Forestry, and Fishing), seal by-products processing (Manufacturing), and service jobs.

TABLE H-3.
AVERAGE ANNUAL FULL-TIME EMPLOYMENT[a]
ST. PAUL, ALASKA
1980

Classification	Number	Percent	Basic Percent	Basic Number	Secondary Number
Agriculture, Forestry, and Fishing	1.0	0.8	50	0.5	0.5
Mining	0.0	0.0	*	0.0	0.0
Contract Construction	0.0	0.0	*	0.0	0.0
Manufacturing	1.0	0.8	100	1.0	0.0
Transportation, Communication, and Public Utilities	1.5	1.2	0	0.0	1.5
Trade	18.5	15.1	22	4.0	14.5
Finance, Insurance, and Real Estate	5.0	4.1	100	5.0	0.0
Service	3.5	2.9	43	1.5	2.0
Government	92.0	75.1	61	56.0	36.0
Federal	(60.5)	(49.4)	(93)	(56.0)	(4.5)
State	(1.0)	(0.8)	(0)	(0.0)	(1.0)
Local	(30.5)	(24.9)	(0)	(0.0)	(30.5)
TOTAL	122.5	100.0	56	68.0	54.5

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[a]Includes self-employed persons and 25 military personnel.

*Not disclosed.

Source: Alaska Consultants, Inc., August 1980.

Table H-4 gives two different estimates of FTE resident employment for St. Paul for the basic, support, and government sectors. The left column was derived from Table H-2, the right column from Table H-3. The footnotes to the table describe how each figure was developed.

We estimate a total FTE employment of 123 for St. Paul in 1980. Twenty-five of these jobs are considered military. The largest share, 68 percent, of resident employment is government and government-sponsored employment. Resident basic employment represents only 3 percent of total resident employment in each estimate. Exogenous employment, employment which provides goods and services for markets outside the local community, was 28 to 33 percent of all resident employment. For every exogenous job there were 2 to 2.5 endogenous jobs. There were .20 endogenous support jobs for every other job in the community.

TABLE H-4.
TWO ESTIMATES OF FULL-TIME EQUIVALENT
EMPLOYMENT IN ST. PAUL, 1980

	Estimates Based on 1980 Census	Estimates Based on AK Consultants Data
Resident Basic Employment	3[a]	2[a]
Seal Processing	2	1
Other (Reindeer Antler)	1	1
Resident Support Employment	42	52
Exogenous	8[b]	9.5[f]
Endogenous	19[c]	19.5[g]
Government-sponsored	15[d]	23[d]
Enclave-sponsored	0	0
Resident Government Employment	52[e]	44[h]
Exogenous	21	17
Endogenous	31	27
Total Resident	97	98
Total Exogenous	32	27.5
Total Endogenous	65	69.5
Nonresident (Enclave) Employment	0	0
Total Resident and Nonresident	97	98
Total Military Employment	25	25

See notes on following page.

Table H-4 Notes

[a]Seasonal employment in seal by-products processing, seal meat processing and reindeer antler processing (on Umnak Island) constitutes three full-time equivalent positions. Alaska Consultants, Inc., (1981) reports that a 35-man meat plant crew is hired for eight weeks, that the by-products plant hires nine people between the end of June and the beginning of August, and another three people for a six-week period beginning in mid-June, and that the reindeer operation hires five people for four weeks a year.

[b]Alaska Tours and Marketing hires two summer workers to lead tours of the island and seal operations. Other support sector positions in this category include hotel, restaurant, and gift shop workers.

[c]Employers in this category include Tanadgusix Corporation (TDX) as well as the bar, gas station, and airline office.

[d]Government-sponsored support employment includes school and clinic employees. The discrepancy between these two estimates is found in data reported for school employees, partly due to the presence of some non-Native teachers being counted by Alaska Consultants, Inc.

[e]NMFS employees involved in seal harvesting and processing are considered exogenous government employees. These positions are seasonal. All year-round and six part-time NMFS employees were categorized as endogenous. City employees are considered endogenous. Other exogenous government employees include weather service personnel.

[f]Six trade sector jobs in the restaurant, cafe, and gift shops and 3.5 from the service sector make up the exogenous resident support employment.

[g]The remaining 13 trade sector jobs are primarily in the IRA-owned bar, store and gas station, in public utilities (1.5), and 5 positions in the TDX Corporation. These jobs are included in endogenous resident support employment.

[h]Seventeen, or 50 percent, of NMFS jobs are assumed exogenous. All other government sector jobs are considered endogenous. These include all local government, the one state employee and the remainder of NMFS positions.

Income

One measure of personal income for St. Paul may be obtained by
multiplying the population (551 persons) by the average per capita
income for the Aleutian Islands Census Division. The Alaska
Department of Labor measured per capita income for the division as
$9,511 in 1980 (Alaska Department of Labor, Alaska Planning
Information, page 92). This method provides an estimate of total
personal income of $5,240,561.

An alternate method is to multiply the number of FTE employment in
each sector by an average wage for that sector. In Table H-5, the
average monthly wage for the basic, support, and government sectors
is shown for the Aleutian Islands Census Division. Using these
figures, an estimated total annual wage income for St. Paul in 1980
ranges from $1,851,588 to $1,910,040, using ISER and Alaska
Consultants, Inc., Table H-4 estimates, respectively.

Two estimates of annual wage income for St. Paul in 1979 are
available. Management and Planning Services (1980) estimates total
local earned income of $2,124,616. ISER (undated) estimates
$2,620,144 for the same year. More recently, a 1982 estimate
(Smythe, 1982, in Dames and Moore, 1983) of total earned income is
$2,836,000. All of these estimates are built from the addition of
wages for different employers and job categories and are, therefore,
probably more accurate than the estimates derived from regional

TABLE H-5.
CALCULATION OF AVERAGE
MONTHLY EARNINGS IN BASIC, SUPPORT, AND
GOVERNMENT SECTORS, ALEUTIAN ISLANDS CENSUS DIVISION, 1980

	Average Annual Employment	Average Monthly Wage	Average Total Monthly Earnings
Mining	0	0	
Manufacturing	1,720	1,469	2,526,680
Total Basic Sector	1,720	1,469[a]	2,526,680
Construction	115	3,845	442,175
Transportation, Communication, and Utilities	90	1,612	145,080
Wholesale Trade	*	*	*
Retail Trade	106	1,223	129,638
Finance, Insurance and Real Estate	76	1,134	86,184
Services	152	1,051	159,752
Total Support Sector	539	1,786[a]	962,829
Federal Government	676	1,306	882,856
State and Local Government	408	1,662	678,096
Government Sector	1,084	1,440[a]	1,560,952

---

[a]Sectoral wage rates calculated by dividing average total earnings by average employment.

*Not disclosed.

Source: Alaska Department of Labor, _Statistical Quarterly_, 1980 I-IV.

data. For our purposes, we will average the two 1979 estimates for an annual wage income of $2,372,380. The difference between this figure and the incomes derived from the census division data suggests that the per capita level for St. Paul is lower than other communities in the census division, that our estimates of FTE employment may be slightly low, or that the wage rates in St. Paul may be higher by sector than in other Aleutian Island communties.

An estimate of nonwage income was derived from the Bureau of Economic Analysis (BEA) estimates of personal income by source for Alaska census divisions (April, 1982). A total of $7.389 million in transfer payments were distributed to residents of the Aleutian Islands Census Division in 1980. Based on the proportion (7.09 percent) of total census division population, St. Paul would account for $523,880 in nonwage transfer payments. This estimate is slightly lower than 1979 estimates of $566,750 by ISER (undated) and $535,600 by Management and Planning Services (1980). The middle estimate of $535,600 implies a per capita nonwage income of $972.

Combining nonwage income of $535,600 with $2,372,380 in total wage income produces $2,907,980 in total personal income, or a per capita level of $5,278.

TABLE H-6.
EMPLOYMENT STATUS OF
PERSONS AGED 16 AND OVER
ST. PAUL, 1980

	Total		Non-Native[a]		Native	
	Male	Female	Male	Female	Male	Female
Civilian Employed	78	35	8	8	70	27
Armed Forces	54	0	54	0	0	0
Unemployed	3	3	0	0	3	3
Not in Labor Force	143	114	0	5	143	109
Total	278	152	62	13	216	139
Employment Rate[b]	.47	.23	1.00	.62	.32	.19

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[a]Calculated by subtracting Native figures from total figures.

[b](Civilian employment + armed forces/total.

Source: Bureau of the Census, <u>1980 Census Special Tabulation STF3A</u>,
         Table 55.

Labor Force Participation

The employment status of Native and non-Native males and females in St. Paul is indicated in Table H-6. Among the non-Natives, 87 percent of the males are employed in the Armed Forces and 38 percent of the females are considered not in the labor force. According to the census figures, the employment rate for Native males and females is 32 percent and 19 percent, respectively.

The civilian labor force participation rate for St. Paul (Table H-7) is highest for non-Natives and higher for males than for females. This reflects the high Armed Forces employment for non-Native males and the typically lower participation rate of Native females. We adjusted labor force participation rates to be consistent with our estimates of FTE employment. In general, the calculated participation rates are probably low due to the omission of many seasonal workers in the figures.

TABLE H-7.
CALCULATION OF LABOR FORCE
PARTICIPATION RATE
FOR ST. GEORGE

Group	Number Civilian Employed (a)	Civilian Population (b)	Labor Force Participation Rate (c)	Population (d)	Calculated Number Employed (e)	Adjusted Number Employed (f)	Adjusted Labor Force Participation Rate (g)
Non-Native Males Ages 20-64	8	8	1.0	32	32	30	.94
Non-Native Females Ages 20-64	8	13	.615	16	10	9	.56
Native Males Ages 20-64	70	216	.324	136	44	41	.30
Native Females Ages 20-64	27	139	.194	103	20	18	.17
Total	113	376		287	106	98	

(a) 1980 Census data from Table H-6. Employed persons ages 16 and over were assumed to be between ages 20 and 64.

(b) 1980 Census data from Table H-6.

(c) Number civilian employed/civilian population.

(d) 1980 Census data from Table VI-1 for ages 20-64.

(e) Labor force participation rate (c) x population (d).

(f) We have assumed resident FTE employment of 98 (Table H-4). In order to obtain rates consistent with total estimated FTE employment, the calculated number employed (e) was multiplied by an adjustment factor of 98/106 = .92.

(g) Adjusted number employed (f)/population (d).

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Appendix I

Technical Appendix: Nelson Lagoon

In this appendix we develop estimates of employment, income and labor force participation in Nelson Lagoon for 1980.

Employment

There is no single source which provides a complete description of 1980 employment in Nelson Lagoon. According to the U.S. Bureau of the Census, there were no employed persons aged 16 and over in Nelson Lagoon at the time of the 1980 census. This information was collected for a given week during the spring of 1980; therefore, it does not include fishing employment. Salmon fisheries, especially the sockeye salmon run, occupies nearly every resident during the June to mid-September fishing season.

Other employment in Nelson Lagoon includes two teachers and a school maintenance person who work nine months, and four other contract employees who are employed year-round. These jobs are not reflected in the 1980 census.

There are a variety of alternative definitions of employment. The measure we have chosen is resident full-time equivalent (FTE) employment. FTE employment is a measure of total person-years of work. We believe it is the single most useful measure of employment in a community, although in a community such as Nelson Lagoon, seasonal variation is an essential measure also. Care is needed in interpreting FTE employment since it may vary greatly from actual employment at any particular time of the year.

In Nelson Lagoon we assumed all employment was resident employment. There is no industry in the village which causes seasonal workers to migrate to the village.

Table I.1 presents our estimates of resident full-time equivalent employment in Nelson Lagoon and the distribution of this employment among several different categories of employment. The footnotes to the table describe how each figure was developed.

We estimate a total 1980 FTE resident employment of 14. Over half (55 percent) of this is represented by seasonal commercial fishing activities. The remainder is composed of support employment and one local government year-round employee. Exogenous employment, employment which provides goods and services for markets outside the local community, was 8 (57 percent of all resident employment). For every exogenous job there were .75 endogenous jobs. There were .36 endogenous support jobs for every other job in the community.

TABLE I.1.
ESTIMATED FULL-TIME EQUIVALENT
EMPLOYMENT IN NELSON LAGOON, 1980

Resident Basic Employment	8
Fishing	8[a]
Fish Processing	0
Petroleum Processing	0
Other (Primarily Mining)	0
Resident Support Employment	5
Exogenous	0
Endogenous	5[b]
Government-sponsored	0
Enclave-sponsored	0
Resident Government Employment	1
Exogenous	0
Endogenous	1
Total Resident	14
Total Exogenous	8
Total Endogenous	6
Nonresident (Enclave) Employment	0
Total Resident and Nonresident	14

---

[a]The 1980 census counted 33 residents aged 20-64. We assumed 29, or 87 percent, of these residents are salmon fishermen. To calculate FTE employment, we multiply 29 by the fraction of the year spent fishing (14 weeks or .27 year) to equal 8 FTE employment.

[b]Endogenous employment in Nelson Lagoon includes two teachers and a school maintenance person who work a nine-month year, and three full-time employees providing support services for the community.

Income

There is no specific income information available for Nelson Lagoon. One measure of personal income for the village may be obtained by multiplying the population (59 persons) by the average per capita income for the Aleutian Islands Census Division. The Alaska Department of Labor measured per capita income for the division as $9,511 in 1980 (Alaska Department of Labor, Alaska Planning Information, page 92). This method provides an estimate of total personal income of $561,149.

An alternate method is to assume a commercial fish harvest employment wage rate of $45,000 and an estimate of $21,432 (Table I.2) for the support sector wage rate. Multiplying these wage rates by the employment estimates in Table I.1 provides an estimate of total resident wage income of $464,590 in 1980.

An estimate of nonwage income was derived from the Bureau of Economic Analysis (BEA) estimates of personal income by source for Alaska Census Division (April 1982). A total of $7.389 million in transfer payments were distributed to residents of the Aleutian Islands Census Division in 1980. Based on the proportion (.76 percent) of total census division population, Nelson Lagoon would account for $56,156 in nonwage transfer payments. This implies a per capita nonwage income of $952. Combining nonwage income of $56,156 with $464,590 in wage income produces $520,746 in total personal income, or total per capita income of $8,826.

TABLE I.2.
CALCULATION OF AVERAGE
MONTHLY EARNINGS IN BASIC, SUPPORT, AND
GOVERNMENT SECTORS, ALEUTIAN ISLANDS CENSUS DIVISION, 1980

	Average Annual Employment	Average Monthly Wage	Average Total Monthly Earnings
Mining	0	0	
Manufacturing	1,720	1,469	2,526,680
Total Basic Sector	1,720	1,469[a]	2,526,680
Construction	115	3,845	442,175
Transportation, Communication, and Utilities	90	1,612	145,080
Wholesale Trade	*	*	*
Retail Trade	106	1,223	129,638
Finance, Insurance and Real Estate	76	1,134	86,184
Services	152	1,051	159,752
Total Support Sector	539	1,786[a]	962,829
Federal Government	676	1,306	882,856
State and Local Government	408	1,662	678,096
Government Sector	1,084	1,440[a]	1,560,952

[a]Sectoral wage rates calculated by dividing average total earnings by average employment.

*Not disclosed.

Source: Alaska Department of Labor, Statistical Quarterly, 1980 I.IV.

Labor Force Participation

There were 33 people aged 20-64 in Nelson Lagoon in 1980 (Table I.3). Four of these were non-Native, two each male and female. It is assumed that all 33 persons are actively employed in either the fisheries or support-sector employment.

TABLE I.3.
CALCULATION OF LABOR FORCE
PARTICIPATION RATE ASSUMPTIONS
FOR NELSON LAGOON

Group	Number Civilian Employed (a)	Population (b)	Labor Force Participation Rate (c)
Non-Native Males Ages 20-64	2	2	1.00
Non-Native Females Ages 20-64	2	2	1.00
Native Males Ages 20-64	16	16	1.00
Native Females Ages 20-64	13	13	1.00
Total	32	33	

(a)ISER estimates.

(b)1980 Census data.

(c)Number employed/population.

List of Tables

Appendix J

RAM Model Assumptions Common to All Communities

This appendix presents worksheets of RAM Model assumptions which were the same for each of the communities included in this report.

WORKSHEET 2. SURVIVAL RATE ASSUMPTIONS
FOR POPULATION MODEL

(Share of population which
does not die each year)

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	.99654	.99757	.99171	.99413
5-14	.99964	1.0000	.99894	.99952
15-19	.99848	1.0000	.99260	.99634
20-34	.99742	.99926	.99164	.99674
35-64	.99310	.99671	.98817	.99403
65+	.94008	.96612	.93506	.97311

NOTE: Variable names for each column are SVRANNM1, . . ., SVRANNM6; SVRANNF1, . . ., SVRANNF6; SVRANAM1, . . ., SVRANAM6; SVRANAF1, . . .,SVRANAF6.

_____

SOURCE: We assume the same cohort survival rates for all communities due to the absence of reliable community-specific data. We calculated the survival rates from 1980 census total population and mortality figures for non-Anchorage Alaska residents.

WORKSHEET 3. FERTILITY RATE ASSUMPTIONS
FOR POPULATION MODEL

(Share of women giving birth each year)

	Non-Native		Native	
	Variable		Variable	
Age Group	Name	Value	Name	Value
15-19	FRNNØ3	.04033	FRNAØ3	.13668
20-34	FRNNØ4	.11641	FRNAØ4	.18235
35-64	FRNNØ5	.02084	FRNAØ5	.03727

SOURCE: We assume the same cohort fertility rates for all communities due to the absence of reliable community-specific data. The rates are based on data for non-Anchorage Alaska. The number of births are from the Alaska Department of Health and Social Services, Office of Information Systems and the Alaska Native Medical Center, Anchorage. Non-Anchorage figures are derived by subtracting Anchorage from statewide data.

WORKSHEET 4. SHIFT FACTOR ASSUMPTIONS

(Share of population which does not advance to the next age group each year)

Age Group	Variable Name	Shift Factor
0-4	SFPA01	.80
5-14	SFPA02	.90
15-19	SFPA03	.80
20-34	SFPA04	.9333
35-64	SFPA05	.9667
65+	SFPA06	1.0000

_____

SOURCE:

Calculated using the formula $1 - \dfrac{1}{\text{(number of age-years in group)}}$

WORKSHEET 5.   INFANT SURVIVAL AND SEX
DISTRIBUTION ASSUMPTIONS

Variable	Variable Name	Value
Infant survival rates		
Native		
Males	IFSVNAMA	1.0
Females	IFSVNAFE	1.0
Non-Native		
Males	IFSVNNMA	1.0
Females	IFSVNNFE	1.0
Sex distribution of infants		
Native	SXDVNA	0.513
Non-Native	SXDVNN	0.518

SOURCE: We assumed these figures in the absence of better data.

WORKSHEET 8. STATE GOVERNMENT PER CAPITA OPERATING AND CAPITAL EXPENDITURES

(Thousands of Real Dollars)

	State Government per capita operating Expenditures (STPCOE)	State Government per capita capital Expenditures (STPCCE)
1980		
1981	4.210	1.831
1982	4.758	2.293
1983	4.602	1.684
1984	5.138	2.014
1985	5.130	1.452
1986	5.121	2.710
1987	4.801	2.526
1988	5.294	2.820
1989	5.102	2.710
1990	5.075	2.710
1991	5.068	2.710
1992	4.365	2.298
1993	4.108	2.146
1994	3.944	2.050
1995	3.672	1.890
1996	3.422	1.742
1997	3.351	1.700
1998	3.258	1.645
1999	3.248	1.640
2000	3.194	1.609
2001	3.142	1.579
2002	3.084	1.548
2003	3.036	1.517
2004	2.992	1.492
2005	2.949	1.468
2006	2.904	1.442
2007	2.861	1.418
2008	2.819	1.395
2009	2.778	1.372
2010	2.736	1.349

SOURCE: These figures are based on recent ISER MAP model projections for the statewide economy (DSET A83T2).

APPENDIX K: RAM MODEL ASSUMPTIONS
FOR UNALASKA PROJECTIONS

The following worksheets provide a complete list of the assumptions which we used in our Unalaska RAM Model projections, except for our OCS employment assumptions which are given in Appendix N.

We have prepared seven "cases," or sets of model projections, for Unalaska. Except where noted, the same assumptions are used for all seven projections. Where assumptions differ, we use the following notation to refer to different cases:

    L   Low base case
    M   Medium base case
    H   High base case

WORKSHEET 1. POPULATION ASSUMPTIONS FOR BASE YEAR

Total Population (PO) _____724_____

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	21	14	8	3
5-14	25	37	19	21
15-19	44	29	16	10
20-34	179	85	46	29
35-64	58	26	28	14
65+	4	2	3	3

Note: Variable names for each column are
PONNM1, . . ., PONNM6; PONNF1, . . .,PONNF6;
PONAM1, . . .,PONAM6; PONAF1, . . ., PONAF6.

_____

SOURCE: U.S. Bureau of the Census, 1980 Census. Special census
tape printouts on file at Institute of Social and
Economic Research, Anchorage.

WORKSHEET 2. SURVIVAL RATES AND FERTILITY RATES ASSUMPTIONS

Survival Rates (Share of population which does not die each year)

Age Group	Non-Native Male	Non-Native Female	Native Male	Native Female
0-4	.99654	.99757	.99171	.99413
5-14	.99964	1.0000	.99894	.99952
15-19	.99848	1.0000	.99260	.99634
20-34	.99742	.99926	.99164	.99674
35-64	.99310	.99671	.98817	.99403
65+	.94008	.96612	.93506	.97311

Note: Variable names for each column are SVRANNM1, . . ., SVRANNM6; SVRANNF1, . . ., SVRANNF6; SVRANAM1, . . ., SVRANAM6; SVRANAF1, . . ., SVRANAF6.

SOURCE: Calculated from 1980 census figures for total population and mortality for non-Anchorage Alaska residents.

Fertility Rates (Share of women giving birth each year)

Age Group	Non-Native Variable Name	Non-Native Value	Native Variable Name	Native Value
15-19	FRNNO3	.04033	FRNAO3	.13668
20-34	FRNNO4	.11641	FRNAO4	.18235
35-64	FRNNO5	.02084	FRNAO5	.03727

SOURCE: These rates are based on data for non-Anchorage Alaska. The number of births are from the Alaska Department of Health and Social Services, Office of Information Systems and the Alaska Native Medical Center, Anchorage. Non-Anchorage figures were derived by subtracting Anchorage from statewide data.

WORKSHEET 3: OTHER POPULATION MODEL ASSUMPTIONS

Shift Factors (Share of population which does not advance
to the next age group each year)

Age Group	Variable Name	Shift Factor
0-4	SFPA01	.80
5-14	SFPA02	.90
15-19	SFPA03	.80
20-34	SFPA04	.9333
35-64	SFPA05	.9667
65+	SFPA06	1.0000

NOTE: Calculated using the formula $1 - \dfrac{1}{(\text{number of age-years in group})}$

Infant Survival and Sex Distribution Assumptions

Variable	Variable Name	Value
Infant survival rates		
Native		
Males	IFSVNAMA	1.0
Females	IFSVNAFE	1.0
Non-Native		
Males	IFSVNNMA	1.0
Females	IFSVNNFE	1.0

Sex distribution of infants

Native	SXDVNA	.5
Non-Native	SXDVNN	.5

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WORKSHEET 4.   POPULATION, EMPLOYMENT, WAGES, INCOME
AND STATE PER CAPITA SPENDING IN BASE YEAR

Variable	Variable Name	Value
Total Population	PO	724
Total Basic Employment	EMBA	110
Resident fishing employment	EMFI	50
Resident fish processing employment	EMFP	58
Nonfishing related basic employment	EMBANF	2
Total Support Employment	EMSU	200
Exogenous support employment	EMSUEX	59
Endogenous support employment	EMSUEG	82
Government-sponsored support employment	EMSUGO	0
Enclave-sponsored support employment	EMSUEN	59
Total Government Employment	EMGO	82
Exogenous government employment	EMGOEX	6
Endogenous government employment	EMGOEG	76
Total Resident Employment		392
Nonproject enclave employment	EMENNOPJ	1,108
Military enclave employment	EMML	0
Basic sector annual wage rate	WABA	17.6
Support sector annual wage rate	WASU	21.4
Government sector annual wage rate	WAGO	17.3
Income		
Total wage income (thousands of $)	INWA	7,635
Nonwage income per capita (thousands of $)	INNOWAPC	0
Total income (thousands of $)	IN	7,635
State Per Capita Spending (Thousands of Dollars)		
Per capita operating expenditures	STPCOE	3.577
Per capita capital expenditures	STPCCE	1.186

SOURCES: Population: worksheet 1.
Employment and income: Appendix D
State per capita spending: worksheet 4.

WORKSHEET 5: MULTIPLIER CALCULATIONS

Multiplier	Name	Formula	Value
Endogenous support employment multiplier	EMSUEGC1	$\dfrac{EMSUEG}{IN}$	.0107
Endogenous government employment multiplier	EMGOEGC1	$\dfrac{EMGOEG}{PO * STPCOE}$	.0293
Government-sponsored support employment multiplier	EMSUGOC1	$\dfrac{EMSUGO}{PO * STPCCE}$	0
Nonproject enclave-generated support employment multiplier	EMSUENC1	$\dfrac{EMSUEN}{EMEN}$	.0532
Project enclave-generated support employment multiplier	EMSUENC2	$\dfrac{EMSUEN}{EMEN}$	.05

WORKSHEET 6.   STATE GOVERNMENT PER CAPITA
OPERATING AND CAPITAL EXPENDITURES

(Thousands of Real Dollars)

	State Government per capita operating Expenditures (STPCOE)	State Government per capita capital Expenditures (STPCCE)
1980	3.577	
1981	4.210	1.186
1982	4.758	1.831
1983	4.602	2.293
1984	5.138	1.684
1985	5.130	2.014
1986	5.121	1.452
1987	4.801	2.710
1988	5.294	2.526
1989	5.102	2.820
1990	5.075	2.710
1991	5.068	2.710
1992	4.365	2.710
1993	4.108	2.298
1994	3.944	2.146
1995	3.672	2.050
1996	3.422	1.890
1997	3.351	1.742
1998	3.258	1.700
1999	3.248	1.645
2000	3.194	1.640
2001	3.142	1.609
2002	3.084	1.579
2003	3.036	1.548
2004	2.992	1.517
2005	2.949	1.492
2006	2.904	1.468
2007	2.861	1.442
2008	2.819	1.418
2009	2.778	1.395
2010	2.736	1.372
		1.349

SOURCE: These figures are based on recent ISER MAP model
projections for the statewide economy (DSET A83T2).

WORKSHEET 7. WAGE AND NONWAGE INCOME
ASSUMPTIONS FOR PROJECTION PERIOD
(Thousands of Real Dollars)

	Per Capita Nonwage Income (INNOWAPC)	Basic Sector Wage Rate (WABA)	Support Sector Wage Rate (WASU)	Government Sector Wage Rate (WAGO)	Project Sector Wage Rate (WAPJ)
1980	0	17.6	21.4	17.3	30
1981	0	17.6	21.4	17.3	30
1982	0	17.6	21.4	17.3	30
1983	0	17.6	21.4	17.3	30
1984	0	17.6	21.4	17.3	30
1985	0	17.6	21.4	17.3	30
1986	0	17.6	21.4	17.3	30
1987	0	17.6	21.4	17.3	30
1988	0	17.6	21.4	17.3	30
1989	0	17.6	21.4	17.3	30
1990	0	17.6	21.4	17.3	30
1991	0	17.6	21.4	17.3	30
1992	0	17.6	21.4	17.3	30
1993	0	17.6	21.4	17.3	30
1994	0	17.6	21.4	17.3	30
1995	0	17.6	21.4	17.3	30
1996	0	17.6	21.4	17.3	30
1997	0	17.6	21.4	17.3	30
1998	0	17.6	21.4	17.3	30
1999	0	17.6	21.4	17.3	30
2000	0	17.6	21.4	17.3	30
2001	0	17.6	21.4	17.3	30
2002	0	17.6	21.4	17.3	30
2003	0	17.6	21.4	17.3	30
2004	0	17.6	21.4	17.3	30
2005	0	17.6	21.4	17.3	30
2006	0	17.6	21.4	17.3	30
2007	0	17.6	21.4	17.3	30
2008	0	17.6	21.4	17.3	30
2009	0	17.6	21.4	17.3	30
2010	0	17.6	21.4	17.3	30

NOTE: We arbitrarily assume an annual wage of $30,000 for project
(OCS-related) employees.

WORKSHEET 8.   BASIC SECTOR EXOGENOUS EMPLOYMENT ASSUMPTIONS
(Full-time Equivalent Employment)

Year	Resident Fishing Employment (EMFI)			Resident Fish-processing Employment (EMFP)			Non-Fishing Related Basic Employment (EMBANF)	Nonproject Enclave Employment (EMENNOPJ)		
	L	M	H	L	M	H		L	M	H
1980	50	50	50	58	58	58	2	1108	1108	1108
1981	50	50	50	58	58	58	2	609	609	609
1982	50	50	50	58	58	58	2	233	233	233
1983	50	50	50	58	58	58	2	166	166	166
1984	52	52	52	62	62	62	2	186	186	186
1985	54	54	54	66	66	66	2	206	262	412
1986	56	56	60	70	70	78	2	226	337	503
1987	58	58	70	74	74	98	2	246	412	654
1988	60	60	80	78	78	118	2	266	488	815
1989	62	65	90	82	88	138	2	342	593	976
1990	64	70	100	86	98	158	2	417	699	1136
1991	66	80	125	90	118	208	2	492	854	1372
1992	68	90	150	94	138	258	2	512	1009	1608
1993	70	100	175	98	158	308	2	532	1165	1733
1994	72	110	200	102	178	358	2	552	1320	1858
1995	74	120	225	106	198	408	2	572	1476	1983
1996	75	130	250	108	218	458	2	582	1576	2108
1997	75	140	300	108	238	558	2	582	1676	2358
1998	75	150	350	108	258	658	2	582	1776	2608
1999	75	150	400	108	258	758	2	582	1776	2858
2000	75	150	450	108	258	858	2	582	1776	3108
2001	75	150	450	108	258	858	2	582	1776	3108
2002	75	150	450	108	258	858	2	582	1776	3108
2003	75	150	450	108	258	858	2	582	1776	3108
2004	75	150	450	108	258	858	2	582	1776	3108
2005	75	150	450	108	258	858	2	582	1776	3108
2006	75	150	450	108	258	858	2	582	1776	3108
2007	75	150	450	108	258	858	2	582	1776	3108
2008	75	150	450	108	258	858	2	582	1776	3108
2009	75	150	450	108	258	858	2	582	1776	3108
2010	75	150	450	108	258	858	2	582	1776	3108

WORKSHEET 9. SUPPORT AND GOVERNMENT SECTOR EXOGENOUS
EMPLOYMENT ASSUMPTIONS

Year	Exogenous Support Employment (EMSUEX)	Exogenous Government Employment (EMGOEX)
1981	59	6
1982	59	6
1982	59	6
1983	59	6
1984	59	6
1985	59	6
1986	59	6
1987	59	6
1988	59	6
1989	59	6
1990	59	6
1991	59	6
1992	59	6
1993	59	6
1994	59	6
1995	59	6
1996	59	6
1997	59	6
1998	59	6
1999	59	6
2000	59	6
2001	59	6
2002	59	6
2003	59	6
2004	59	6
2005	59	6
2006	59	6
2007	59	6
2008	59	6
2009	59	6
2010	59	6

WORKSHEET 10. LABOR FORCE PARTICIPATION RATE ASSUMPTIONS

	Age Group	Non-Native		Native	
		Male	Female	Male	Female
Labor Force Partic- ipation Rates (Note: Variable names are LFPRNNM3, . . ., 6; LFPRNNF3, . . ., 6; LFPRNAM3, . . ., 6; LFPRNAF3, . . ., 6)	15-19	0	0	0	0
	20-34	1	.8	.6	.5
	35-64	1	.8	.6	.5
	65+	0	0	0	0
Population in Base Year (from Worksheet 1)	15-19	44	29	16	10
	20-34	179	85	46	29
	35-64	58	26	28	14
	65+	4	2	3	3
Check: Employment in Base Year	15-19	0	0	0	0
	20-34	179	68	28	14
	35-64	58	21	17	7
	65+	0	0	0	0
TOTAL		237	89	45	21

Total Resident Employment = ___392___
Total Resident Employment (from Worksheet 3) = ___392___

SOURCE: Table D-7.

WORKSHEET 11.   ENDOGENOUS OUT-MIGRATION PARAMETERS ASSUMPTIONS

Variable	Variable Name	Value
Threshold maximum increase in unemployment before out-migration begins	HIUNRA	0
Threshold maximum decrease in unemployment before in-migration begins	LWUNRA	0
Share of unemployed native workers who leave once unemployment rises above threshold level	OULAPANA	0
Share of unemployed non-native workers who leave once unemployment rises above threshold level	OULAPANN	1
Adjustment parameter for ratio of native dependents who out-migrate to native workers who out-migrate (a value of one indicates that this ratio is the same as the ratio of native dependents to native workers in the population)	OUDEPANA	1
Adjustment parameter for ratio of non-native dependents who out-migrate to non-native workers who out-migrate	OUDEPANN	1

WORKSHEET 12. ENDOGENOUS IMMIGRATION PARAMETERS ASSUMPTIONS:
NUMBER OF PERSONS WHO IMMIGRATE IN EACH COHORT
FOR EACH WORKER WHO IMMIGRATES

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	.064	.043	0	0
5-14	.077	.113	0	0
15-19	.135	.089	0	0
20-34	.549	.261	0	0
35-64	.178	.080	0	0
65+	.012	.006	0	0

Note: Variables are MGPANNM1, . . ., MGPANNM6; MGPANNF1, . . .,
MGPANNF6; MGPANAM1, . . ., MGPANAM6; MGPANAFI, . . .,
MGPANNF6.

Note: calculated as ratio of non-Native population in each
cohort (see worksheet 1) to total non-Native employment
of 326 (see worksheet 10).

WORKSHEET 13.   EXOGENOUS MIGRATION PARAMETER ASSUMPTIONS: SHARE OF EACH COHORT WHICH MIGRATES IN OR OUT EACH YEAR IN RESPONSE TO NON-ECONOMIC (EXOGENOUS) FACTORS

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	-.9	-.9	0	0
5-14	-.9	-.9	0	0
15-19	-.9	-.9	0	0
20-34	-.9	-.9	0	0
35-64	-.9	-.9	0	0
65+	-.9	-.9	0	0

Note: Variables are MXRANNM1, . . ., MXRANNM6; MXRANNF1, . . ., MXRANNF6; MXRANAM1, . . ., MXRANAM6; MXRANAFI, . . ., MXRANAF6.

Exogenous migration parameter for
skilled labor (MXRASK)   -.9

Note: The assumption of high exogenous migration parameters implies high turnover among resident non-Natives so that the age distribution of non-Natives remains relatively constant over time. We realize that this pattern of high turnover is not characteristic of all Unalaska non-Natives, but modeling constraints require that we choose between this assumption and an assumption of no turnover or transiency in resident non-Native population.

WORKSHEET 14. MISCELLANEOUS EXOGENOUS ASSUMPTIONS

	Enclave Military Employment (EMML)	Enclave Military Dependents (DEML)
1982	0	
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	0	0
2007	0	0
2008	0	0
2009	0	0
2010	0	0
	0	0

NOTE: We did not treat Unalaska's small military population
as a separate enclave.

WORKSHEET 15. PROJECT EMPLOYMENT PARAMETERS

Residency and Commuter Parameters

	Share of Project Jobs Reserved for Nonresidents by Industry	Share of Nonresident Workers Brought in to Fill Excess Demand Who Become Residents	Share of Nonresident Workers Who Only Commute Thru Community (ie, Do Not Live in Enclaves; Mostly Offshore Workers)
Onshore Short-term Skilled	SNPSONSK 1	SRPSONSK 0	CPPSONSK 0
Onshore Short-term Unskilled	SNPSONNS 0	SRPSONNS 0	CPPSONNS 0
Onshore Long-term Skilled	SNPLONSK 0	SRPLONSK 1	CPPLONSK 0
Onshore Long-term Unskilled	SNPLONNS 0	SRPLONNS 1	CPPLONNS 0
Offshore Short-term Skilled	SNPSOFSK 1	SRPSOFSK 0	CPPSOFSK 1
Offshore Short-term Unskilled	SNPSOFNS 1	SRPSOFNS 0	CPPSOFNS 1
Offshore Long-term Skilled	SNPLOFSK 1	SRPLOFSK 0	CPPLOFSK 1
Offshore Long-term Unskilled	SNPLOFNS 1	SRPLOFNS 0	CPPLOFNS 1

Skill and Training Parameters

Variable	Variable Name	Value
Number of skilled workers in year prior to first projection year	LSSK	0
Maximum share of nonskilled workers who are trained for project jobs in any given year	TNPANS	0
Maximum share of excess demand for skilled labor which is filled by training local labor in any given year	TNPAED	0

WORKSHEET 16. PROJECT EMPLOYMENT ASSUMPTIONS

O N S H O R E

	Short-term		Long-term	
Year	Skilled <u>EMPSONSK</u>	Unskilled <u>EMPSONNS</u>	Skilled <u>EMPLONSK</u>	Unskilled <u>EMPLONNS</u>
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

NOTE: See Appendix N for OCS employment assumptions.

WORKSHEET 16. PROJECT EMPLOYMENT ASSUMPTIONS
(Continued)

O F F S H O R E

Year	Short-term		Long-term	
	Skilled EMPSOFSK	Unskilled EMPSOFNS	Skilled EMPLOFSK	Unskilled EMPLOFNS
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

SOURCE: For OCS impact projections, assumptions are provided by Alaska OCS office. NOTE: The term "skilled" refers to jobs requiring previous special oil-industry-related training or experience.

APPENDIX L: RAM MODEL ASSUMPTIONS
FOR COLD BAY PROJECTIONS

The following worksheets provide a complete list of the assumptions

which we used in our Cold Bay RAM Model projections, except for OCS

employment assumptions which are given in Appendix N.

We have prepared seven "cases," or sets of model projections, for

Cold Bay. Except where noted, the same assumptions are used for all

seven cases.   Where assumptions differ, we use the following

notation to refer to different cases:

L   Sale 89 low base case.

M   Sale 89 medium base case and all other cases except the
        Sale 89 low base case and the Sale 89 high base case.

H   Sale 89 high base case.

WORKSHEET 1. POPULATION ASSUMPTIONS FOR BASE YEAR

Total Population (PO)   <u>228</u>

Age Group	Non-Native Male	Non-Native Female	Native Male	Native Female
0-4	7	10	0	1
5-14	9	9	0	1
15-19	10	6	1	0
20-34	61	29	3	1
35-64	53	23	2	1
65+	1	0	0	0

Note: Variable names for each column are
PONNM1, . . ., PONNM6; PONNF1, . . .,PONNF6;
PONAM1, . . .,PONAM6; PONAF1, . . ., PONAF6.

SOURCE: U.S. Bureau of the Census, 1980 Census. Special census
tape printouts on file at Institute of Social and
Economic Research.

WORKSHEET 2.   SURVIVAL RATES AND FERTILITY RATES ASSUMPTIONS

Survival Rates (Share of population which does not die each year)

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	.99654	.99757	.99171	.99413
5-14	.99964	1.0000	.99894	.99952
15-19	.99848	1.0000	.99260	.99634
20-34	.99742	.99926	.99164	.99674
35-64	.99310	.99671	.98817	.99403
65+	.94008	.96612	.93506	.97311

Note: Variable names for each column are SVRANNM1, . . ., SVRANNM6; SVRANNF1, . . .,   SVRANNF6;   SVRANAM1, . . .,SVRANAM6; SVRANAF1, . . .,SVRANAF6.

SOURCE: Calculated from 1980 census figures for total population and mortality for non-Anchorage Alaska residents.

Fertility Rates (Share of women giving birth each year)

Age Group	Non-Native		Native	
	Variable		Variable	
	Name	Value	Name	Value
15-19	FRNNO3	.04033	FRNAO3	.13668
20-34	FRNNO4	.11641	FRNAO4	.18235
35-64	FRNNO5	.02084	FRNAO5	.03727

SOURCE: These rates are based on data for non-Anchorage Alaska. The number of births are from the Alaska Department of Health and Social Services, Office of Information Systems and the Alaska Native Medical Center, Anchorage. Non-Anchorage figures were derived by subtracting Anchorage from statewide data.

Community   Cold Bay

WORKSHEET 3: OTHER POPULATION MODEL ASSUMPTIONS

Shift Factors (Share of population which does not advance
to the next age group each year)

Age Group	Variable Name	Shift Factor
0-4	SFPA01	.80
5-14	SFPA02	.90
15-19	SFPA03	.80
20-34	SFPA04	.9333
35-64	SFPA05	.9667
65+	SFPA06	1.0000

NOTE: Calculated using the formula $1 - \dfrac{1}{(\text{number of age-years in group})}$

Infant Survival and Sex Distribution Assumptions

Variable	Variable Name	Value
Infant survival rates		
Native		
Males	IFSVNAMA	1.0
Females	IFSVNAFE	1.0
Non-Native		
Males	IFSVNNMA	1.0
Females	IFSVNNFE	1.0

Sex distribution of infants

	Variable Name	Value
Native	SXDVNA	.5
Non-Native	SXDVNN	.5

WORKSHEET 4. POPULATION, EMPLOYMENT, WAGES, INCOME
AND STATE PER CAPITA SPENDING IN BASE YEAR

Variable	Variable Name	Value
Total Population	PO	228
Total Basic Employment	EMBA	6
Resident fishing employment	EMFI	0
Resident fish processing employment	EMFP	6
Nonfishing related basic employment	EMBANF	0
Total Support Employment	EMSU	85
Exogenous support employment	EMSUEX	71
Endogenous support employment	EMSUEG	14
Government-sponsored support employment	EMSUGO	0
Enclave-sponsored support employment	EMSUEN	0
Total Government Employment	EMGO	63
Exogenous government employment	EMGOEX	54
Endogenous government employment	EMGOEG	9
Total Resident Employment		154
Nonproject enclave employment	EMENNOPJ	0
Military enclave employment	EMML	0
Basic sector annual wage rate	WABA	17.6
Support sector annual wage rate	WASU	21.4
Government sector annual wage rate	WAGO	17.3
Income		
Total wage income	INWA	3,015
Nonwage income per capita	INNOWAPC	0
Total income	IN	3,015
State Per Capita Spending (Thousands of Dollars)		
Per capita operating expenditures	STPCOE	4.758
Per capita capital expenditures	STPCCE	2.293

SOURCES: Population worksheet 1.
          Employment and income: Appendix E
          State per capita spending: worksheet 4.

WORKSHEET 5: MULTIPLIER CALCULATIONS

Multiplier	Name	Formula	Value
Endogenous support employment multiplier	EMSUEGC1	$\dfrac{EMSUEG}{IN}$	.0046
Endogenous government employment multiplier	EMGOEGC1	$\dfrac{EMGOEG}{PO * STPCOE}$	.0083
Government-sponsored support employment multiplier	EMSUGOC1	$\dfrac{EMSUGO}{PO * STPCCE}$	0
Nonproject enclave- generated support employment multiplier	EMSUENC1	$\dfrac{EMSUEN}{EMENNOPJ}$	0
Project enclave- generated support employment multiplier	EMSUENC2	$\dfrac{EMSUEN}{EMEN}$	.05

WORKSHEET 6. STATE GOVERNMENT PER CAPITA
OPERATING AND CAPITAL EXPENDITURES

(Thousands of Real Dollars)

	State Government per capita operating Expenditures (STPCOE)	State Government per capita capital Expenditures (STPCCE)
1981	4.210	1.831
1982	4.758	2.293
1983	4.602	1.684
1984	5.138	2.014
1985	5.130	1.452
1986	5.121	2.710
1987	4.801	2.526
1988	5.294	2.820
1989	5.102	2.710
1990	5.075	2.710
1991	5.068	2.710
1992	4.365	2.298
1993	4.108	2.146
1994	3.944	2.050
1995	3.672	1.890
1996	3.422	1.742
1997	3.351	1.700
1998	3.258	1.645
1999	3.248	1.640
2000	3.194	1.609
2001	3.142	1.579
2002	3.084	1.548
2003	3.036	1.517
2004	2.992	1.492
2005	2.949	1.468
2006	2.904	1.442
2007	2.861	1.418
2008	2.819	1.395
2009	2.778	1.372
2010	2.736	1.349

SOURCE: These figures are based on recent ISER MAP model
projections for the statewide economy (DSET A83T2).

WORKSHEET 7. WAGE AND NONWAGE INCOME
ASSUMPTIONS FOR PROJECTION PERIOD
(Thousands of Real Dollars)

	Per Capita Nonwage Income (INNOWAPC)	Basic Sector Wage Rate (WABA)	Support Sector Wage Rate (WASU)	Government Sector Wage Rate (WAGO)	Project Sector Wage Rate (WAPJ)
1982	0	17.6	21.4	17.3	30
1983	0	17.6	21.4	17.3	30
1984	0	17.6	21.4	17.3	30
1985	0	17.6	21.4	17.3	30
1986	0	17.6	21.4	17.3	30
1987	0	17.6	21.4	17.3	30
1988	0	17.6	21.4	17.3	30
1989	0	17.6	21.4	17.3	30
1990	0	17.6	21.4	17.3	30
1991	0	17.6	21.4	17.3	30
1992	0	17.6	21.4	17.3	30
1993	0	17.6	21.4	17.3	30
1994	0	17.6	21.4	17.3	30
1995	0	17.6	21.4	17.3	30
1996	0	17.6	21.4	17.3	30
1997	0	17.6	21.4	17.3	30
1998	0	17.6	21.4	17.3	30
1999	0	17.6	21.4	17.3	30
2000	0	17.6	21.4	17.3	30
2001	0	17.6	21.4	17.3	30
2002	0	17.6	21.4	17.3	30
2003	0	17.6	21.4	17.3	30
2004	0	17.6	21.4	17.3	30
2005	0	17.6	21.4	17.3	30
2006	0	17.6	21.4	17.3	30
2007	0	17.6	21.4	17.3	30
2008	0	17.6	21.4	17.3	30
2009	0	17.6	21.4	17.3	30
2010	0	17.6	21.4	17.3	30

NOTE: We arbitrarily assume an annual wage of $30,000 for project
(OCS-related) employees.

WORKSHEET 8.   BASIC SECTOR EXOGENOUS EMPLOYMENT ASSUMPTIONS
(Full-time Equivalent Employment)

Year	Resident Fishing Employment (EMFI)	Resident Fish-processing Employment (EMFP)		Non-Fishing Related Basic Employment (EMBANF)	Nonproject Enclave Employment (EMEN)
		L/M	H		
1982	0	6	6	0	0
1983	0	6	8	0	0
1984	0	6	10	0	0
1985	0	6	12	0	0
1986	0	6	14	0	0
1987	0	6	16	0	0
1988	0	6	18	0	0
1989	0	6	20	0	0
1990	0	6	22	0	0
1991	0	6	24	0	0
1992	0	6	26	0	0
1993	0	6	28	0	0
1994	0	6	30	0	0
1995	0	6	32	0	0
1996	0	6	34	0	0
1997	0	6	36	0	0
1998	0	6	38	0	0
1999	0	6	40	0	0
2000	0	6	42	0	0
2001	0	6	44	0	0
2002	0	6	46	0	0
2003	0	6	48	0	0
2004	0	6	50	0	0
2005	0	6	52	0	0
2006	0	6	54	0	0
2007	0	6	56	0	0
2008	0	6	58	0	0
2009	0	6	60	0	0
2010	0	6	62	0	0

Community <u>Cold Bay</u>

WORKSHEET 9. SUPPORT AND GOVERNMENT SECTOR EXOGENOUS
EMPLOYMENT ASSUMPTIONS

Year	Exogenous Support Employment (EMSUEX)			Exogenous Government Employment (EMGOEX)		
	L	M	H	L	M	H
1982	71	71	71	54	54	54
1983	62	62	71	46	46	54
1984	60	60	71	43	43	54
1985	58	58	71	39	39	54
1986	56	56	71	38	38	54
1987	54	54	71	37	37	54
1988	52	52	71	36	36	54
1989	51	51	71	35	35	54
1990	50	50	71	34	35	54
1991	49	50	71	33	35	54
1992	48	50	71	32	35	54
1993	47	50	71	31	35	54
1994	46	50	71	31	35	54
1995	45	50	71	31	35	54
1996	44	50	71	31	35	54
1997	43	50	71	31	35	54
1998	42	50	71	31	35	54
1999	41	50	71	31	35	54
2000	40	50	71	31	35	54
2001	40	50	71	31	35	54
2002	40	50	71	31	35	54
2003	40	50	71	31	35	54
2004	40	50	71	31	35	54
2005	40	50	71	31	35	54
2006	40	50	71	31	35	54
2007	40	50	71	31	35	54
2008	40	50	71	31	35	54
2009	40	50	71	31	35	54
2010	40	50	71	31	35	54

WORKSHEET 8. LABOR FORCE PARTICIPATION RATE ASSUMPTIONS

	Age Group	Non-Native Male	Non-Native Female	Native Male	Native Female
Labor Force Participation Rates (Note: Variable names are LFPRNNM3, . . ., 6; LFPRNNF3, . . ., 6; LFPRNAM3, . . ., 6; LFPRNAF3, . . ., 6)	15-19	0	0	0	0
	20-34	1	.63	1	.63
	35-64	1	.63	1	.63
	65+	1	.63	1	.63
Population in Base Year (from Worksheet 1)	15-19	10	6	1	0
	20-34	61	29	3	1
	35-64	53	23	2	1
	65+	1	0	0	0
Check: Employment in Base Year	15-19	0	0	0	0
	20-34	61	18.3	3	.6
	35-64	53	14.5	2	.6
	65+	1	0	0	0
TOTAL		114	32.8	5	1.2

Total Resident Employment =   154
Total Resident Employment (from Worksheet 4) =   154

WORKSHEET 9.   ENDOGENOUS OUT-MIGRATION
PARAMETERS ASSUMPTIONS

Variable	Variable Name	Value
Threshold maximum increase in unemployment before out-migration begins	HIUNRA	0
Threshold maximum decrease in unemployment before in-migration begins	LWUNRA	0
Share of unemployed native workers who leave once unemployment rises above threshold level	OULAPANA	1
Share of unemployed non-native workers who leave once unemployment rises above threshold level	OULAPANN	1
Adjustment parameter for ratio of native dependents who out-migrate to native workers who out-migrate (a value of one indicates that this ratio is the same as the ratio of native dependents to native workers in the population)	OUDEPANA	1
Adjustment parameter for ratio of non-native dependents who out-migrate to non-native workers who out-migrate	OUDEPANN	1

WORKSHEET 10. ENDOGENOUS IMMIGRATION PARAMETERS ASSUMPTIONS:
NUMBER OF PERSONS WHO IMMIGRATE IN EACH COHORT
FOR EACH WORKER WHO IMMIGRATES

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	.045	.065	0	.006
5-14	.058	.058	0	.006
15-19	.065	.039	.006	0
20-34	.396	.188	.019	.006
35-64	.344	.149	.013	.006
65+	.006	0	0	0

Note: Variables are MGPANNM1, . . ., MGPANNM6; MGPANNF1, . . .,
MGPANNF6; MGPANAM1, . . ., MGPANAM6; MGPANAFI, . . .,
MGPANNF6; values are calculated as ratio of population in
each cohort (see worksheet 1) to total employment (154).

WORKSHEET 11. EXOGENOUS MIGRATION PARAMETER ASSUMPTIONS:
SHARE OF EACH COHORT WHICH MIGRATES IN OR OUT EACH
YEAR IN RESPONSE TO NON-ECONOMIC (EXOGENOUS) FACTORS

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	-.9	-.9	-.9	-.9
5-14	-.9	-.9	-.9	-.9
15-19	-.9	-.9	-.9	-.9
20-34	-.9	-.9	-.9	-.9
35-64	-.9	-.9	-.9	-.9
65+	-.9	-.9	-.9	-.9

Note: Variables are MXRANNM1, . . ., MXRANNM6; MXRANNF1, . . .,
MXRANNF6; MXRANAM1, . . ., MXRANAM6; MXRANAF1, . . .,
MXRANAF6.

WORKSHEET 12. MISCELLANEOUS EXOGENOUS ASSUMPTIONS

	Enclave Military Employment (EMML)	Enclave Military Dependents (DEML)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	0	0
2007	0	0
2008	0	0
2009	0	0
2010	0	0

NOTE: Due to the enclave character of the entire Cold Bay
community, we did not treat the military as a
separate enclave.

WORKSHEET 13. PROJECT EMPLOYMENT PARAMETERS

Residency and Commuter Parameters

	Share of Project Jobs Reserved for Nonresidents by Industry	Share of Nonresident Workers Brought in to Fill Excess Demand Who Become Residents	Share of Nonresident Workers Who Only Commute Thru Community (ie Do Not Live in Enclaves; Mostly Offshore Workers)
Onshore Short-term Skilled	SNPSONSK 1	SRPSONSK 0	CPPSONSK 0
Onshore Short-term Unskilled	SNPSONNS 1	SRPSONNS 0	CPPSONNS 0
Onshore Long-term Skilled	SNPLONSK 0	SRPLONSK 1	CPPLONSK 0
Onshore Long-term Unskilled	SNPLONNS 0	SRPLONNS 1	CPPLONNS 0
Offshore Short-term Skilled	SNPSOFSK 1	SRPSOFSK 0	CPPSOFSK 1
Offshore Short-term Unskilled	SNPSOFNS 1	SRPSOFNS 0	CPPSOFNS 1
Offshore Long-term Skilled	SNPLOFSK 1	SRPLOFSK 0	CPPLOFSK 1
Offshore Long-term Unskilled	SNPLOFNS 1	SRPLOFNS 0	CPPLOFNS 1

Skill and Training Parameters

Variable	Variable Name	Value
Number of skilled workers in year prior to first projection year	LSSK	0
Maximum share of nonskilled workers who are trained for project jobs in any given year	TNPANS	0
Maximum share of excess demand for skilled labor which is filled by training local labor in any given year	TNPAED	0

WORKSHEET 16.   PROJECT EMPLOYMENT ASSUMPTIONS

O N S H O R E

	Short-term		Long-term	
Year	Skilled EMPSONSK	Unskilled EMPSONNS	Skilled EMPLONSK	Unskilled EMPLONNS
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

NOTE: See Appendix N for OCS employment assumptions.

WORKSHEET 16.   PROJECT EMPLOYMENT ASSUMPTIONS
(Continued)

O F F S H O R E

| | Short-term | | Long-term | |
| Year | Skilled | Unskilled | Skilled | Unskilled |
	EMPSOFSK	EMPSOFNS	EMPLOFSK	EMPLOFNS
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

SOURCE: For OCS impact projections, assumptions are provided by
Alaska OCS office.   NOTE: The term "skilled" refers to
jobs requiring previous special oil-industry-related
training or experience.

APPENDIX M:

SAND POINT RAM MODEL ASSUMPTIONS

The following worksheets provide most of the assumptions which we used to run the RAM model for Sand Point. The worksheets do not correspond exactly to those in Appendixes K and L. Those assumptions not included in this appendix may be found in Appendix J (i.e., assumptions for birth rates, survival rates, etc.).

WORKSHEET 1. RESIDENT POPULATION ASSUMPTIONS
FOR YEAR PRIOR TO FIRST PROJECTION YEAR

Total Population (PO)   <u> 625 </u>

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	10	13	15	19
5-14	16	12	39	33
15-19	17	14	20	28
20-34	74	55	60	38
35-64	33	23	50	42
65+	1	0	5	8

Note: Variable names for each column are
PONNM1, . . ., PONNM6; PONNF1, . . .,PONNF6;
PONAM1, . . .,PONAM6; PONAF1, . . ., PONAF6.

SOURCE: U.S. Bureau of the Census.

WORKSHEET 6. EMPLOYMENT IN YEAR PRIOR
TO FIRST PROJECTION YEAR

(Full-time Equivalent Employment)

Variable	Variable Name	Value
Resident fishing employment	EMFI	107
Resident fish processing employment	EMFP	47
Other basic employment	EMBANF	11
Exogenous support employment	EMSUEX	11
Endogenous support employment	EMSUEG	35
Government-sponsored support employment	EMSUGO	21
Enclave-sponsored support employment	EMSUEN	1
Exogenous government employment	EMGOEX	2
Endogenous government employment	EMGOEG	14
Nonproject enclave employment	EMEN	54

NOTE: These figures are not used directly as model assumptions. Instead, they are used as the basis for calculation of model assumptions in subsequent worksheets.

SOURCES: U.S. Bureau of the Census, Alaska Department of Labor and city of Sand Point. See discussion in footnotes to Table F-4.

WORKSHEET 7. WAGE RATES AND INCOME IN YEAR PRIOR TO FIRST PROJECTION YEAR

(Thousands of Real Dollars)

Variable	Variable Name	Value
Basic sector annual wage rate	WABA	17.6
Support sector annual wage rate	WASU	21.4
Government sector annual wage rate	WAGO	17.3
Total wage income	INWA	4,642
Nonwage income per capita	INNOWAPC	1.0
Total income	IN	4,643

NOTE: These figures are not used directly as model assumptions. Instead, they are used as the basis for calculation of model assumptions in subsequent worksheets.

SOURCES: Wage rates are calculated on the basis of available data from the Department of Labor, which is usually available only at the census division level. Total wage income is calculated by multiplying employment in each category (see Worksheet 6) by the assumed wage rates. Nonwage income is calculated as a proportion of total nonwage income for the census district. Per capita nonwage income is obtained by dividing nonwage income by population.

Community ___Sand Point___

WORKSHEET 9.   EMPLOYMENT MULTIPLIER ASSUMPTIONS

Employment multipliers are calculated from the data from the year prior to the first projection year, using data from Worksheets 6, 7, and 8.

Multiplier	Variable Name	Formula	Value
Endogenous support employment multiplier	EMSUEGC1	$\dfrac{EMSUEG}{IN}$	.0075
Endogenous government employment multiplier	EMGOEGC1	$\dfrac{EMGOEG}{PO * STPCOE}$	.0053
Government-sponsored support employment multiplier	EMSUGOC1	$\dfrac{EMSUGO}{PO * STPCCE}$	.0184
Nonproject enclave-generated support employment multiplier	EMSUENC1	$\dfrac{EMSUEN}{EMEN}$	.05[a]
Project enclave-generated support employment multiplier	EMSUENC2		.05[a]

----

[a]Assumed arbitrarily for Sand Point, this multiplier is comparable to the nonresident petroleum-related multiplier used in previous SCIMP model projections (.0549).   See discussion in Goldsmith, et al. (1982, Appendix C, p. C-15).

WORKSHEET 10. WAGE AND NONWAGE INCOME
ASSUMPTIONS FOR PROJECTION PERIOD
(Real Dollars)

	Per Capita Nonwage Income (INNOWAPC)	Basic Sector Wage Rate (WABA)	Support Sector Wage Rate (WASU)	Government Sector Wage Rate (WAGO)	Project Sector Wage Rate (WAPJ)
1980	1.0	17.628	21.432	17.280	0
1981	1.0	17.914	21.586	17.496	0
1982	1.0	18.206	21.742	17.714	0
1983	1.0	18.501	21.898	17.935	0
1984	1.0	18.802	22.056	18.159	0
1985	1.0	19.108	22.215	18.386	0
1986	1.0	19.418	22.375	18.615	0
1987	1.0	19.734	22.536	18.847	0
1988	1.0	20.054	22.698	19.083	0
1989	1.0	20.380	22.861	19.321	0
1990	1.0	20.711	23.026	19.562	0
1991	1.0	21.048	23.192	19.806	0
1992	1.0	21.390	23.359	20.053	0
1993	1.0	21.738	23.527	20.303	0
1994	1.0	22.091	23.696	20.557	0
1995	1.0	22.450	23.867	20.813	0
1996	1.0	22.815	24.039	21.073	0
1997	1.0	23.185	24.212	21.336	0
1998	1.0	23.562	24.386	21.602	0
1999	1.0	23.945	24.562	21.872	0
2000	1.0	24.334	24.739	22.145	0
2001	1.0	24.729	24.917	22.421	0
2002	1.0	25.131	25.096	22.701	0
2003	1.0	25.540	25.277	22.984	0
2004	1.0	25.955	25.459	23.271	0
2005	1.0	26.376	25.642	23.562	0
2006	1.0	26.805	25.827	23.856	0
2007	1.0	27.241	26.013	24.153	0
2008	1.0	27.683	26.200	24.455	0
2009	1.0	28.133	26.389	24.760	0
2010	1.0	28.590	26.579	25.069	0

SOURCES: Wage rate assumptions are assumed, starting from 1980 wage rates (see Worksheet 7), and changing to reflect any assumed changes in the structure of employment within sectors, or in statewide Alaskan wage levels. Per capita nonwage income is assumed in a similar manner. Basic, Support, and Government sector real wages assumed to increase at 1.625 percent, .72 percent, and 1.248 percent per year, respectively, based on ISER MAP Model projections done in February 1983 (DSET A83T2). Nonwage income was assumed to remain constant in real per capita terms.

WORKSHEET 11.   BASIC SECTOR EXOGENOUS EMPLOYMENT ASSUMPTIONS
(Full-time Equivalent Employment)

Year	Resident Fishing Employment (EMFI)	Resident Fish-processing Employment (EMFP)	Other Resident Basic Employment (EMBANF)	Nonproject Enclave Employment (EMENNOPJ)
1980	107	47	11	54
1981	107	48	11	55
1982	107	48	11	55
1983	107	49	11	56
1984	107	50	11	56
1985	107	51	11	57
1986	107	51	11	57
1987	107	52	11	58
1988	107	53	11	58
1989	107	54	11	59
1990	107	55	11	60
1991	107	55	11	60
1992	107	56	11	61
1993	107	57	11	61
1994	107	58	11	62
1995	107	59	11	63
1996	107	60	11	63
1997	107	61	11	64
1998	107	61	11	65
1999	107	62	11	65
2000	107	63	11	66
2001	107	64	11	67
2002	107	65	11	67
2003	107	66	11	68
2004	107	67	11	69
2005	107	68	11	69
2006	107	69	11	70
2007	107	70	11	71
2008	107	71	11	71
2009	107	72	11	72
2010	107	73	11	73

SOURCES: Exogenous employment in basic industries must be projected
on the basis of assumptions about factors such as resource
availability, resource prices, development of special
projects, state subsidies, transportation development, and
so forth.   We assumed resident fishing employment and
other resident basic employment remain constant.   Resident
fish processing employment was assumed to grow 1.5% per
annum; nonproject enclave employment was assumed to grow
at 1.0% per annum.

WORKSHEET 12.   SUPPORT AND GOVERNMENT SECTOR EXOGENOUS
EMPLOYMENT ASSUMPTIONS

Year	Exogenous Support Employment (EMSUEX)	Exogenous Government Employment (EMGOEX)
1980	11	2
1981	11	2
1982	11	2
1983	11	2
1984	11	2
1985	11	2
1986	11	2
1987	11	2
1988	11	2
1989	11	2
1990	11	2
1991	11	2
1992	11	2
1993	11	2
1994	11	2
1995	11	2
1996	11	2
1997	11	2
1998	11	2
1999	11	2
2000	11	2
2001	11	2
2002	11	2
2003	11	2
2004	11	2
2005	11	2
2006	11	2
2007	11	2
2008	11	2
2009	11	2
2010	11	2

SOURCES: We assumed exogenous support and government employment
will remain constant. These assumptions are based on an
analysis of support and government employment likely to
take place in activities which are not geared towards
serving the local community, such as export terminals,
or National Park Service operations.

WORKSHEET 13. LABOR FORCE PARTICIPATION RATE ASSUMPTIONS

Age Group	Non-Native		Native	
	Male	Female	Male	Female
15-19	0	0	0	0
20-34	.96	.88	.55	.21
35-64	.96	.88	.55	.21
65+	0	0	0	0

Note: Variable names are LFPRNNM3, . . ., 6; LFPRNNF3, . . ., 6; LFPRNAM3, . . ., 6; LFPRNAF3, . . ., 6.

SOURCE: Labor force participation rates were assumed to be zero for age groups 15-19 and 65+. This greatly simplified the calculation of these rates. See Table F-8 and discussion in text for calculations.

WORKSHEET 14. ENDOGENOUS OUT-MIGRATION
PARAMETERS ASSUMPTIONS

Variable	Variable Name	Value
Threshold maximum level of unemployment before out-migration begins	HIUNRA	.05
Threshold minimum level of unemployment before in-migration begins	LWUNRA	-.05
Share of Native workers who leave once unemployment rises above threshold level	OULAPANA	.1
Share of non-Native workers who leave once unemployment rises above threshold level	OULAPANN	.7
Adjustment parameter for ratio of Native dependents who out-migrate to Native workers who out-migrate (a value of one indicates that this ratio is the same as the ratio of Native dependents to Native workers in the population)	OUDEPANA	1
Adjustment parameter for ratio of non-Native dependents who out-migrate to non-Native workers who out-migrate	OUDEPANN	1

_____

SOURCE: Assumed values based on our best judgment.

WORKSHEET 15. ENDOGENOUS IMMIGRATION PARAMETERS ASSUMPTIONS:
NUMBER OF PERSONS WHO IMMIGRATE IN EACH COHORT
FOR EACH WORKER WHO IMMIGRATES

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	.05	.05	0	0
5-14	.05	.05	0	0
15-19	.05	.05	0	0
20-34	.41	.29	0	0
35-64	.29	.21	0	0
65+	0	0	0	0

NOTE: Variables are MGPANNM1, . . ., MGPANNM6; MGPANNF1, . . .,
MGPANNF6; MGPANAM1, . . ., MGPANAM6; MGPANAFI, . . .,
MGPANNF6.

_____

SOURCE: Values are assumed on the basis of assumptions about the
age-sex-race breakdown of workers, the number of
dependents per worker, and the age-sex-race breakdown of
dependents. Specific assumptions are:

1. All immigrants are non-Natives.

2. Sixty percent of immigrant workers are male.

3. Each immigrant worker brings .5 dependents.

4. Dependents are evenly distributed among males and females in
the first three age groups.

WORKSHEET 16. EXOGENOUS MIGRATION PARAMETER ASSUMPTIONS:
SHARE OF EACH COHORT WHICH MIGRATES IN OR OUT EACH
YEAR IN RESPONSE TO NON-ECONOMIC (EXOGENOUS) FACTORS

Age Group	Non-Native		Native	
	Male	Female	Male	Female
0-4	0	0	0	0
5-14	0	0	0	0
15-19	0	0	0	0
20-34	0	0	0	0
35-64	0	0	0	0
65+	-.1	-.1	-.1	-.1

Note: Variables are MXRANNM1, . . ., MXRANNM6; MXRANNF1, . . .,
MXRANNF6; MXRANAM1, . . ., MXRANAM6; MXRANAFI, . . .,
MXRANAF6.

_____

SOURCE: Very little data is available on which to base these
asssumptions. They are based on our best judgment.

WORKSHEET 17.   MILITARY ENCLAVE ASSUMPTIONS

	Enclave Military Employment EMML	Enclave Military Dependents DEML
1980	0	0
1981	0	0
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	0	0
2007	0	0
2008	0	0
2009	0	0
2010	0	0

SOURCE: Military population is assumed to remain zero over the projection period.

WORKSHEET 18. PROJECT EMPLOYMENT ASSUMPTIONS

O N S H O R E

Year	Short-term		Long-term	
	Skilled EMPSONSK	Unskilled EMPSONNS	Skilled EMPLONSK	Unskilled EMPLONNS
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

NOTE: No OCS-related employment was assumed for Sand Point.

WORKSHEET 18.   PROJECT EMPLOYMENT ASSUMPTIONS
(Continued)

O F F S H O R E

| | Short-term | | Long-term | |
| Year | Skilled | Unskilled | Skilled | Unskilled |
	EMPSOFSK	EMPSOFNS	EMPLOFSK	EMPLOFNS
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				

SOURCE: For OCS impact projections, assumptions are provided by Alaska OCS office. NOTE: The term "skilled" refers to jobs requiring previous special oil-industry-related training or experience.

Community _____

WORKSHEET 19. PROJECT EMPLOYMENT PARAMETERS

	Share of Project Jobs Reserved for Non-residents by Industry	Share of Nonresident Workers Brought in to Fill excess Demand who Became Residents	Share of Nonresident Workers Who Only Commute Thru Community (ie Do Not Live in Enclaves; Mostly Offshore Workers)
Onshore Short-term Skilled	SNPSONSK	SRPSONSK	CPPSONSK
Onshore Short-term Unskilled	SNPSONNS	SRPSONNS	CPPSONNS
Onshore Long-term Skilled	SNPLONSK	SRPLONSK	CPPLONSK
Onshore Long-term Unskilled	SNPLONNS	SRPLONNS	CPPLONNS
Offshore Short-term Skilled	SNPSOFSK	SRPSOFSK	CPPSOFSK
Offshore Short-term Unskilled	SNPSOFNS	SRPSOFNS	CPPSOFNS
Offshore Long-term Skilled	SNPLOFSK	SRPLOFSK	CPPLOFSK
Offshore Long-term Unskilled	SNPLOFNS	SRPLOFNS	CPPLOFNS

SOURCE: Assumed.

WORKSHEET 20. SKILLED WORKERS AND TRAINING PARAMETERS

Variable	Variable Name	Value
Number of skilled workers in year prior to first projection year	LSSK	_____
Maximum share of nonskilled workers who are trained for project jobs in any given year	TNPANS	_____
Maximum share of excess demand for skilled labor which is filled by training local labor in any given year	TNPAED	_____

APPENDIX N: OCS EMPLOYMENT ASSUMPTIONS

Our RAM model OCS impact projections are based on annual OCS
employment figures provided to us by the Minerals Management Service
Alaska OCS office. This employment is broken down into eight
categories:

Employment Category	RAM Model Variable Name
Onshore short-term skilled employment	EMPSONSK
Onshore short-term nonskilled employment	EMPSONNS
Onshore long-term skilled employment	EMPLONSK
Onshore long-term nonskilled employment	EMPLONNS
Offshore short-term skilled employment	EMPSOFSK
Offshore short-term nonskilled employment	EMPSOFNS
Offshore long-term skilled employment	EMPLOFSK
Offshore long-term nonskilled employment	EMPLOFNS

Onshore employment is employment located onshore in the vicinity of
the community for which the projections are being prepared.
Offshore employment is employment which is located either offshore
or onshore at some distance away from the community for which the
projections are being prepared, but which passes through the
community (usually by helicopter or plane) enroute to or returning
from the worksite. Generally, offshore employment of nonresidents
would have only a minimal impact upon a community.

Short-term employment is work which lasts for only a few years at
most, generally associated with the exploration or construction
phase of an OCS project. Long-term employment is work which lasts

for a number of years, generally associated with the production phase of an OCS project.

Skilled employment is employment which requires previous experience in similar-type jobs or special training. Nonskilled employment is work which requires relatively little previous training or experience.

The Minerals Management Service Alaska OCS office calculates these employment assumptions based on a large number of assumptions about the kind of OCS development which will take place. The most important of these assumptions is the level of resources which will be discovered and developed. Next, assumptions are made about what activities will be associated with this development, such as the number of platforms which will be constructed, the number of oil wells drilled, the kinds of onshore bases which will be established, and the number of helicopters, planes, and ships which will be used in transporting personnel and supplies. Next, assumptions are made about the level of employment associated with each of these activities. Finally, assumptions are made about the breakdown of employment into onshore and offshore, short-term and long-term, and skilled and nonskilled categories. Obviously, many of these assumptions are subject to considerable uncertainty, and, therefore, the resulting employment assumptions and the impact projections which we base on them are also uncertain. Readers should keep these various sources of uncertainty in mind in interpreting our impact projections.

In the past, we have been questioned as to the basis for our breakdown of employment into skilled and nonskilled categories. This breakdown is, to a large extent, arbitrary since there are many jobs which require some skills but not extensive training, and it is not clear how they should be classified. However, some kind of breakdown of employment by skill requirement is essential in order to project how many jobs might be filled locally.

Our OCS employment assumptions are shown in Tables N-1--N-12, as follows:

Tables	Cases
N-1, N-2	Unalaska Sale 89 Base Case and Sale 89 Impact Case
N-3, N-4	Unalaska Sale 92 Base Case and Sale 92 Impact Case
N-5, N-6	Unalaska Sale 89 Base Case and Sales 89 and 92 Combined Impact Case
N-7, N-8	Cold Bay Sale 89 Base Case and Sale 89 Impact Case
N-9, N-10	Cold Bay Sale 92 Base Case and Sale 92 Impact Case
N-11, N-12	Cold Bay Sale 89 Base Case and Sales 89 and 92 Combined Impact Case

In past studies, our base cases have usually not included any OCS employment. However, for this study, the Alaska OCS office has instructed us to assume that oil resources in the Navarin Basin will be developed irrespective of whether development occurs in the Sale 89 or Sale 92 lease areas. In addition, we are to assume a small amount of exploration-related employment for Sale 70 in the St. George Basin. We have included this OCS employment, as provided to us by the Alaska OCS office, in our base case employment assumptions. In addition, for the Sale 92 base case, we have

included a small amount of exploration-related employment for Sale 89. (Thus, the Sale 92 base case assumes exploration of the Sale 89 lease area, but no development).

The Alaska OCS office also provided us with OCS employment assumptions associated with development of the Sale 89 and Sale 92 lease areas. In order to calculate our total OCS employment assumptions for our impact cases, we added this employment to the OCS employment included in the base cases. For the Sale 89 impact case, we added the Sale 89 specific employment to the Sale 89 base case employment. For the Sale 92 impact case, we added the Sale 92 specific employment to the Sale 92 base case employment. Finally, for the Sale 89 and Sale 92 combined impact case, we added the specific employment associated with each of the sales to the Sale 89 base case employment.

| | SHORT-TERM | | | | | | LONG-TERM | | | | | |
| | SKILLED | | | UNSKILLED | | | SKILLED | | | UNSKILLED | | |
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	33		33	107		107						
1985	55		55	7		7						
1986	47	1	48	7	22	29						
1987	35	1	36	157	6	163						
1988	12	3	15	32	8	40						
1989	3	2	5		7	7						
1990	6	9	15		18	18						
1991	10	6	16		14	14						
1992	10	22	32		34	34						
1993	8	20	28		64	64						
1994	6	7	13		10	10		1	1		15	15
1995	33	7	40	55	9	64		1	1		15	15
1996	66		66	110		110	18	2	20		16	16
1997	83		83	198		198	54	2	56		16	16
1998	39		39	145		145	99	2	101		16	16
1999	6		6	70		70	117	2	119	100	16	116
2000							117	2	119	100	16	116
2001							117	2	119	100	16	116
2002							117	2	119	100	16	116
2003							117	2	119	100	16	116
2004							117	2	119	100	16	116
2005							117	2	119	100	16	116
2006							117	2	119	100	16	116
2007							117	2	119	100	16	116
2008							117	2	119	100	16	116
2009							117	2	119	100	16	116
2010							117	2	119	100	16	116

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.2.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 89 BASE CASE AND OCS SALE 89 IMPACT CASE
OFFSHORE EMPLOYMENT
UNALASKA

	SHORT-TERM						LONG-TERM					
	SKILLED			UNSKILLED			SKILLED			UNSKILLED		
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	96		96									
1985	156		156									
1986	132	6	138									
1987	96	6	112									
1988	48	18	66									
1989	24	12	36									
1990	60	62	122									
1991	108	43	151									
1992	108	126	234									
1993	84	110	194									
1994	60	43	103									
1995	253	40	293					12	12			
1996	506		506				72	12	86			
1997	632		632				216	24	240			
1998	286		286				396	24	420			
1999	33		33				468	24	492			
2000							468	24	492			
2001							468	24	492			
2002							468	24	492			
2003							468	24	492			
2004							468	24	492			
2005							468	24	492			
2006							468	24	492			
2007							468	24	492			
2008							468	24	492			
2009							468	24	492			
2010							468	24	492			

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.3.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 92 BASE CASE AND OCS SALE 92 IMPACT CASE
ONSHORE EMPLOYMENT
UNALASKA

	SHORT – TERM						LONG – TERM					
	SKILLED			UNSKILLED			SKILLED			UNSKILLED		
	Base Case	Sale 92	Total	Base Case	Sale 92	Total	Base Case	Sale 92	Total	Base Case	Sale 92	Total
1980												
1981												
1982												
1983												
1984	33		33	107		107						
1985	55		55	7		7						
1986	53	3	56	57	51	108						
1987	41	3	44	157	7	164						
1988	18	7	25	32	7	39						
1989	9	5	14		7	7						
1990	12	28	40		23	23						
1991	10	20	30		18	18						
1992	10	45	55		29	29		5	5		25	25
1993	8	33	41		75	75		5	5		25	25
1994	6	11	17					12	12		25	25
1995	33	5	38	55		55		12	12		25	25
1996	66		66	110		110	18	13	31		25	25
1997	83		83	198		198	54	13	67		25	25
1998	39		39	145		145	99	13	112		25	25
1999	6		6	70		70	117	13	130	100	25	125
2000							117	13	130	100	25	125
2001							117	13	130	100	25	125
2002							117	13	130	100	25	125
2003							117	13	130	100	25	125
2004							117	13	130	100	25	125
2005							117	13	130	100	25	125
2006							117	13	130	100	25	125
2007							117	13	130	100	25	125
2008							117	13	130	100	25	125
2009							117	13	130	100	25	125
2010							117	13	130	100	25	125

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.4.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 92 BASE CASE AND OCS SALE 92 IMPACT CASE
OFFSHORE EMPLOYMENT
UNALASKA

	S H O R T − T E R M						L O N G − T E R M					
	SKILLED			UNSKILLED			SKILLED			UNSKILLED		
	Base Case	Sale 92	Total	Base Case	Sale 92	Total	Base Case	Sale 92	Total	Base Case	Sale 92	Total
1980												
1981												
1982												
1983												
1984	96		96									
1985	156		156									
1986	148	9	157									
1987	112	9	121									
1988	64	27	91									
1989	40	18	58									
1990	76	101	177									
1991	108	71	179									
1992	108	104	212					10	10			
1993	84	83	167					10	10			
1994	60		60					21	21			
1995	253		253					21	21			
1996	506		506				72	21	93			
1997	632		632				216	21	237			
1998	286		286				396	21	417			
1999	33		33				468	21	489			
2000							468	21	489			
2001							468	21	489			
2002							468	21	489			
2003							468	21	489			
2004							468	21	489			
2005							468	21	489			
2006							468	21	489			
2007							468	21	489			
2008							468	21	489			
2009							468	21	489			
2010							468	21	489			

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.5.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 89 BASE CASE AND OCS SALES 89 AND 92
COMBINED IMPACT CASE, ONSHORE EMPLOYMENT
UNALASKA

	SHORT - TERM								LONG - TERM							
	SKILLED				UNSKILLED				SKILLED				UNSKILLED			
	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total
1980																
1981																
1982																
1983																
1984	33			33	107			107								
1985	55			55	7			7								
1986	47	1	3	51	7	22	51	80								
1987	35	1	3	39	157	6	7	170								
1988	12	3	7	22	32	8	7	47								
1989	3	2	5	10		7	7	14								
1990	6	9	28	43		18	23	41								
1991	10	6	20	36		14	18	32								
1992	10	22	45	77		34	29	63			5	5			25	25
1993	8	20	33	61		64	75	139			5	5			25	25
1994	6	7	11	24		10		10		1	12	13		15	25	40
1995	33	7	5	45	55	9		64		1	12	13		15	25	40
1996	66			66	110			110	18	2	13	33		16	25	41
1997	83			83	198			198	54	2	13	69		16	25	41
1998	39			39	145			145	99	2	13	114		16	25	41
1999	6			6	70			70	117	2	13	132	100	16	25	141
2000									117	2	13	132	100	16	25	141
2001									117	2	13	132	100	16	25	141
2002									117	2	13	132	100	16	25	141
2003									117	2	13	132	100	16	25	141
2004									117	2	13	132	100	16	25	141
2005									117	2	13	132	100	16	25	141
2006									117	2	13	132	100	16	25	141
2007									117	2	13	132	100	16	25	141
2008									117	2	13	132	100	16	25	141
2009									117	2	13	132	100	16	25	141
2010									117	2	13	132	100	16	25	141

SOURCE: Minerals Management Service, Alaska OCS Office.

OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 89 BASE CASE AND OCS SALES 89 AND 92
COMBINED IMPACT CASE, OFFSHORE EMPLOYMENT
UNALASKA

	SHORT – TERM								LONG – TERM							
	SKILLED				UNSKILLED				SKILLED				UNSKILLED			
	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total
1980																
1981																
1982																
1983																
1984	96			96												
1985	156			156												
1986	132	6	9	147												
1987	96	6	9	111												
1988	48	18	27	93												
1989	24	12	18	54												
1990	60	62	101	223												
1991	108	43	71	222												
1992	108	126	104	338							10	10				
1993	84	110	83	277							10	10				
1994	60	43		103							21	21				
1995	253	40		293						12	21	33				
1996	506			506					72	12	21	105				
1997	632			632					216	29	21	261				
1998	286			286					396	24	21	441				
1999	33			33					468	24	21	513				
2000									468	24	21	513				
2001									468	24	21	513				
2002									468	24	21	513				
2003									468	24	21	513				
2004									468	24	21	513				
2005									468	24	21	513				
2006									468	24	21	513				
2007									468	24	21	513				
2008									468	24	21	513				
2009									468	24	21	513				
2010									468	24	21	513				

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.7.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 89 BASE CASE AND OCS SALE 89 IMPACT CASE
ONSHORE EMPLOYMENT
COLD BAY

| | SHORT-TERM | | | | | | LONG-TERM | | | | | |
| | SKILLED | | | UNSKILLED | | | SKILLED | | | UNSKILLED | | |
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	47		47	50		50						
1985	76		76									
1986	64	4	68	50	21	71						
1987	93	4	97	25	4	29						
1988	50	11	61		4	4						
1989	10	7	17		4	4						
1990	10	23	33		4	4						
1991	10	16	26		4	4						
1992	10	52	62		4	4						
1993	10	46	56		38	38						
1994	10	25	35					6	6		12	12
1995	10	23	33					6	6		12	12
1996	10		10				5	12	17		12	12
1997	10		10	30		30	15	12	27		12	12
1998	10		10	40		40	27	12	44		12	12
1999	10		10	30		30	32	12	44		12	12
2000				30		30	32	12	44		12	12
2001				30		30	32	12	44		12	12
2002				30		30	32	12	44		12	12
2003				30		30	32	12	44		12	12
2004				30		30	32	12	44		12	12
2005				30		30	32	12	44		12	12
2006				30		30	32	12	44		12	12
2007				30		30	32	12	44		12	12
2008				30		30	32	12	44		12	12
2009				30		30	32	12	44		12	12
2010				30		30	32	12	44		12	12

SOURCE: Minerals Management Service, Alaska OCS Office.

| | SHORT - TERM | | | | | | LONG - TERM | | | | | |
| | SKILLED | | | UNSKILLED | | | SKILLED | | | UNSKILLED | | |
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	418		418									
1985	684		684									
1986	582	32	614									
1987	430	32	462									
1988	110	78	188									
1989		55	55									
1990		260	260									
1991		185	185									
1992		487	487									
1993		525	525		400	400						
1994		135	135					134	134		9	9
1995		124	124					134	134		9	9
1996								215	215		18	18
1997	90		90	360		360		220	220		18	18
1998	180		180	720		720		220	220		18	18
1999	90		90	360		360	111	225	336		18	18
2000							116	230	346		18	18
2001							123	230	353		18	18
2002							126	235	361		18	18
2003							126	235	361		18	18
2004							126	235	361		18	18
2005							126	235	361		18	18
2006							126	235	361		18	18
2007							126	235	361		18	18
2008							126	235	361		18	18
2009							126	235	361		18	18
2010							126	235	361		18	18

SOURCE: Minerals Management Service, Alaska OCS Office.

OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 92 BASE CASE AND OCS SALE 92 IMPACT CASE
ONSHORE EMPLOYMENT
COLD BAY

| | SHORT-TERM | | | | | | LONG-TERM | | | | | |
| | SKILLED | | | UNSKILLED | | | SKILLED | | | UNSKILLED | | |
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	47		47	50		50						
1985	76		76									
1986	70	3	73	67	48	115						
1987	99	3	102	25	3	28						
1988	56	10	66		3	3						
1989	16	6	22		3	3						
1990	16	23	39		3	3						
1991	10	16	26		3	3						
1992	10	27	37		3	3						
1993	10	20	30		53	53		3	3			
1994	10	6	16					6	6		12	12
1995	10	3	13					6	6		12	12
1996	10		10				5	7	12		12	12
1997	10		10	30		30	15	7	22		12	12
1998	10		10	40		40	27	7	34		12	12
1999	10		10	30		30	32	7	39		12	12
2000							32	7	39		12	12
2001							32	7	39		12	12
2002							32	7	39		12	12
2003							32	7	39		12	12
2004							32	7	39		12	12
2005							32	7	39		12	12
2006							32	7	39		12	12
2007							32	7	39		12	12
2008							32	7	39		12	12
2009							32	7	39		12	12
2010							32	7	39		12	12

SOURCE: Minerals Management Service, Alaska OCS Office.

	S H O R T – T E R M						L O N G – T E R M					
	SKILLED			UNSKILLED			SKILLED			UNSKILLED		
	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total	Base Case	Sale 89	Total
1980												
1981												
1982												
1983												
1984	418		418									
1985	684		684									
1986	613	32	645									
1987	461	32	493									
1988	141	79	220									
1989	31	55	86									
1990	31	365	396									
1991		260	260									
1992		534	534									
1993		450	450		203	203						
1994		125	125					145	145		9	9
1995		52	52					145	145		9	9
1996								226	226		18	18
1997	90		90	360		360		231	231		18	18
1998	180		180	720		720		231	231		18	18
1999	90		90	360		360	111	235	346		18	18
2000							116	240	356		18	18
2001							123	240	363		18	18
2002							126	245	371		18	18
2003							126	245	371		18	18
2004							126	245	371		18	18
2005							126	245	371		18	18
2006							126	245	371		18	18
2007							126	245	371		18	18
2008							126	245	371		18	18
2009							126	245	371		18	18
2010							126	245	371		18	18

SOURCE: Minerals Management Service, Alaska OCS Office.

TABLE N.11.
OCS EMPLOYMENT ASSUMPTIONS,
OCS SALE 89 BASE CASE AND OCS SALES 89 AND 92
COMBINED IMPACT CASE, ONSHORE EMPLOYMENT
COLD BAY

	SHORT - TERM								LONG - TERM							
	SKILLED				UNSKILLED				SKILLED				UNSKILLED			
	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total
1980																
1981																
1982																
1983																
1984	47			47	50			50								
1985	76			76												
1986	64	4	3	71	50	21	48	119								
1987	93	4	3	100	25	4	3	32								
1988	50	11	10	71		4	3	7								
1989	10	7	6	23		4	3	7								
1990	10	23	23	56		4	3	7								
1991	10	16	16	42		4	3	7								
1992	10	52	27	89		4	3	7		3	3					
1993	10	46	20	76		38	53	91		3	3					
1994	10	25	6	41						6	6	12		12	12	24
1995	10	23	3	36						6	6	12		12	12	24
1996	10			10					5	12	7	24		12	12	24
1997	10			10	30			30	15	12	7	34		12	12	24
1998	10			10	40			40	27	12	7	46		12	12	24
1999	10			10	30			30	32	12	7	51		12	12	24
2000	10			10	30			30	32	12	7	51		12	12	24
2001	10			10	30			30	32	12	7	51		12	12	24
2002	10			10	30			30	32	12	7	51		12	12	24
2003	10			10	30			30	32	12	7	51		12	12	24
2004	10			10	30			30	32	12	7	51		12	12	24
2005	10			10	30			30	32	12	7	51		12	12	24
2006	10			10	30			30	32	12	7	51		12	12	24
2007	10			10	30			30	32	12	7	51		12	12	24
2008	10			10	30			30	32	12	7	51		12	12	24
2009	10			10	30			30	32	12	7	51		12	12	24
2010	10			10	30			30	32	12	7	51		12	12	24

SOURCE: Minerals Management Service, Alaska OCS Office.

	SHORT - TERM								LONG - TERM							
	SKILLED				UNSKILLED				SKILLED				UNSKILLED			
	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total	Base Case	Sale 89	Sale 92	Total
1980																
1981																
1982																
1983																
1984	418			418												
1985	684			684												
1986	582	32	32	646												
1987	430	32	32	494												
1988	110	78	79	267												
1989		55	55	110												
1990		260	365	625												
1991		185	260	445												
1992		487	534	1021												
1993		525	450	975	400	203		603								
1994		135	125	260						134	145	279		9	9	18
1995		124	52	176						134	145	279		9	9	18
1996										215	226	441		18	18	36
1997	90			90	360			360		220	231	451		18	18	36
1998	180			180	720			720		220	231	451		18	18	36
1999	90			90	360			360	111	225	235	460		18	18	36
2000									116	230	240	470		18	18	36
2001									123	230	240	470		18	18	36
2002									126	235	245	480		18	18	36
2003									126	235	245	480		18	18	36
2004									126	235	245	480		18	18	36
2005									126	235	245	480		18	18	36
2006									126	235	245	480		18	18	36
2007									126	235	245	480		18	18	36
2008									126	235	245	480		18	18	36
2009									126	235	245	480		18	18	36
2010									126	235	245	480		18	18	36