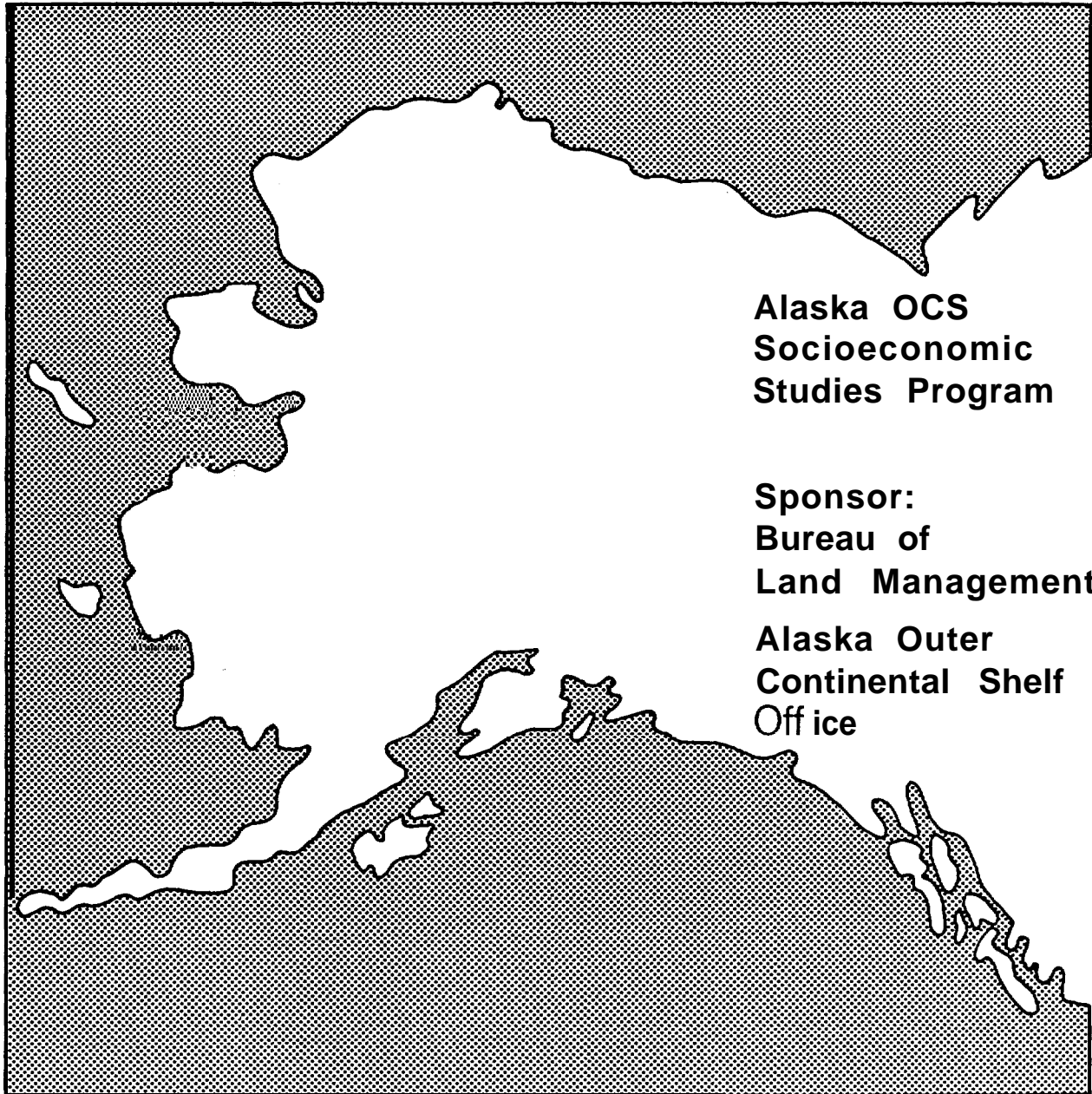


Technical Report
Number 11 "



**Alaska OCS
Socioeconomic
Studies Program**

**Sponsor:
Bureau of
Land Management
Alaska Outer
Continental Shelf
Office**

**Beaufort Sea Region
Socioeconomic Baseline**

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

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The analysis addresses the differing effects among various geographic units: the State of Alaska as a whole, the several regions within which oil and gas development is likely to take place, and within these regions, the various communities.

The overall research method is multidisciplinary in nature and is based on the preparation of three research components. In the first research component, the internal nature, structure, and essential processes of these various geographic units and interactions among them are documented. In the second research component, alternative sets of assumptions regarding the location, nature, and timing of future OCS petroleum development events and related activities are prepared. In the third research component, future oil and gas development events are translated into quantities and forces acting on the various geographic units. The predicted consequences of these events are evaluated in relation to present goals, values, and expectations.

In general, program products are sequentially arranged in accordance with BLM's proposed OCS lease sale schedule, so that information is timely to decision making. In addition to making reports available through the National Technical Information Service, the BLM is providing an information service through the Alaska OCS Office. Inquiries for information should be directed to: Program Coordinator (COAR), Socioeconomic Studies Program, Alaska OCS Office, P. O. Box 1159, Anchorage, Alaska 99510.

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

BEAUFORT SEA REGION
SOCIOECONOMIC BASELINE

PREPARED FOR

BUREAU OF LAND MANAGEMENT
ALASKA OUTER CONTINENTAL SHELF OFFICE

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ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM
BEAUFORT SEA REGION SOCIOECONOMIC BASELINE

Prepared by
PEAT, MARWICK, MITCHELL & CO.

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TABLE OF CONTENTS

I. INTRODUCTION	1
Purpose of the Socioeconomic Studies Program	1
PURPOSE OF THIS REPORT	1
The Concept of a Baseline	3
METHODOLOGICAL IMPLICATIONS	4
THE VALUE OF ANALYTIC INTERPRETATION	5
THE DEVELOPMENT OF BASELINES IN OTHER AREAS	6
Definition of the Beaufort Sea Region	7
AN OVERVIEW OF THE REGION	10
OIL AND RECENT SOCIOECONOMIC CHANGE	12
II. SOCIOCULTURAL SYSTEMS	15
Aboriginal Period	16
INUPIAT: ECOLOGICAL INTERRELATIONSHIPS	16
Tagiugmiut	20
Territorial Occupation Beaufort/Chukchi Sea	22
Settlement Patterns	25
Migration Cycles	27
Tribal and Family Social Organization	29
Economic Complexes	33
Nunamiut	40
Territorial Boundaries	42
Major Groups	43
Social Organization	45
Subsistence Patterns	45
Tagiugmiut/Nunamiut Interrelationship	47
The Historical Period: Major Economic Influences	50
EXPLORATION PERIOD	51
THE COMMERCIAL WHALING PERIOD AND DECLINE	53
THE FUR INDUSTRY	61
NAVAL PETROLEUM RESERVE #4 EXPLORATION	64
The Contemporary Period	66
POLITICAL DEVELOPMENT	66
Village Councils	67
Wainwright	69
Point Hope	75
Kaktovik	76
Anaktuvuk Pass	76
Barrow	78
Summary	80
Regional Development	81
Inupiat Pai tot	84
Arctic Slope Native Association	85
The Inupiat Community of the Arctic Slope	89
The Arctic Slope Regional Corporation	90
Land Status Following ANCSA	92
Edwardsen vs. Morton	96
The North Slope Borough	96
The Inuit Circumpolar Conference	1;;
SOCIOECONOMIC SUBSISTENCE PATTERNS	107

Subsistence Issues6	107
The Caribou Crisis	107
The Bowhead Whale Controversy	110
Petroleum Exploration and Development Activities	111
Subsistence Elements	116
Economic Aspects of Subsistence	116
The Socioeconomic Unit	118
Cultural Values of Subsistence	121
Settlement Patterns and Land Use	121
Ice Hunting	124
Interethnic Relations	131
AREAS OF CONFLICT	136
Economic Factors	136
Social Factors	137
Institutional Factors	139
Sociocultural Impact of New Technology and Rate of Change	140
Increase and Diversity of Social Contacts	143
Resident Inupiat	145
Resident Non-Inupiat	147
Transients	148
Indications of Negative Impact	150
Alcohol and Drugs	150
Family Discord and Violent Behavior	161
Suicide and Mental Illness	167
Indicators of Positive Change	168
II 1. REGIONAL POPULATION, ECONOMY, AND SERVICES	173
Population	173
PAST TRENDS	173
POPULATION COMPOSITION	179
GROWTH PROSPECTS	184
Economy	186
COMPOSITION OF EMPLOYMENT	186
UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT	191
RECENT TRENDS AND CHANGES	197
OCCUPATIONAL SKILLS	206
INCOME LEVELS	207
SECTOR ANALYSIS	221
Oil and Gas	221
GOVERNMENT	226
TOURISM	232
NATIONAL PETROLEUM RESERVE-ALASKA	238
ALASKA NATIVE CLAIMS SETTLEMENT ACT	240
Land Use	246
SETTLEMENT	246
Community Development	246
Anaktuvuk Pass	248
Atkasook	249
Point Hope	249
Point Lay	251

Oil and Gas Development Base Camps	251
Prudhoe Bay/Deadhorse	253
National Petroleum Reserve-Alaska Exploration Base Camps	254
Lonely	258
Umiat	259
ARCHAEOLOGIC AND HISTORIC SITES	259
Inventories of Archaeologic Sites	261
Implications	262
Legislation and Administrative Programs	262
Federal Antiquities Act	263
Historic Preservation Act	263
Executive Order 11593	263
Alaska Native Claims Settlement Act	263
National Petroleum Reserve Act	264
Alaska Historic Preservation Act	264
North Slope Borough Land Use Inventories	264
National Petroleum Reserve Studies	265
Proposed Projects	266
Other Considerations	267
SUBSISTENCE	268
Subsistence and Land Use	268
Conflicts	270
Land Status	272
ARCTIC NATIONAL WILDLIFE RANGE	273
STATE LANDS	274
NORTH SLOPE BOROUGH	274
NATIVE REGIONAL AND VILLAGE CORPORATIONS	275
REGIONAL CORPORATION CONVEYANCES	275
VILLAGE CORPORATION CONVEYANCES	276
NATIVE ALLOTMENTS	276
LAND STATUS ISSUES	278
National Interest Lands	278
Native Corporation Management	280
Easements Across Native Lands	280
Community Facilities and Services	283
BOROUGH POWERS AND PROGRAMS	283
INTERREGIONAL AND INTERCOMMUNIT% TIES	291
COMMUNITY POWERS AND PROGRAMS	297
Fire Protection	297
Recreation	302
LAW ENFORCEMENT	306
HEALTH AND SOCIAL SERVICES	309
Public Health Service	309
Alaska Department of Health and Social Services	316
North Slope Borough	316
Other	318
EDUCATION	318
UTILITIES	322
Water, Sewer, and Solid Waste Disposal	323
Electric Power and Heat	324
Utilities Service Plans	325

COMMUNICATIONS*	0	329
Telecommunications Satellite System		329
DEW Line Stations		330
Communications for Oil and Gas Exploration		331
TRANSPORTATION		332
Limitations of the Study		333
Air Transportation		335
Marine Transportation		339
NPR-A Oil Exploration		342
Port Development		343
Land Transportation		344
IV. CITY OF BARROW*		347
Population		347
PAST TRENDS*		347
POPULATION COMPOSITION		351
GROWTH PROSPECTS		352
Economy		356
COMPOSITION OF EMPLOYMENT		356
UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT		359
RECENT TRENDS AND CHANGES		360
OCCUPATIONAL SKILLS		362
INCOME LEVELS		365
Land Use		368
OVERALL PATTERNS*		368
HOUSING		372
Housing Conditions		374
Housing Programs0		376
Land Status		380
Community Facilities and Services		385
CITY POWERS AND PROGRAMS		385
Recreation*		387
Potential Recreational Land Uses		389
Fire Protection		390
LAW ENFORCEMENT		391
HEALTH AND SOCIAL SERVICES		393
Hospital		393
Barrow Health Center		395
North Slope Borough Health Program		396
EDUCATION		397
UTILITIES		402
Water, Sewer, and Solid Waste Disposal		403
Water		403
Sewage*		408
Drainage		410
El ectrica l Power and Heat		411
Communi ca ti ons		419
Transportation		420
AIR TRANSPORTATION		420
Operations		421
Airport Facilities		422
MARI NE TRANSPORTATION		425

LAND TRANSPORTATION	430
Footpaths	432
Collector Road Maintenance	433
Alternative Access Between Barrow and Browerville . . .	434
Gravel Availability	435
V. CITY OF KAKTOVIK	439
Population	439
PAST TRENDS	439
Population Composition	443
Growth Prospects	446
ECONOMY	447
Composition of Employment	447
Unemployment and Seasonality of Employment	450
Recent Trends and Changes	451
Occupational Skills	453
Income Levels	453
Land Use	457
OVERALL PATTERNS	457
HOUSING	462
RECREATION	465
LAND STATUS	465
Community Facilities and Services	468
CITY POWERS AND PROGRAMS	468
Recreation	470
Fire Protection	470
LAW ENFORCEMENT	471
HEALTH AND SOCIAL SERVICES	472
EDUCATION	473
UTILITIES	476
Water, Sewer, and Solid Waste Disposal	476
Electric Power and Heat	478
Communications	480
AIR TRANSPORTATION	480
MARINE TRANSPORTATION	482
LAND TRANSPORTATION	482
VI. CITY OF WAINWRIGHT	485
Population	485
PAST TRENDS	485
POPULATION COMPOSITION	486
GROWTH PROSPECTS	491
Economy	493
COMPOSITION OF EMPLOYMENT	493
UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT	496
RECENT TRENDS AND CHANGES	497
OCCUPATIONAL SKILLS	498
INCOME LEVELS	499
Land Use	501
OVERALL PATTERNS	501
HOUSING	507
Land Status	512

WAINWRIGHT TOWNSITE	514
WAINWRIGHT AREA	516
Community Facility and Services	517
CITY POWERS AND PROGRAMS	517
RECREATION	519
FIRE PROTECTION	520
LAW ENFORCEMENT	521
HEALTH AND SOCIAL SERVICES	522
EDUCATION	524
UTILITIES	527
Water, Sewer, and Solid Waste Disposal	527
Electric Power	530
Communications	531
Transportation	531
AIR TRANSPORTATION	531
MARINE TRANSPORTATION	533
LAND TRANSPORTATION	535
VII. CITY OF NUIQSUT	537
Population	537
PAST TRENDS	537
POPULATION COMPOSITION	538
GROWTH PROSPECTS	541
Economy	542
COMPOSITION OF EMPLOYMENT	542
UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT	544
RECENT TRENDS AND CHANGES	546
OCCUPATIONAL SKILLS	547
INCOME LEVELS	547
Land Use	551
OVERALL PATTERNS	551
HOUSING	553
Land Status	554
Community Facilities and Services	558
CITY POWERS AND PROGRAMS	558
Recreation	560
Fire Protection	560
LAW ENFORCEMENT	561
HEALTH AND SOCIAL SERVICES	561
EDUCATION	562
UTILITIES	565
Water, Sewer, and Solid Waste Disposal	565
Electric Power and Heat	569
Communications	570
Transportation	570
AIR TRANSPORTATION	570
MARINE TRANSPORTATION	572
LAND TRANSPORTATION	573
VII 1. NATURAL PHYSICAL ENVIRONMENT	575
Source Data Maps	577
MATERRESOURCES	577

Figure Compilation and Purpose: Appendix Figure 1 . . .	577
Regional Water Availability, Quality, and Use	579
Summary of Current Use Problems	583
GRAVEL AND SAND RESOURCES	585
Figure Compilation and Purpose: Appendix Figure 2 . . .	585
Regional Availability and Use	586
Onshore Deposits	587
Offshore Deposits	591
Summary of Current Use Problems	593
TERRAIN FEATURES	595
Figure Compilation and Purpose: Appendix Figure 3 . . .	595
Regional Terrain Features	596
Relationship to Water Resources	598
WILDLIFE AND FISH DISTRIBUTION	599
Wildlife Distribution: Appendix	
Figures 4 and 5	599
Terrestrial	599
Marine	602
Aquatic	605
Hunting and Fishing	606
Critical Areas	608
Conclusions	608
WATER RESOURCES (APPENDIX FIGURE NO. 1)	610
GRAVEL AND SAND RESOURCES (APPENDIX FIGURE NO. 2)	610
TERRAIN FEATURES (APPENDIX FIGURE NO. 3)	611
WILDLIFE AND FISH DISTRIBUTION (APPENDIX FIGURES NOS.	
4 AND 5)	611
BI B L I O G R A P H Y	613
G L O S S A R Y	633
APPENDIX FIGURES (See accompanying Envelope)	

LIST OF TABLES

Table 1
Alcohol and mental health diagnoses, percent of annual total and year for Barrow Service Unit 158

Table 2
Reported Incidence of Alcohol - and Drug-Related Violation 159

Table 3
Population Estimates, North Slope Borough Region, 1939 - 1977 176

Table 4
Nonagricultural Wage and Salary Employment Distribution, North Slope Borough, 1976 187

Table 5
Nonagricultural Wage and Salary Employment Distribution, North Slope Borough and State of Alaska, 1976 190

Table 6
Comparison of Insured Employment, North Slope Borough Areas Outside Barrow Labor Area, 1970 and 1974 198

Table 7
Trends in Nonagricultural Wage and Salary Employment, Barrow Labor Area, 1970 - 1974 200/201

Table 8
Trends in Nonagricultural Wage and Salary Employment, North Slope Borough, 1975 - 1976 203

Table 9
Average Monthly Wage, Alaska Census Divisions, 1976 208

Table 10
Average Monthly Wage by Industry Sector, Barrow-North Slope Division, 1975 - 1977 209

Table 11
Family Income Distribution, Barrow Census Division and State of Alaska, 1969 214

Table 12
Family Income Distribution, North Slope Borough Traditional Communities, 1973 214

Table 13
Median Family Income, North Slope Borough Traditional Communities, 1973 216

Table 14	
Per Capita and Family Income, North Slope Borough Traditional Communities, 1975	216
Table 15	
General Assistance Payments, North Slope Borough Traditional Communities, FY 1970, FY 1974, FY 1976	219
Table 16	
Public Assistance Program Payments, North Slope Borough Traditional Communities, October, 1970 and October, 1976	220
Table 17	
Population Breakdown, Atyeska Pipeline Camps and Prudhoe Bay Industrial Area, June 15, 1977	224
Table 18	
Status of Capital Improvements Program to be Funded by Bonds Authorized and to be Authorized, FY 1974 - FY 1983	230
Table 19	
Village Corporation Enrollment and Land Entitlements, Arctic Slope Region	245
Table 20	
Beaufort Sea Region Land Status, Current Native Village Conveyances Under the ANCSA (Sect. 12a)	277
Table 21	
General Revenues by Source, North Slope Borough, FY 1973 - FY 1978	289
Table 22	
Leading Causes of Hospitalization, Barrow Service Unit, FY 1974 - FY 1976	312
Table 23	
Leading Causes of Outpatient Visits, Barrow Service Unit, FY 1974 - FY 1976	313
Table 24	
Population Trends, Barrow, Alaska, 1890- 1977	349
Table 25	
Composition of Population by Race and Sex, Barrow, Alaska, 1970	353
Table 26	
Household Densities, Barrow, Alaska, 1970	353
Table 27	
Average Annual Full-Time Employment, Barrow, Alaska, 1977	357

Table 28	Employment Composition, Barrow Labor Area, 1970 and 1975	361
Table 29	Occupational Skills, Barrow Manpower Center Registrants, FY 1977	364
Table 30	Family Income Distribution, Barrow Census Division, Alaska, 1969	366
Table 31	Family Income Distribution, Barrow, Alaska, 1973	366
Table 32	General Assistance Payments, Barrow, Alaska, FY 1973 - FY 1976	369
Table 33	Public Assistance Program Payments, Barrow, Alaska, October, 1976	369
Table 34	Enrollment Trends, Final Enrollment, Barrow, Alaska, 1959-60 - 1976-77	400
Table 35	Barrow Transportation, Marine Transportation, Cargo Delivered to Barrow Via <u>North Star 111</u>	427
Table 36	Population Trends, Kaktovik, Alaska, 1939 - 1977	442
Table 37	Composition of Population by Race and Sex, Kaktovik, Alaska, 1970 . . .	444
Table 38	Household Densities, Kaktovik, Alaska, 1970	444
Table 39	Average Annual Full-Time Employment, Kaktovik, Alaska, 1977	448
Table 40	Family Income Distribution, Kaktovik, Alaska, 1973	454
Table 41	General Assistance Payments, Kaktovik, Alaska, FY 1973 - FY 1976	454
Table 42	Enrollment Trends, Final Enrollment, Kaktovik, Alaska, 1964-65 - 1976-77	475
Table 43	Population Trends, Wainwright, Alaska, 1920 - 1977	487

Table 44	Composition of Population by Race and Sex, Wainwright , Alaska, 1970	489
Table 45	Household Densities, Wainwright , Alaska, 1977	489
Table 46	Average Annual Full-Time Employment, Wainwright , Alaska, 1977	494
Table 47	Household Income Distribution, Wainwright , Alaska, 1976	500
Table 48	General Assistance Payments, Wainwright , Alaska, FY 1973 - FY 1976	502
Table 49	Public Assistance Program Payments, Wainwright , Alaska, October, 1976	502
Table 50	Existing Land Use, Wainwright , Alaska, 1977	503
Table 51	Age of Occupied Housing Units, Wainwright , Alaska, 1977	508
Table 52	Home Ownership Characteristics, Wainwright , Alaska, 1977	508
Table 53	Size of Occupied Housing Units, Wainwright , Alaska, 1977	510
Table 54	Number of Rooms and Bedrooms by Household Size, Occupied Housing Units, Wainwright , Alaska, 1977	510
Table 55	Monthly Housing Costs, Wainwright , Alaska, 1977	513
Table 56	Enrollment Trends, Final Enrollment, Wainwright School, 1959-60 - 1976-77	525
Table 57	Household Densities, Nuiqsut , Alaska, 1974	540
Table 58	Average Annual Full-Time Employment, Nuiqsut , Alaska, 1977	543
Table 59	Family Income Distribution, Nuiqsut , Alaska, 1973	548

Table 60	
Household Income Distribution, Nuiqsut , Alaska, 1975	548
Table 61	
General Assistance Payments, Nuiqsut , Alaska, FY 1974 - FY 1976	550
Table 62	
Enrollment Trends, Final Enrollment, Nuiqsut , Alaska, 1972-73 -	
1976-77	564
Table 63	
Critical Hunting and Fishing Areas	609

LIST OF FIGURES

Figure 1 Beaufort Sea Regional Study, Beaufort Sea Petroleum Development Region	8
Figure 2 Beaufort Sea Regional Study, Description of the Region	9
Figure 3 Composition of Population, United States, Alaska, North Slope Borough, 1970	183
Figure 4 Seasonality of Nonagricultural Wage and Salary Employment, Selected Alaska Districts, 1976	194
Figure 5 Beaufort Sea Region Land Status	239
Figure 6 Beaufort Sea Regional Study, Settlements in the Region	247
Figure 7 National Petroleum Reserve-Alaska	256
Figure 8 Beaufort Sea Regional Study, Regional Transportation Routes	334
Figure 9 Beaufort Sea Regional Study, Airports in the Region	337
Figure 10 Composition of Population, Barrow, 1970	354
Figure 11 Barrow Community Study, Barrow Area Land Use	370
Figure 12 Barrow Community Study, Land Use	373
Figure 13 Barrow Community Study, Barrow Region Land Status	382
Figure 14 Barrow Community Study, Barrow Area Land Status	383
Figure 15 Barrow Community Study, Planned Water and Sewer Improvements	404
Figure 16 Barrow Community Study, Planned Gas and Electrical Interties	418

Figure 17	
Kaktovik Community Study, Location Map*	440
Figure 18	
Composition of Population, Kaktovik, 1970	445
Figure 19	
Kaktovik Community Study, Land Use	458
Figure 20	
Kaktovik Community Study, Townsite Land Use, December, 1977	459
Figure 21	
Kaktovik Community Study, Kaktovik Area Land Status	466
Figure 22	
Composition of Population, Wainwright , 1977	490
Figure 23	
Wainwright , Land Use	505
Figure 24	
Wainwright Community Study, Mainwright Area Land Status	506
Figure 25	
Nuiqsut Land Use	552
Figure 26	
Nuiqsut Community Study, Nuiqsut Area Land Status	556
Appendix Figure No. 1	
Water Resources	Envelope
Appendix Figure No. 2	
Gravel and Sand Resources	Envelope
Appendix Figure No. 3	
Terrain Features	Envelope
Appendix Figure Nos. 4 and 5	
Wildlife and Fish Distribution	Envelope

I. INTRODUCTION

Purpose of the Socioeconomic Studies Program

The Alaska OCS Socioeconomic Studies Program is a multi-year, multi-disciplinary research program designed to assess the social, economic and physical impacts likely to result from future offshore oil and gas development on the Alaska Outer Continental Shelf (OCS). The Studies Program is being conducted for the Alaska OCS office of the U.S. Department of the Interior, Bureau of Land Management (**BLM**) which bears major responsibility for administering mineral leasing and development activity in the offshore areas of Alaska lying under federal jurisdiction.

Program products are designed to be of assistance in making federal OCS decisions; state and local governments and local **communities** may also find program products to be of value to them. **Immediate** applications include the preparation of environmental impact statements for specific OCS lease-sales, development of lease-sale stipulations and limitations, and long-range assessment of the socioeconomic effects of federal lease-sale policy. **In** addition the Program is to develop a better understanding of the potential consequences which OCS petroleum development may have on Alaska's unique natural **endowment** and culture.

PURPOSE OF THIS REPORT

The purpose of this report is to provide a basis upon which to project socioeconomic impacts on the Beaufort Sea Petroleum Development Region

(see Figure 1, **page 8**), given a variety of Outer Continental Shelf petroleum development scenarios. This report is based on four essentially concurrent investigations of the **Beaufort** Sea Region conducted from **1976** to 1978. These investigations **are** reported in Studies Program Technical Reports:

- Number 5, "Baseline Study - **Beaufort** Sea Region - Interim Report", CCC/HOK (Crittenden, Cassetta, Cannon/Helmuth, Obata, Kassabaum)
- Number 8, "**Beaufort** Sea Region Man-Made Environment", Alaska Consultants, Inc.
- Number 9, "**Beaufort** Sea Region Sociocultural Systems", World Associates
- Number 10, "**Beaufort** Sea Region - Natural Physical Environment", Dames & Moore

Other Technical Reports related to the Beaufort Sea Region include:

- Number 4, "Preliminary Report - **Prudhoe** Bay Study", CCC/HOK (Crittenden, Cassetta, Cannon/Helmuth, Obata, Kassabaum)
- Number 6, "Beaufort Sea Region Petroleum Development Scenarios", Dames & Moore
- Number 12, "Anchorage Socioeconomic and Physical Baseline", Richard L. Ender

- Number 14, "Alaska-Fairbanks Case Study", Wordsmiths
- Number 16, "Beaufort Sea Region Governance Study", ISER (Institute for Social and Economic Research)

The Concept of a Baseline

The Beaufort Sea Region Socioeconomic Baseline Study is far more than a mere compilation of quantified facts by which certain OCS-induced changes can be assessed. Many facets of this report can be used for this purpose. However, the greater proportion of this report is devoted to highlighting and analyzing the critical socioeconomic and **sociocultural** elements and relationships which comprise the socioeconomic environment of the Beaufort Sea region.

Baseline descriptions of a community or a region can exhaustively cover every observable facet of daily life. However, not every facet of life is likely to be significantly affected by OCS development.

Baseline descriptions can also be so narrowly focused as to miss the salient features of life as experienced by residents. By treating of communities and regions only as "elements", "indicators", and "subject areas", the product of study tends to be disintegrative. Conceptually this approach is more akin to anatomy than to physiology -- it asks "what are the parts" rather than "how does it work".

It was found that a synthesis of **analytic** approaches to baseline study was required to meet multiple program needs. The synthesis involved the identification of critical community and regional components, the evaluation of current **endogenous** and exogenous sources of change, and the analysis of the functional organization among different sectors of community and regional life, as well as susceptible community relationships, values, activities, and processes.

METHODOLOGICAL IMPLICATIONS

With a general understanding of how the Beaufort Sea Region "works", it was then possible to select and measure those aspects of community and regional life most likely to be affected by OCS development. Each approach **required** a research method appropriate to the form of the **existing** data. In establishing change in population, for example, census data compiled using identical methods and boundaries were necessary at specific points and intervals. However, in establishing change in political and cultural systems, the baseline represents a span of time rather than a point in time. For example, where the object of study is "effective political **leadership**", the baseline includes changes and trends discoverable only through the examination of the past decade. These trends may, in turn, form the basis for projections concerning leadership; in doing so, they are more useful than a simple listing of powerful positions and their occupants at a single point in time.

Many areas of social, economic, political, and cultural concern required examination with both qualitative and quantitative methods. For **example**,

in wage and subsistence issues, it was found **useful** to have quantified information at specific **intervals** about such indicators as income **levels**, employment, and prices of ammunition, fuel, and food, as well as trends in who is employed and during what season, herd movement and size, wildlife regulations, participation in subsistence activities, and so on. Similarly, in health and social services, not only **level** of services but type, appropriateness, and adequacy were examined.

In any community or region there will be sectors of the economy and population which bear the costs of development but do not necessarily share in the benefits. Thus, investigation was directed at which populations were susceptible to which forms of change, depending on their proximity to development and their direct and indirect participation in development.

THE VALUE OF ANALYTIC INTERPRETATION

In order to satisfy the decision needs of **BLM**, the investigators expended considerable effort in analyzing their data and drawing conclusions of potential utility to BLM. They focused on long and short term trends, on the roots and dynamics of change, and on the established patterns of response to change. As a consequence of this effort, this report should have a **useable** life far longer than most "baseline" reports. **While** much basic data may become swiftly outdated (requiring renewed data collection), it is unlikely that basic regional socioeconomic and **sociocultural** dynamics are equally mutable. Many of these dynamics are rooted in thousands of years of social custom and a **high** degree of social and economic interdependence. To the degree that OCS activities will be projected to

contribute to the alteration or perpetuation of these dynamics, it can be said that these activities will have a measurable impact, positive or negative, on the **Beaufort** Sea Region socioeconomic environment.

The amount of attention given to the cultural and political life of the Beaufort Sea region serves one additional purpose--the depiction of life in the region that is accessible to the residents of the region. The focus of attention in social impact assessment is too often on "social facts", that is, those aspects of life which can be most easily measured.

However, most often residents do not think of themselves and changes in their **lives** in terms of miles of road, suicide rates, and service levels. Rather, they focus on certain salient values, activities, relationships, spaces, and events which have historical and emotional components. This report attempts to analyze and convey the links between social facts and residents' perceptions and feelings.

THE DEVELOPMENT OF BASELINES IN OTHER AREAS

The investigation of socioeconomic impacts flowing from OCS events and activities is not unique to the Beaufort Sea region. The Socioeconomic Studies Program **will** be engaging in similar studies in other regions adjacent to potential OCS **lease** sale basins as the lease **sale** schedule indicates federal lease sale intentions.

It is expected that each region will display a number of unique characteristics, each requiring thorough and timely analysis. It is also

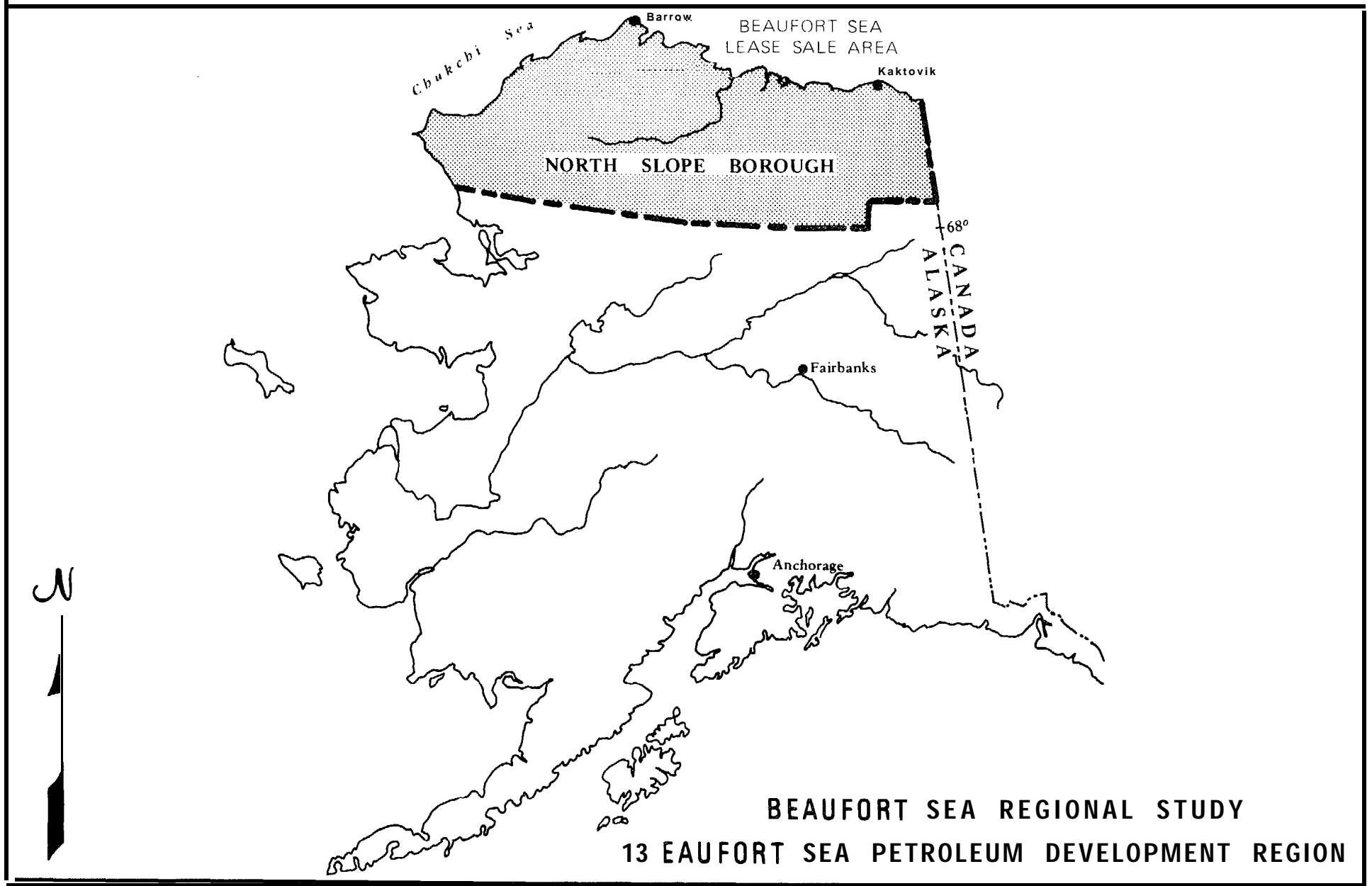
expected that there will be **commonalities** among regions, simplifying the analytic task. As the first region to be investigated by the Socioeconomic Studies Program, however, the Beaufort Sea region appeared uncommon in many respects. A summary of certain regional characteristics may be useful here.

Definition of the Beaufort Sea Region

For analytic convenience, the geographic boundaries of the Beaufort Sea region are identical with those of the North Slope Borough (see Figures 1 and 2). The North Slope Borough covers a 228,648 square kilometer (88,281 square mile) area across the extreme north of Alaska. It extends from near Point Hope on the **Chukchi** Sea approximately 1,040 kilometers (650 miles) east to the Canadian border, and from Point Barrow in the north to 68 degrees latitude in the Brooks Range, a distance of about 360 kilometers (225 miles). The Borough's estimated 9,643 permanent and temporary residents in July 1977 lived primarily in the **Prudhoe** Bay area (which, including pipeline camps, accounted for 55.5 percent of the Borough's 1977 population) or in eight widely separated traditional Eskimo **communities--Anaktuvuk** Pass, Atkasook, Barrow, Kaktovik, **Nuiqsut**, Point Hope, Point Lay and **Wainwright**.

The remoteness of this region from major centers of population and commerce, the **low** population density, the harsh climate, the forbidding terrain, and the hazardous transportation conjure in most minds an image of Arctic Alaska as a frontier. Those Americans and Europeans who first

FIGURE 1

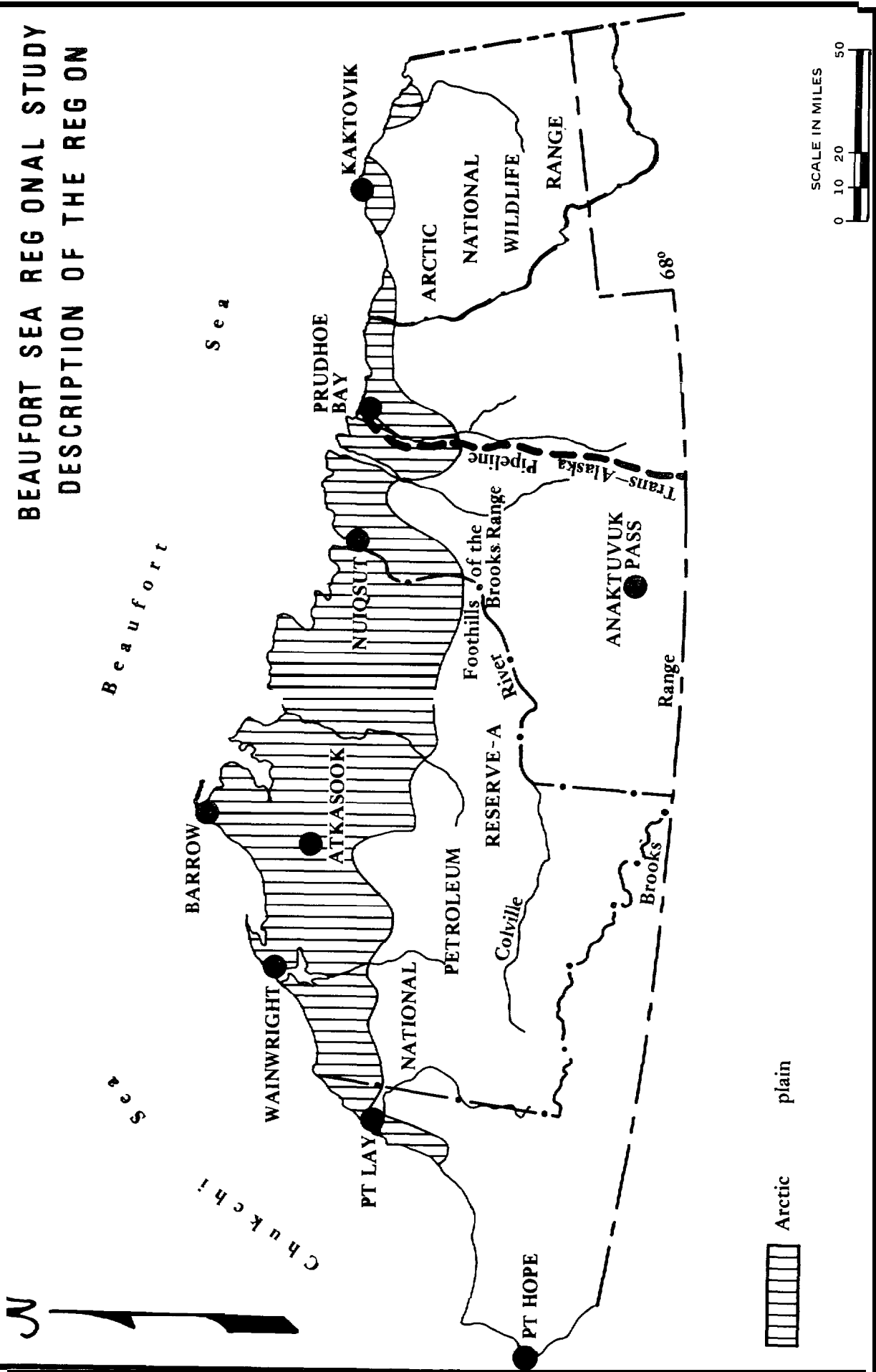


BEAUFORT SEA REGIONAL STUDY

13 BEAUFORT SEA PETROLEUM DEVELOPMENT REGION

FIGURE 2

BEAUFORT SEA REGIONAL STUDY DESCRIPTION OF THE REGION



explored this area and exploited its resources conveyed to **those** back home a sense of romance probably not dissimilar from the adventures of modern astronauts.

However, Arctic Alaska at the time of initial exploration was scarcely a frontier for its many residents. Archaeological discoveries indicate that Arctic Alaska has been continuously inhabited for over 10,000 years. The Inupiat (Eastern Eskimo) lived in this area in considerable numbers based on hunting, fishing, and gathering activities in the rich ocean waters and among the vast migratory herds of caribou and wildfowl populations. While to the untrained eye, Arctic Alaska appears to be a frozen desert, the hardy and resourceful Inupiat found a treasurehouse of marine and terrestrial resources.

AN OVERVIEW OF THE REGION

In order to maintain a viable existence within this ecological zone, a complex, homogeneous system of social organization and technology developed to offset the vagaries of weather and resource availability. The environmental extremes were countered by intense social cooperation, invention, and adaptation.

The riches of Arctic Alaska were discovered by Europeans and Americans in the early 1800's. Large enterprises followed these discoveries, leading to the exploitation of marine and land mammals at a rate far in excess of traditional usage and endangering the traditional resource base. The

early impact of whites upon the Inupiat was severe; the introduction of alcohol and disease resulted in the death of half the population.

However unhappy the results of contact were, the social and economic systems of the Inupiat remained essentially intact. Since few whites took up permanent residence in the Arctic and the intense exploitation of whales, walrus, and fur-bearing mammals was relatively short in duration, the Inupiat were not confronted with major new resident populations.

The Inupiat adapted quickly to the new Western technologies without necessarily losing their cultural heritage. They managed to blend useful modern tools into their traditional activities. As each period of outside resource exploitation declined, residents returned to their traditional resource activities, supplemented by new tools which required some continuing level of involvement in a cash economy.

Over time, the introduction of new food staples, new tools, and new occupations resulted in the creation of larger settlements. The introduction of stores, churches, hospitals, schools, and government agencies and facilities added to the centralization and Westernization of the population. Each change brought about a new adaptation between the traditional and the modern. Intermittent developments (whaling, trapping, reindeer herding, military construction, oil drilling, pipeline construction) allowed time for accommodation to socioeconomic change and cultural adaptation.

OIL AND RECENT SOCIOECONOMIC CHANGE

In recent years, however, the pace and magnitude of change has increased. From the American purchase of Alaska **from** Russia until the 1970's, the United States exercised dominion over the land of Alaska Natives without a treaty compensating **them** for loss of their rights over land. In **1971**, following the discovery **of oil** at Prudhoe Bay, Congress passed the Alaska Native Claims Settlement Act (ANCSA) which conveyed millions of acres of land back to Alaska Natives and compensated them in cash for the remainder of their land claims.

The direct **result of** this Act was the creation of Native regional and village profit corporations and, in the **Beaufort** Sea area, the creation of the North Slope Borough. The financial resources and policies of the Arctic Slope Regional Corporation and the taxing authority of the North **Slope** Borough over the Prudhoe **Bay oil** activities have significantly **al-**tered the socioeconomic organization of the region. The North Slope Borough, only five years old, is the major employer in the region (excluding **Prudhoe** Bay) and its extensive Capital Improvements Program is altering the everyday life of **community** residents. The regional corporation has leased extensive subsurface rights to oil companies for purposes of exploration and development. In addition, the federal government is pursuing a major **oil** exploration program on federal lands.

Since the oil development and **trans-Alaska** pipeline construction camps are far from traditional communities, the large-scale but probably

impermanent industrial population does not have extensive contact with the Inupiat. Traditional communities continue to adapt to modern life at a **somewhat** controlled rate. However, may new regulations limiting subsistence hunting and fishing are affecting traditional lifestyles. The combination of unknown petroleum-related events, North **Slope** Borough programs, and subsistence wildlife issues make the socioeconomic future somewhat imponderable.

One potentially significant petroleum-related event is the proposed federal sale of OCS exploration leases in the Beaufort Sea. The socioeconomic consequences of a large find, a small find, or no find are dependent on a wide range of technological and environmental considerations, costs of development and distribution systems, and institutional and community responses to the opportunities and risks of development. In addition, the interaction of OCS-induced changes with the magnitude and pace of the array of changes depicted briefly above remains to be explored.

The purpose of this report, then, is to provide an analysis of existing socioeconomic conditions and trends without OCS in the Beaufort Sea petroleum development region and provide standards for future impact analysis. Since this report is a melding of four individual reports, the reader seeking additional information is encouraged to go directly to these reports and the source materials on which they are based.

This report is organized to begin with the history and social organization of the permanent regional population; it then proceeds to document

and analyze the population, economy, services, land use, and governance of the region and four of its coastal communities. It concludes with a short analysis of the susceptibilities of the natural physical environment.

II. SOCIOCULTURAL SYSTEMS

This chapter will demonstrate that social, cultural, and psychological values are as important as the economic values of the environment to the regional population. The Beaufort Sea Region illustrates how a persisting traditional society is reorganizing itself with its older **social** and **cultural** forms in a modern setting. In order to understand the contemporary society, it is necessary to analyze **traditional** systems and to assess the impacts on and responses by the aboriginal society to the external influences which were exerted by the development activities during the historical period.

The **Beaufort** Sea Region has not attracted a permanent and large non-Native population. During the periods of economic development there was an influx of non-Native persons, but they were temporary residents and tended to remain fairly removed from the indigenous population. They introduced trade items and cash in exchange for Inupiat participation in the commercial whaling and fur trading ventures. The principal negative effects resulted from the introduction of diseases, alcohol, and the near extinction of the caribou and bowhead whale populations. Major long term changes in the traditional culture resulted from the introduction of Western religious, educational, and political institutional forms. In the contemporary period, the Inupiat organized and utilized the political and legal institutions to protect their land rights. The Inupiat's continued relationship to their environment is seen as the basis for the persistence of the traditional culture.

Aboriginal Period

INUPIAT: ECOLOGICAL INTERRELATIONSHIPS

Prior to considering the contemporary **sociocultural** systems of the Beaufort Sea region, it is essential to examine the aboriginal social and cultural organizations which provided the foundation of the present society. Although significant changes have occurred within the social and cultural patterns since initial contact with western influences 150 years ago, recent ethnographic accounts and contentions by the residents themselves about the survival of their traditional society all give evidence of the cultural persistence of the Inupiat. "Inupiat," meaning "People" or "Real People," is the **self** designated name and is preferred over the name "Eskimo." "Inupiat" or "**Inuit**," the term used in Canada and Greenland, refer to northern Eskimos in contrast to the southern Eskimos who are known as **Yupik**.

Although not germane to a description of the aboriginal **sociocultural systems**, a brief and simplistic introduction to the origins and cultural evolution of the Inupiat and their inhabitation of the Arctic Slope may provide a key for understanding the adaptations made by the Inupiat during the historical phase.

The Eskimos were the only aboriginal population to occupy both the Old

and the New World. They are dispersed from **southcentral** Alaska, around the Prince William Sound to the Alaska Peninsula, and northeastward along the entire **Alaska** coast across Canada **to** Greenland. **In** addition, **Eskimoan** populations occupied St. Lawrence Island and the **Chukchi** Peninsula on the Asiatic side. Related to the Eskimo are the **Aleuts** who inhabit the southern portion of the Alaska Peninsula and the Aleutian Chain. With the exception of the Caribou Eskimos in the Canadian Barren Grounds and the Alaskan Inland **Nunamiut**, the Eskimos were generally associated with the coastal and **riverine** environments, while the inland territories were restricted to Indians. Contrary to popular conception, the Eskimo population cannot be classified as Indian. Serological and morphological evidence indicate they form a class with other northeastern Siberian groups **called** Arctic or Siberian Mongoloids (Laughlin 1963).

Alaska and Siberia were connected during three periods of the Late Pleistocene, ranging from approximately **90,000** to 10,000 years ago, during which overland travel was possible between the two continents. (**Muller-Beck** 1967). It is generally accepted that the ancestors of the Eskimos and **Aleuts** crossed the Bering Land Bridge during the third period, **13,000** to **10,000** years ago. Archaeological evidence dating from approximately 8,000 B.C. suggests that the tundra dwelling hunters infiltrated Alaska and dispersed along the Canadian Arctic to Greenland, while others migrated south to the Alaska Peninsula and the Aleutian Chain (**Bandi** 1969; **Dumond** 1977). The dispersal throughout Alaska and along the coast as the land bridge receded was gradual.

Around 500 B.C. the northern cultures developed a maritime orientation exploiting the rich marine resources of the Bering Strait. The coastal orientation stimulated the development and diversification of other **cultural** traditions identified with both coastal and inland settings. However, **by 1000 A.D.** a remarkable development began with the spread from northern **Alaska** of the **Thule** Culture, which served to level the cultural differences that existed between the Eskimo. Bandi described the effect, ". . . a remarkable degree of unification was attained, a dissemination of the **Thule** culture (or at least elements of it) from the eastern tip of Siberia to the east of Greenland" (Bandi 1969). Dumond elaborates that the expansion of **Thule** tradition included cultural elements and people or both (Dumond 1977).

Linguistically, the Eskimo population is divided into **two** mutually unintelligible languages, **Yupik** and Inupiat or Western and Eastern Eskimo. While there are marked dialectical differences with Yupik, Inupiat is remarkably homogeneous from **Unalakleet** in western Alaska to Greenland.

Translators were used during the recent **Inuit Circumpolar** Conference, which was attended by Inupiat speakers from Alaska, Canada, and **Greenland**. After several days of continuous contact, some participants were **able to** begin conversing directly with one another. While emphasizing the vast span of territory occupied by the Eskimos, the variations in habitat, and the range of cultural diversity, Dumond (1977) noted the uniformity of Eastern Eskimo (Inupiat) speech. He suggested that this may indicate that only **a** short time has elapsed since the ancestral

speakers formed a single social group. This in all likelihood can be attributed to the expansion of the **Thule** Culture.

The Beaufort Sea Region, which encompasses the area within the boundaries of the North Slope Borough, is the aboriginal homeland of two distinct but interrelated groups of the **Inupiat--the Taġiugmiut** and the **Nunamiut**. The ethnographic literature generally refers to the coastal group as "**Tareumiut**," however, this is corrected to **Taġiugmiut** to conform with their own self designated name and the accepted orthography in current usage by the North Slope Inupiat.

The **Taġiugmiut** were primarily dependent on a marine economy based on the harvest of sea mammals. They are best known for their **hunting** of the mammoth bowhead whales (**Balaena mysticetus**). The whaling complex was the focal point of their social and cultural developments. **Taġiugmiut** permanent settlements ranged along the **Chukchi** and Beaufort coastal area from **Tikigaq** (**Tigara** or Point Hope) to **Utqkeavik** (Barrow) and Nuvuk (Point Barrow) where the bowhead whales are most accessible.

Although the **Taġiugmiut** frequented areas eastward of Barrow, the Beaufort coastal area was also utilized by other groups more closely identified with inland groups. The inland zone was occupied by the Nunamiut, whose primary economic pursuit centered around the harvesting of the caribou. Their structural organization paralleled that of their coastal neighbors except that, instead of the whale, the caribou was central to their organization and cultural patterns.

Although the two Inupiat groups represent adaptations to two contrasting ecological zones, they have been characterized as a **single** cultural unit because of the economic interrelationships between the **inland** caribou hunter and the coastal whalers and the similarities between their social and cultural **systems**. Larsen and Rainey (1948) and Spencer (1959) suggested that the interrelationship between the two groups was essential to the occupation of the North Slope. According to Larsen and **Rainey** the caribou skins which the **Tagiugmiut** obtained in trade from the **Nunamiut** were necessary for survival in hunting on the ice. On the other hand, the inland Inupiat were dependent on the coastal hunters for seal and whale oil which they exchanged for their furs and skins. The dual economic patterns coupled with the formalized trading system constituted a cultural **whole** which permitted the successful occupation of an area which has been variously described as barren, inhospitable, and desolate.

Tagiugmiut

In 1948 Larsen and **Rainey** suggested incorporating the various phases and cultural developments of Eskimo **prehistory** along the northern Alaskan coast under one designation, the Arctic **Whale** Hunting Culture. They proposed to retain the names which had become established, **Okvik**, Old Bering Sea, **Birnirk**, Penuk, **Thule**, and **Inugsuk**, to designate the **cultural** phases. For purposes of a general and brief overview, this **cultural** classification will be adopted since, as Larsen and Rainey pointed out, there were no basic cultural differences between them. The

fundamental elements of the Arctic **Whale** Hunting Culture, they noted, "are sea **mammal** hunting with **floats** in open water, a permanent solidly built winter house with a deep long entrance, pottery or stove lamps, **cooking pots**, rubbed slate implements, an extensive use of baleen and a knowledge of the sled and **bowdrill**" (Larsen and Rainey "1948). Central to all the phases was the hunting of the whale; however, hunting caribou during the winter continued. Larsen and Rainey added another period, the Modern Phase, characterized by the introduction of new cultural elements, some arriving from southern areas and others deriving from an Asiatic origin. Iron tools were first obtained through contact with trade from the **Chukchi** Sea area. However, the most notable feature of this phase was direct contact with white men and the introduction of firearms, (Larsen and Rainey 1948).

Whaling in its present form of planned interception in an open water lead between ice flow, its capture by direct contact from a skin boat, and its towing to shore has been practiced well over a thousand years and perhaps somewhat longer. **Giddings** found evidence of a maritime culture at Cape Krusenstern which he designated the Old Whaling culture. Radiocarbon evidence suggested a dating from **1700** to 1500 B.C. However, he was not able to demonstrate a direct relationship with previous or subsequent cultures (**Giddings 1967**).

The northern arctic coast was occupied prior to the Arctic Whaling Culture by a population who, according to Larsen and Rainey, did not engage in whaling but did hunt other marine as well as terrestrial mammals.

They **were** characterized as seasonal migrants who spent, their winters inland and their **summers** on the coast. Larsen and Rainey argue that this population, known as the **Ipiutak**, "continued their original mode **of** life and became **the** ancestors of the **modern Nunatarmiut (Nunamiut)**, while others remained permanently on the coast and adopted the elements of the Arctic Whale Hunting cultures. . ." (Larsen and Rainey 1948).

Territorial Occupation Beaufort/Chukchi Sea. The **Tagiugmiut**, whose primary subsistence activities were governed by the presence, absence, or conditions of the sea ice, inhabited coastal areas where considerable ice movements occurred. The abundance of marine resources available off the **Chukchi** was reflected by the presence of numerous settlements of its coast. Situated nearly continuously between **Tikigaq** (Point Hope) and Nuvuk (Point Barrow) were several major settlements and many smaller satellite colonies. Although many sites were not permanently occupied throughout every season or from one year to the next, the frequency of settlements was indication of a rich resource supply. Charles Brewer, who traveled up the coast from Point Hope to Point Barrow during the late 1800's, recorded numerous small villages in his original manuscripts which formed the basis of a later published book (Brewer 1942).

While the presence of the **Tagiugmiut** along the **Chukchi** coast is indicated by the number of permanent and semipermanent settlements, their utilization of the Beaufort Sea coastal area was characterized by the numerous campsites along the shore. Trading centers were also located on the Beaufort Sea coast, usually at the mouth of rivers. Two significant sites were **Neqlik (Nirlik)** and **Uuliktaq (Oliktok)**, where **Tagiugmiut** met

and traded with the **Nunamiut**. Trading was also conducted at Barter Island (Kaktovik) with the **Tikixtaqmiut** who were more closely associated with their Canadian neighbors. Trade was also carried on at Herschel Island on what is now the Canadian side of the Beaufort Sea (Stefansson 1966). The **Chukchi** Sea and the Alaska side of the Beaufort coastal areas were largely utilized by the **Tagiugmiut** except for a group of inland people who had a quasi-permanent settlement at the mouth of the **Utukok** and, as already noted, the **Tikixtaqmiut** at Barter Island. The **Nunamiut** also ventured to the Beaufort Sea coast to engage primarily in trading activities with their coastal neighbors.

The contrast in Inupiat settlement patterns between the **Chukchi** and Beaufort Seas corresponds most directly with the availability of marine resources. The difference between the two seas, and the presence of marine life, correlates with contrasting ice environments. A description of contrasting ice conditions as they relate to use and occupancy by the Inupiat is abstracted from the Alaska Regional Profiles, Arctic Region, to describe the complexity and difference.

. . . the waters of the Alaskan arctic seas are dominated by sea ice. This ice has many forms and extremely variable dynamics, but collectively is the most important single factor of the Alaskan arctic marine environment. Its seasonal formation, movement, and degradation continually influence other physical and biological aspects of the environment, including the hunting activities of the indigenous Inupiat people and resource exploration by modern

technological means. . . Although **there is no** physical barrier between the two, (**Beaufort** and **Chukchi** Seas) there are a **number of** critical differences. The **Chukchi Sea** is **quite** shallow with depths less than **50** fathoms (**100 m**) extending several hundred miles offshore. Throughout much of the year relatively warm Alaskan coastal waters and Bering Sea waters enter the Arctic Ocean through Bering Strait and strongly influence the character of the water and the behavior of the sea ice in the **Chukchi** Sea. In contrast, the **Beaufort** Sea has a narrow continental shelf between 30 and 60 miles off Alaska where depths of less than 100 fathoms (**200 m**), and the water mass is dominated by circulation patterns of the Arctic Ocean The distribution of animals and man along the **north** coast of **Alaska** reflect the differences between the two seas. **West** of Barrow north and east flowing currents in the **Chukchi** Sea tend to keep the winter sea ice moving and prevent tight ice occupation of the near-shore environment. In contrast, Beaufort Sea currents force the ice shoreward and produce a great expanse of relatively tight, shorefast ice in winter. Without open areas of water and the resulting edge effect, marine mammal populations are at a much lower level in winter. (**Selkregg** 1975).

The Beaufort ice environment is characterized by thick, **multiyear** ice present more than 10 months a year. The **Chukchi** is dominated by **one-year** ice which is present seven to eight months a year and is seasonal in structure and form. The **Chukchi** Sea coast is generally ice free in the summer, often in contrast to the Beaufort **polar** pack ice which may be

blown against the shore. There is only slight ice movement in the Beaufort, while considerable ice movement typifies the Chukchi. The ice movement produces large, linear openings in the ice called leads, which influence the biological aspects of the environment. Coincident with the leads are abundant marine resources. The Beaufort, which has relatively few open water leads, is sparsely populated, while the Chukchi with numerous reoccurring leads is more densely occupied (Selkregg 1975).

Settlement Patterns. As previously noted, the availability of marine natural resources, which is influenced by the conditions of the sea ice, largely determined the location of settlements. The ancestor of the Tagiugmiut depended equally on sea mammals and terrestrial mammals. However, the Tagiugmiut were first oriented towards a coastal economy and secondarily dependent on resources obtained from the inland areas.

The principal characteristic of the Tagiugmiut distinguishing them from their predecessors was their dependence on the bowhead whale. The primary coastal settlements were located at points where bowhead whales passed on their annual migration north each spring. Point Hope was the southern terminus in the arctic region where intensive whaling commenced, and Point Barrow was the most northern.

Spencer (1959) listed five permanent settlement areas along the Chukchi Sea coast and several smaller satellite communities which were in essence suburb extensions of the larger villages. In addition, there was one major settlement at Barter Island. Associated with the major and smaller settlements were numerous campsites within the boundaries of the settlement group.

Although the **Tagiugmiut** are generally described as sedentary, **living** in permanent settlements located **along** the coast, they established many temporary and seasonal settlements several miles out on the ocean ice, along the **Chukchi** and Beaufort Sea coast, along the river banks, and in many inland locales. Their territorial occupation extended **miles** beyond the shores, where campsites were established on the ocean ice. The nature and duration of the camp depended on the economic activity they pursued, which varied from whale, fowl, or caribou hunting, fishing, gathering berries, or trading ventures. These campsites were often visited every season year after year, or new camps might be established. Of course, the location of whaling camps depended on sea-ice formation and movement, but even these camps could be utilized for one to two months.

Archaeological evidence suggests that the size of Beaufort Sea **prehist . . . population** was apparently significantly greater than the historic population and also fluctuated during earlier phases of Eskimo **prehistory**. Spencer (1959) estimated that the aboriginal coastal population numbered around 1,500, not including the inhabitants along the Beaufort Sea, **however**, the large prehistoric settlement discovered in 1939 at Point Hope indicated the presence of a large population around 100 B.C. which suggests Spencer's estimate may be **low**. Archaeological investigations discovered 575 dwellings and beach erosion may have washed away a **considerable** number of other houses. **It** is unlikely that **all** the houses were occupied simultaneously. It is probable that during the early part of the nineteenth century at least 1,000 persons lived in Point Hope alone.

Migration Cycles. Emphasis has been placed on the pervasive influence of the sea ice on the economic behavior of the **Taġiugmiut**. When the ice formed in the **fall**, the hunters returned to their permanent coastal settlements, and after break-up and the disappearance of the ice, **the** hunters dispersed. The formation of ocean ice in the **early fall** coincided with the return of families from their summer camps. During the dark winter months, coastal residents generally stayed in the village to participate in a round of festival and ceremonial events. Hunters would venture out on the ocean ice during the few hours of twilight to hunt seal or to fish. Polar bears were frequently encountered while out on the ice seal hunting, and it was not always necessary to make prolonged and numerous trips solely to hunt polar bears.

The arrival of spring and the appearance of the open water lead off the ice signaled the arrival of the bowhead **whale** and the establishment of whaling camps. Whaling camps were often located several miles out on the ice. All the whaling crews, which involved at least half of the village population resided at these camps for several weeks. These camps also served as a base from which hunters went seal or duck hunting when the whales were not migrating through. The whaling season began with the bowhead's northern migration in April and ended in late May or early June.

Although stress has been placed on the effects the sea ice had in influencing hunting activities, it must not be assumed that the northern hunters were completely dominated by environmental factors. . In actuality, the element of economic choice did exist, and this was best demonstrated

during the spring and summer season. The socioeconomic unit had the option of remaining in the locale of the permanent village or migrating to their summer camps.

Even before the whaling season was over, some crews may have elected to move to the inland rivers to hunt geese when they began arriving in late May or early June. If larger camps were to be established inland, travel usually began along the frozen river systems before breakup.

After the sea ice broke up, the male members of a socioeconomic group might return **to** the village to participate in the communal hunt for the walrus and ugruk (bearded seal). The women and children remained in the summer camps fishing or gathering eggs and berries. Other hunting groups might decide to camp along the coast to hunt ducks **or** to frequent the bird rookeries. Some hunters traveled inland to hunt caribou.

One of the most significant summer activities was the trading fairs between the **Tagiugmiut** and the Nunamiut. Some families, primarily those from Point Hope, traveled south to the trading center at Kotzebue, while others migrated to the mouth of the **Utokok**. The **Nuvunmiut** and the **Utqeaivimmiut** journeyed to the **Colville** Delta, Barter Island, and as far east as the Mackenzie River.

The spring and summer months were characterized by high mobility, which initially began with a dispersion several miles out on the ocean ice and along the open water lead and then became a retreat inland up **to** as

far as the Brooks Range foothills and along the **Chukchi** and Beaufort Sea coasts. Each settlement group ranged within a fairly well-defined boundary. The range of travel extended as far as the Mackenzie River and south to Kotzebue. Seasonal excursions were undertaken by individuals, families, and sometimes entire groups.

Tribal and Family Social Organization. Varied interpretations exist in the literature describing the attributes of the different social **units** among the northern Inupiat. Generally, anthropologists agree that the northern Inupiat were divided between those who lived inland and derived their livelihood from inland resources **while** those living along the coast were primarily oriented towards a marine economy. However, Burch (1976) took issue with the existence of a coastal/inland or **Tagiugmiut/Nunamiut** dichotomy and concluded that the twofold distinction is not adequate to denote the regional variations that **exist** among both the coastal and **noncoastal** people. He argued for delineating the Inupiat into regional groups which he called societies.

However, since Inupiat linguistic designation distinguishes a geographic reference between coastal and inland occupation, and not necessarily implying membership in a social unit, the dichotomous approach will be adopted for purposes of analysis. **It will** be utilized to designate a geographic reference and economic orientation while recognizing that no formal centralized organization existed uniting each division. The inland or coastal orientation does not **imply** exclusive use and occupancy of a single ecological zone.

The **Nunamiut** and **the Taġiugmiut** were divided into regional entities which formed the tribal organization. Each tribe had designations which described the topographic and geographic features of the region they occupied and utilized. Among **the Taġiugmiut**, the tribe was identified with a permanent coastal community, smaller satellite settlements and inland fish camps. The **Nunamiut** tribal units were represented by one to four territorial bands moving within a defined regional area. The bands were composed of several households. The coastal village or inland band was integrated around the **karigi**, or dance hall, which was associated with the concept of the whaling crew or the communal caribou hunt. Although each whaling crew and caribou drive had an **umealiq** (whaling captain) there were no formally recognized chiefs of the tribes. However, it is interesting to note that Brewer, who made the first journey by a white man along the coast in 1884, repeatedly referenced encounters with the head man of each village (Brewer 1943).

Rainey designated the village and satellite settlements as the tribal organization. Although he described the village of **Tikigaq** (Point Hope) as follows, his tribal designation applied to neighboring coastal villages and inland bands:

The **Tikerarmiut (Tikigaqmiut)** area distinct tribal group of the **Tareormiut (Taġiugmiut)** or coastal Eskimo. The basis of this grouping was proximity of residence and blood relation, rather than a well-defined political organization. Neither chief nor governing body controlled tribal action. The tribal group was composed of

many virtually independent family groups who remained together in a single village because of common interest and a need for protection. . . . Occasionally, groups of families established semi-permanent colonies on the coast some distance from Point Hope. But, despite those movements, they considered themselves one people **affiliated** with a single village. (Rainey 1947)

Although Spencer appears **reluctant to** recognize the village unit as a tribal organization, **his** descriptions of the geographical division of villages compares with Rainey's characterization of the tribe in terms of tribal **characteristics** of moving within a defined territory and exhibiting common interests. Spencer cited group solidarity as a tribal attribute; however, he attributed the group stability to kinship ties. His reference to those groups who established new settlements, either temporarily or longer, and who continued to identify with the major settlement compares with **Rainey's** contention that those who may have established semi permanent colonies remain affiliated with the permanent settlement.

Inupiat tribal units were composed of a set of local families. Numerous references have been made to the extended family units of the Eskimos; however, the descriptions generally refer to a bilateral kinship designation in which relationship is reckoned through both parents. In a detailed study of northwestern Eskimo kinship systems, **Burch** (1975) recognized four specific patterns of affiliation.

<u>Social Unit</u>	<u>Demographic Unit</u>	<u>Spatial Unit</u>
Society	Regional group	Region
Community	Villagers	Village
Local family	Local group	Hamlet (or neighborhood)
Domestic family	Household (or domestic group)	Dwelling

The previous analysis of the tribal organization corresponds closely to **Burch's** designation of the regional groups as society. **Burch** noted that the traditional Eskimo population was organized as societies associated with a particular territory and followed a distinctive annual economic cycle. The societies tended to be **endogamous**, but there was no formal requirement limiting marriage to the society's membership. A **final** characteristic that served **to** distinguish members of **one** society from others was differences in dialect between societies. **While** these characteristics also apply to tribe, Inupiat tribal attributes **also** include **forms** of integration and group solidarity extending beyond kinship ties such as the communal hunting efforts and sharing practices. Tribe is defined to include the community and the regional-area within a defined boundary in which members of the tribe move.

Burch's conceptual categories of the local family and domestic family are without question applicable **to** the Northern Inupiat and for purposes of further description and analysis will be adopted. He defined the minimum Eskimo domestic family as consisting of the single conjugal family including husband, wife, and offspring. However, he noted that the majority of domestic families who occupied a single dwelling were

more complex in membership. The two most frequent **included** the **grand-**parents, parents, and children or two or more siblings, their spouses, and children.

Local families, according to **Burch's** analysis, were identical in structure and composition to domestic families, but their membership was distributed among two or more households. **Burch** described the local families as the major organizational component in which the relationships were ordered in a definite pattern. Most activities were carried out by the local family. Families were largely self-sufficient in economic terms.

Previous references have been made to the Inupiat socioeconomic unit. In view of the **local** families' participation in the appropriation of natural resources for food, clothing, shelter and other utilitarian items, it has been designated a socioeconomic unit. The kin-based socioeconomic unit collectively and cooperatively undertook economic ventures. They formed the membership of the whaling crew and the walrus and bearded seal communal hunt. Division of labor was between the sexes of the local family. Additionally, the economic activities were divided between the domestic units of the local family. Some members elected to hunt caribou while others devoted their attention to fishing or duck hunting.

Economic Complexes. Repeated references have been made to the effect the ocean ice had on the economic behavior of the Inupiat. Through their cultural evolution and technological advances, the coastal Inupiat developed a greater dependence on **marine** mammals than had their ancestors, but they continued to rely on inland resources which they

obtained directly or through trade with the **Nunamiut**.

Spencer's (1959) emphasis on the dichotomy between the coastal and inland inhabitants and their interrelationships (also referenced by Larsen and **Rainey** in 1948) has tended **to** create **the** impression that residents exploited the resources of a single ecological zone and that the mutual interdependence between the two groups was absolutely essential. While such a strict interpretation of Spencer's analysis is not accurate, it has influenced later research and placed undue emphasis on the discontinuation of trade between the inland and coastal **people** as the cause for the **Nunamiut** abandoning the inland areas during the historic period.

This preoccupation with **the dual** ecological division has downplayed the dramatic difference between **an** ordinary coastal maritime culture and that of the northern coastal Inupiat. The grounded shorefast ice and the ice packs extended the boundaries of the Inupiat to a rich environment unlike any other exploited by aboriginal people. The economic complexes will be considered within three separate areas--the ice environment and the littoral and inland zones.

Economic activities associated with the ice environment are **highly** specialized and are primarily conducted by a relatively large **male-**dominated group. Ice hunting is of paramount importance both in terms of the primacy of the resources obtained on and off the ice and the amount of time expended in these activities.

In her analysis of the contemporary Arctic Slope socioeconomic subsistence complexes, **Worl** (1977) distinguished the ice environment as a separate and distinct ecological zone characterized by highly specialized subsistence patterns. Earlier Sonnenfeld (1957) had emphasized that the ocean represented the most important subsistence area to the Barrow Eskimo.

To the Eskimo, it is of least use when free of ice. Most marine activities of the Eskimo originate on the ice . . . it is the ice which facilitates transport and **whi**ch limits, or at least localizes and makes known to the Eskimo, the range and migration paths of sea mammals. With an open sea, potent^{ial} food resources are hopelessly dispersed. . . . The hunting of this one **mammal** (seal) makes this ecological zone paramount in the living area of the Barrow Eskimo. The fact that it is also the habitat of whale and walrus makes it even more so. The sea ice may be considered an extension of both land and sea. . . .

The following description of the seasonal formation **and movement** of the ocean ice and its relationship to economic patterns is abstracted from Larsen and Rainey (1948) who emphasized that the ice pack is responsible for a distinct annual cycle of activities. Hunting on or off the ice can range over a period of eight months.

● New Ice Forms in Fall:

- Return from the summer dispersion; await formation of "slush ice" to begin series of fall and winter religious ceremonies; little hunting.

● Pack Ice Solid:

- November-April. **Small** hunting groups obtain seal through breathing holes and **seal** nets; **polar** bears also present on pack ice.
- January Jigging tomcods and smelt through ice.
- February-March. Crab obtained through ice only at Point Hope.

● Offshore Lead Opens in Ice:

- March-May. Crews on pack ice, one to three miles from shore **awaiting** bowhead whales; some seals, **belugas**, and migratory waterfowl hunted.

● Ponds Appear on Ice:

- May-June. Small ponds appear on ice, usually at **seal** breathing holes where seals now crawl out on ice; after whaling feast, men stalk seals on ice.
- June-July. Larger ponds open; hunters hide behind walls of ice blocks they have constructed; bearded seals harpooned as they rise or swim close to shield; some walrus killed by same method.

● Appearance of Ice Floes:

- July. Herds of walrus rest on beach and are killed there or as they crawl up out of the water.

● Ice Disappears:

- Villagers disperse to summer camps along the shore where fish and **belugas** taken in nets; others visit rookeries for birds and to gather eggs; some hunt caribou; other villagers travel to trading centers.

Worl (1977) emphasized that the occupation of the arctic slope was based on an effective utilization of the resources which was accomplished not only through the development of technological innovations, but, more importantly, through a system of social organization that promoted cooperation. Collaborative efforts were especially evident in the whaling **complex** in which formalized regulations demanded the cooperation between non-kin whaling crews.

During the aboriginal period the harvest of a bowhead whale required a minimum of six crews. The ritualized patterns of sharing promoted cooperation even between crews which were not members of the same **Karigi** (ceremonial dance house) since the size of the share of the whale depended on the order of response when a whale was struck. Whichever crew first assisted another got a larger share of the whale than the next crew which came to assist. Walrus, bearded seal, and **beluga** were **communally** taken by several local family units who may have had common **membership** in a **Karigi**. Game or fowl hunted individually was also shared among local families. Fishing, usually done by the elderly and young children, was also associated with the ice environment both on the sea and inland areas.

Hunting, fishing, and gathering within the littoral zone--the area between high and low watermarks--tended to be pursued by the domestic family unit, primarily during late spring and summer to take advantage of the absence of landfast ice. Duck hunting has been practiced along the Arctic shoreline for the past 1,000 to 1,400 years and is the most

important subsistence activity of the littoral zone. Although waterfowl have been classed as a supplemental, secondary resource, they became a primary dietary element if whaling and sealing had not been too successful. But fowl **were** not only important for food. Down and skins were used for clothing, and puffin beaks decorated ceremonial items. Ducks were a trade item as **well** as a special gift to old women.

Some duck hunting took place out on the ice during early spring at the whaling camps or during seal hunting and continued from coastal campsites through fall. Johnson's (1971) research on waterfowl harvest during 1970 revealed that the percentage of hunters age 12 to 24 was considerably greater than the percentage of hunters age **25** to 50 and even greater than those over 50. Spencer (1959), however, felt that duck hunting was primarily limited to the older people who were not capable of more strenuous hunting activities.

Birds hug the shore as they migrate from point to point west along the northern coast. King eiders were the first hunted species to arrive, followed by common eiders and **old** squaws, spectacle eiders, Stellar's eiders, Arctic loons, and crested auklets (Johnson 1971). Bird rookeries located along the coastline were exploited for eggs and birds. Nine species of seabirds breed on **the** sea cliffs, the most abundant being the **murre**. **Swartz** (1966) found that some 400,000 seabirds annually nested in the sea cliffs in the vicinity of Cape Thompson alone. During July the villagers frequented bird rookeries along Cape Lisburne and Cape Thompson to gather eggs and snare birds. The skins were used for

clothing and the eggs **and** young birds were cooked and preserved in bags of **seal** oil (**Rainey** 1947).

After sea-ice breakup, ocean fishing for salmon, char, tomcod, and **candlefish** commenced all along the coast. **Belugas** and white whales were hunted by herding them to the shore. Driftwood, an available resource in the treeless coastal region, washed up along the shore, mainly from the large rivers flowing into the Kotzebue Sound and the Beaufort Sea. The supply was adequate for the Inupiat's limited fuel and other purposes (Murdoch 1892).

In the aboriginal period, **the Tagiugmiut** utilization of the inland zone was primarily limited to the **summer** season. After the ocean-ice breakup, villagers of all ages dispersed along the coast and into the inland region along rivers and lakes to hunt caribou and other fur-bearing animals, black **brant**, and geese; fish; harvest the molting fowl; and gather eggs and berries. **Small** camps dotted the inland areas at favorable fishing sites. Women and young children **remained** in camp while the men hunted. In addition to fishing activities, women scraped and prepared skins for sewing into clothing and dried or otherwise preserved the harvested food resources.

Although Spencer (1959) divided the arctic slope between the coastal and inland Inupiat, he did recognize the **Tagiugmiut** use of the inland zone. **Burch** (1976) chose to dismiss the **inland/coastal** dichotomy and adopted a regional approach to account for variations. As noted earlier, however, since the Inupiat themselves use a geographical reference, it has

been employed for purposes of this report; but this regional approach does not mean to **imply** that significant variations existed between **Tagiugmiut** groups since their similarities were greater than any differences.

Nunamiut

The **Nunamiut** have been contrasted with their coastal counterparts as Inupiat who were primarily oriented towards an inland economy. Like the **Tagiugmiut**, their appropriation of resources from one ecological zone was not exclusive. Although their primary subsistence pursuits were hunting terrestrial mammals, the **Nunamiut** also hunted in coastal regions but probably to a lesser extent than the **Tagiugmiut** were able to utilize the inland area. Their hunting activities on the sea ice were limited, and it is fairly certain that they did not participate in whaling. Differences among various **Nunamiut** groups were greater than those that might have existed between the **Tagiugmiut**. The regional approach allows for the best description of how various Nunamiut groups differed.

Human occupation of the inland region of the North Slope dates back 5,000 to 7,000 years to the Kayuk complex (Campbell 1962). Archaeological findings announced December 1, 1977 by the National Petroleum Reserve--Alaska Field Studies reported **datings** to 8,000 years ago. **While** the evidence substantiates an ancient human occupation of the arctic tundra by a **pre-Nunamiut** population, the origins, cultural evolution, population movements between the coastal and inland regions and the

southern and northern areas, and the interrelationships between the populations have not been firmly established.

Campbell (1962) asserted that the archaeological evidence indicates that the **Nunamiut** colonized the arctic slope region and the northern Brooks Range by immigrating from the Arctic coast and the Noatak and **Kobuk riverine** areas about 1,600 **A.D.** Hall (1976) located a **Nunamiut** habitation site dating back to 1,500 **A.D.** to 1,400 **A.D.** These movements may have been stimulated by famine, population expansion, hostilities between the various groups, a simple attraction to the abundant inland resources, or a combination of factors. If Campbell's position is correct, that the most relevant movements of coastal people inland was as recent as several centuries ago, this may account for their familiarity with and dependence on coastal products.

The ancestors of many of the present day **Wainwright** residents, the **Utorqarmiut (Utukokmiut)**, as described by Larsen and **Rainey** (1948), may have represented a transitional group between the **Taqiugmiut** and the **Nunamiut**, although they were classed as **Nunamiut**. The population, estimated at 800, spent considerable time and effort preparing for and participating in coastal activities. Small family units dispersed **along** the coastal areas between Icy Cape and the mouth of the Utukok River to hunt seal on the ice or from kayaks. Larger kin units engaged in communal walrus hunts. Campbell (1962) felt that the population estimate of **800** was too high, but even if the number is halved, it **still** suggests a highly successful adaptation. There were also **Nunamiut** groups who did

not hunt sea mammals, and it **might** be conjectured that **they**, too, **represent** a distinct origin and cultural evolution.

Territorial Boundaries. The Inupiat designated as Nunamiut ranged from the Noatak River in the west to near the delta of the Mackenzie River in the east. They inhabited the **Endicott** Mountains; the northern coastal plain; and the **Colville**, Utukok, Noatak, Kobuk, and **Selawik** river drainages. Their neighbors included the **Tagiugmiut** Inupiat in the west and north and those who **lived** to the east of Barter Island. They were bounded **on** the south by the Koyukon Indians with whom they had friendly relations and the Kutchin Indians, who lived in the **Chandalar** River drainage and its tributaries and were their bitter enemies.

Campbell (1962) distinguished two **Nunamiut** groups of arctic Alaska Eskimos--those of the inland **montane**, whose economy was primarily based on caribou, and the **riverine** Inupiat, who also hunted caribou but basically were fishermen.

Larsen and Rainey (1948) estimated that at the turn of the century there were at least three thousand **Nunamiut**; however, this count included the **Kobuk** and **Selawik** Rivers and the **Noatik** region. Spencer (1959) estimated that the **Nunamiut** aboriginal population north of the Brooks Range numbered **1,500**, while Campbell (1962) calculated a maximum of 1,400.

The inland Inupiat were scattered along the river watercourses and did not have permanent fixed communities. They did, however, reside and hunt within defined territorial boundaries, and each group was generally

named after that area. Riverine Nunamiut occupied the **Kobuk, Noatik,** and **Selawik** River drainages. The inland **montane Nunamiut** occupied and utilized the interior arctic from the northern slopes of the **Brooks** Range, the foothills, and the adjacent plains to the shores of the Beaufort Sea and the **Chukchi** coastal area around **the Utukok** River. Territorial boundaries between the North Slope **Nunamiut** and the **Tagiugmiut** were not well defined since there was common usage of the peripheral zone but at different times during the seasons. Except for the trading fairs along the coastal areas, the two groups did not mix.

Major Groups. **Gubser** (1965) distinguished four major groups of Nunamiut, not including Larsen and **Rainey's** (1948) transitional **Utukokmiut**. **Gubser also** excluded the Kugmiut, who lived along the tributaries of the Kuk River and were **similar** to the **Utukokmiut**. The four **Nunamiut** groups he identified were each comprised of one to five bands. He described each band as an aggregation of households numbering 50 to 150 people who could be identified as inhabitants of a given region. The four major groups made up of these bands are:

- **Kanjanigmiut**

- Lived along the upper **Colville** River (above the mouth of the **Killik** River) and its tributaries, such as the **Nuka,** Kuna, **Estivluk, Nigu,** and **Kurupa**; closely associated with the **Noatakmiut** who lived in the upper Noatok region; traveled north to the mouth of the **Colville** to trade with the **Tagiugmiut**.

- **Killikmiut**

- Resided in the **Killik, Okokmilaga, Okpikruak**, and Chandler river regions; some ranged as far as Survey Pass and the upper **Alatna** River where they were known as the **Alashukmiut**.

- **Nanmalikmiut**

- Inhabited the Anaktuvuk Pass area, **Nanushuk** or Anoktuvaaurak, upper Fork, upper **Tinaijguk**, and upper **Wild** Rivers; most frequented **Tulujak** Lake area and were sometimes referred to as the **Tulugakmiut**.

- **Itkillikmiut**

- Included those **Nunamiut** who lived along the **Itkillik** River, in **Ulu** Pass, and on the upper **Dietrich** River.

Like the **Tagiugmiut**, whose permanent communities had satellite colonies, the major **Nunamiut** groups had smaller offshoots that continued to identify with the parent group. Although they were recognized as a subunit of the larger group, they might have their own name to designate the area where they resided. If the separation continued over a considerable length of time, they might become an independent group.

At the time of western contact, before their drastic decline, **Nunamiut** from the four major groups were expanding eastward. Had they not been disrupted, the **Nunamiut** who were ranging along the **Kuparuk, Sagavanirktok, Ivishok**, and Canning Rivers may have become major stable bands. The **Nunamiut** were also traveling east and establishing camps on the **Jago, Hulahula, Sheejek**, the East Fork of the **Chandalar**, and the **Colleen** Rivers.

Social Organization. The band united by kinship, a sense of territoriality, and communal caribou hunting efforts was the primary **Nunamiut** social unit and ranged in size from 50 to **150** individuals. As previously noted, one to five bands comprised a group, but in actuality it is more likely that a group was represented by one band because of the limited resources available in a region. **Gubser's** (1965) group classification may, however, be useful to describe territorial bounds and to recognize group membership of those bands which had temporarily split away from the major band when the population was high or resources were scarce.

The band was similar to the larger socioeconomic unit of the **Tagiugmiut**, but it was much more formalized and persisted from year to year. It was composed of several households with a sense of membership in the band. They traveled and camped within a defined territory. Their primary corporate economic activity was the caribou hunt. Although there may have been more than one **umealik** (rich man, recognized as a leader, but not a chief) in a band, there tended to be a dominant one who was characterized by economic strength and held a position of power and influence (**Gubser** 1965).

During certain periods of the year the band had to disperse. Smaller domestic **family** units were formed into a temporary cooperative economic complex which might include two to three nuclear families. The domestic unit might also occupy a **single dwelling** when they were with the band.

Subsistence Patterns. The **Nunamiut** have become characterized as

hunters **of the** migratory caribou. Caribou movements ordered the nomadic behavior **of the Nunamiut in** the interior tundras **and** the high montane region. Caribou provided the raw materials for shelter, boats, clothing, bedding, rope, thread, **tools**, and food.

Campbell (1962) described **Nunamiut** subsistence activities in part of his analysis of their settlement patterns. **Among** hunting societies in which there is no subsistence surplus, he noted that "the basic relationship between settlements and environment is a direct and immediate one. . . . **Nunamiut** encampments more directly mirror, as it were, those Brooks Range ecological variables which on the one hand seasonally delimit or restrict, and on the other hand **seasonally** provide the natural resources necessary to a hunting culture."

Campbell distinguished three primary categories of **Nunamiut** settlement patterns, which varied according to season and type of economic activity --main encampments (bands), scattered encampments (family), and nomadic campsites (family). The large summer encampments at predetermined rendezvous points, where trading took place between the **Nunamiut** and coastal Inupiat, represented a fourth major type of settlement.

o Main Encampments (Bands]

In April and May and again in August and September, the thousands of migrating caribou traveling through the major passes concentrated the **Nunamiut** in large population units in strategically located positions.

- Small Scattered Encampments (Domestic Family)

October through January, the large encampments broke up into scattered camps throughout the region, subsisting on small bands of caribou that were insufficient to support the large main encampments. Winter camps might remain in valleys in the same locality for several months, depending on the availability of the caribou.

- Nomadic-Moving Campsites (Domestic Family)

February-March and June-July, small groups scour the country for game, fish, and plants. The main camps from which foragers are based range in size from two to many families.

- Trading Settlements (Bands)

Large **Nunamiut** settlements occurred at such established trading centers as the mouth of the **Colville** or Utukuk Rivers, Barrow, and Kotzebue. In addition to trading, they also hunted sea mammals and fished. Some Brooks Range **Nunamiut** occasionally summered on the northern coast. These large coastal summer gatherings must be considered as part of the **Nunamiut** settlement pattern.

Tagiugmiut/Nunamiut Interrelationship

The relationship between **the Tagiugmiut** and the **Nunamiut** was both economic and social. Structured trade occurred within established formal

partnerships between **inland** and coastal groups **or** between men and **women** with no **formal** arrangement. Commodities were exchanged for their subsistence worth and for their prestige value. Surplus resources and crafts accumulated throughout the previous year were major trade items, but they **also** exchanged goods they had previously bartered from southern and eastern groups.

Spencer (1959) noted that the **Nunamiut** depended more on trade than their coastal counterparts. He suggested that the inland group may have originally obtained seal and **whale** oil themselves, but after a change in hunting patterns, they could no longer obtain these **in** sufficient **quantity** within their own economic system. Although oil was a food **item**, its most significant use was for **fuel**.

In exchange for the vital oil, the **Nunamiut** primarily offered caribou meat and caribou products--hides (tanned and untanned), sinew, and caribou antlers and bones for the marrow. Other important items were **wolf**, fox, wolverine, sheepskin, musk-ox hair, and wood objects. The **Nunamiut** **also** acted as the trading intermediaries for such European items as **metal** vessels, tobacco, trade beads, and knives obtained from the **Siberians** in the Bering Straits by the **riverine Nunamiut**.

The **Tagiugmiut** were less dependent on trade, and the many caribou skins they obtained in trade were viewed as wealth. They did, however, require caribou for bedding and clothing. The **principal** items of trade they **offered** were seal and whale oil, whale bone, **seal** and **ugruk** skins, walrus skins which were important for the construction of the umiak (skin boats),

and stone and slate for dart points. They also traded with their eastern neighbors for stone **lamps**.

Although it should be emphasized that there were Nunamiut who did not engage in sea mammal hunting, it appears that the **Nunamiut** expended considerable effort in coastal hunting activities. Conversely, the **Tagiugmiut** were able hunters within the inland area. It appears that the crucial trade item for the **Nunamiut** was seal and whale oil for fuel; however, since **Nunamiut** travel and camping plans considered the availability of willow, it is clear that they had certain fuel sources of their own. The **Nunamiut** could, in fact, obtain **seal** oil for themselves and they did have access to willow which was also used as fuel.

Trade served to bring these widely separated groups together. Following trading activities, people engaged in several days of dancing and playing games. The two groups did not dance with one another, but they did dance for each other and participated together in competitive sports. This interaction promoted the spread of ideas and cultural elements and helped diminish differences between the groups. Inter-marriage, however, was rare, and there were no recognized kinship ties between the two groups. Nunamiut women were forbidden to marry **Tagiugmiut** men (Ingstad 1954). Trading activities did, however, help the Inupiat achieve a mutual interdependence and **social** stability.

We do know that there were occasions when the **Tagiugmiut** (Barrow) invited Nunamiut **people** from the **Colville** River area to participate in the

Messenger Feast, or as it is sometimes **called**, the Messenger Dance. The feast was an elaborate **socioceremonial** occasion involving economic exchange **to** enhance the status **of** the **umialik**, whaling captains, and men who owned boats. Its significance was as an integrating force among families, trading partners, and friends, and it helped establish a sense of solidarity and cultural uniformity between the communities and groups. (Spencer 1959). Little has been written about the Messenger Feast, and **less** is known about the circumstances of coastal and inland group participation in it.

The Historical Period: Major Economic Influences

The historical period commenced in **1826** with contact between the Inupiat and early explorers. The explorers' journals, maps, reports on travel conditions and wildlife populations served to open the Arctic to economic development which characterized the historic period. Although reports on culture contact and change are dominated by theories of acculturation, the prevalent research bias and assumptions continue to treat acculturation as a unidirectional process to complete assimilation into the dominant culture. Acculturation is a process of focusing on cultural change and is not in itself an end result of culture change.

The history of Inupiat acculturation is complex and demonstrates the incorporation of alien cultural elements, the elimination of previously existing elements, and the modification and reorganization of others. The addition of new cultural elements was selective like the many

technological innovations which were adopted, such as the whaling weaponry, **while** traditional items such as the skin boat used for spring whaling were retained. Examples of directed culture change also occurred under the proselyte and educational institution programs in which the missionaries and teachers purposefully initiated change to eradicate aboriginal beliefs and ideologies and to introduce new ideals. The Inupiat **also** responded to contact situations by actively exerting their influence to participate in the various economic development activities which included the commercial whaling era, the fur trapping and the military construction periods. The **reduction** of the natural resources on which the Inupiat depended and their involvement in the development activities resulted in a modification of the degree of their autonomy; however, after each period of economic development, they intensified their traditional subsistence pursuits. The viability of the Inupiat culture can be attributed to their social solidarity and their continuing relationship to their land and traditional way of **life** through the periods of economic development. The Inupiat case demonstrates that acculturation may occur without a subsequent change in **values** and without a change in the reference group.

EXPLORATION PERIOD

Long before the Inupiat saw a white person, they were familiar with western manufactured goods, which they received by way of Asiatic trade. In 1826 Commander **R.W. Beechey**, of the vessel **H.M.S. Blossom**, became the first white person to record contact with the northern Inupiat--years after the Russians landed on Alaskan shores.

Beechey was astonished that the Inupiat not only did not appear **surprised to** see their first white person but were friendly and hospitable all **along** the **Chukchi** coast. **He also** commented **on** their aggressive efforts to trade, which he obliged. The Inupiat at **Utqkeavik** (Barrow) and **Nuvuk** (Point Barrow) were not, however, as delighted to greet their first white men. **Mr. Elson**, the Master Officer of the **Blossom**, had been dispatched to continue the **Blossom's** expedition in a barge from Icy Cape, and he described the Inupiat at **Utqkeavik** as overbearing and neither friendly nor easily satisfied with the trading transactions. The Inupiat at Nuvuk greeted Mr. **Elson** with a show of arms and would not **allow** him to land.

Nevertheless, direct trade and commercial relationships with the white man had begun. The first recorded natural resources exported from the North Slope were coal, two swans, and four hundred pounds of venison. The explorers hired their first Inupiat to pull the barge along the coastline. In exchange, the explorers left beads, tobacco, and knives (**Beechey** 1831).

British exploration crews **in** the Arctic continued to make brief, periodic contact with the Northern Inupiat. The motivating force behind the explorations was to locate Sir John Franklin and his expedition, which had been lost searching for the Northwest Passage in 1848. During the following decade, 41 search parties had been dispatched. Six had gone overland to the coast of arctic America, and 35 had traveled along the Arctic coast. In 1850, the first ship wintered off Point Barrow, and the following year two ships wintered off the northern coast. The

surveys made by early expeditions were carefully executed and were used as the basis for later maps and charts of the Arctic coast (Hulley 1970).

To gain trade information, the Hudson's Bay Company dispatched Thomas Simpson to the region by way of the Mackenzie River delta in 1837. The **Colville** River and **Beechey** Point were named during his survey trip to Barrow (Andrews 1947), but Simpson encountered difficulties with the Barrow Inupiat and was forced to turn back before he made any explorations further east (Van Stone 1962).

The expeditions continued to trade and obtain the supplies and resources they needed. They offered items with which the Inupiat were familiar, and they also introduced the Inupiat to the practice of working in exchange for commodities. The direct effects of their activities on the Inupiat were not immediately evident, but the stage was set for the first commercial development in the Arctic, which we know did profoundly affect the Inupiat. These early explorers surveyed previously uncharted coasts, and gave the landmarks the English names they are now known by. The aboriginal inhabitants had been described to the public as friendly and receptive to trade. Explorers' reports of large numbers of bowhead **whales** in the Arctic soon lured commercial whalers.

THE COMMERCIAL WHALING PERIOD AND DECLINE

Women's fashions, and the need for whale oil, stimulated the commercial expansion of the bowhead whaling industry into arctic Alaska. Balreen,

or whale bone as it is sometimes called in the literature was in high demand for women's corset stays and skirt hoops. It was also used for buggy whips. The whale oil was used for fuel in lamps. The bowhead whale, which could be found in abundance off the Arctic coast, yielded more baleen than other whale, averaging 1,500 pounds apiece. When commercial whaling began in the Arctic in 1850, baleen sold for 32¢ a pound; by 1905 the price had soared to \$4.90 a pound (Van Stone 1962).

The development of the petroleum industry in the late 1860's cut heavily into the demand for whale oil. One bowhead whale could yield an average of 100 barrels of oil which in 1865 was worth \$1.45 a gallon. However, between 1865 to 1875 whale oil imports to the United States dropped from 76,000 to 35,000 gallons, and the price was down to 65¼¢ a gallon (Bockstoe 1977). Petroleum products were rapidly supplanting the use of whale oil, but at the same time the skyrocketing market for baleen kept whaling pressures on the bowhead high.

The market for baleen finally plummeted with the introduction of flexible spring steel in 1907. The depressed demand for baleen and whale oil, the heavy losses of whaling vessels in the treacherous seas, and a depleted whale resource reduced profits to the extent that the market for bowhead whale completely collapsed by 1910.

The golden age of the whaling in arctic Alaska began in 1848 with the discovery by New England whalers of the whaling grounds in the Bering Strait and the Arctic Ocean. In 1846 more than 725 vessels were

involved in commercial whaling activities, and a majority of **them** eventually penetrated into the Arctic (Andrews 1947). Steamship whaling was ushered in with the return of the Mary and Helen to San Francisco in 1880. She carried 2,350 barrels of oil and 45,000 pounds of baleen valued at more than \$100,000 obtained from a catch of 27 bowhead whales (Bockstoce 1977).

With added steam-power, whaling vessels would penetrate into difficult and dangerous ice zones and could winter in the Arctic, and this, coupled with the establishment of onshore whaling stations in the mid-1880's, meant continuous contact between the Inupiat and whites. By 1893 one fourth of the whaling vessels were wintering off the mouth of the Mackenzie River, while others remained at Herschel Island and in the vicinity of Point Barrow (Van Stone 1962). In 1894 over 500 whale men wintered at Herschel. Onshore whaling stations were established at Barrow in 1884 and Point Hope in 1887.

Historians and anthropologists uniformly describe the effects the commercial whalers had on the Inupiat as devastating. Hully (1970) stated, "While there, they (American whalers on the Arctic coast) carried off the fuel and supplies of the Eskimos, debauching the natives with liquor and ruining their **health** by introducing the diseases of the white man." Hinckley (1972) described the whalers as ". . . ruthless predators, men little different from their contemporary, the Great Plains buffalo hunter. Both were sojourners who gave slight thought to the possible extinction of their mammal quarry. . . . As for the Impact their **ecological** ravages might have on Eskimo life, few seem to have cared."

Van Stone (1962), an anthropologist, assessed the effects as follows:

The crews of the whaling vessel taught the people how to make intoxicating **liquor** and then took advantage of their desire to obtain the raw material for its manufacture in trade for the baleen. They introduced venereal and other diseases that had never prevailed.

. . . Many northern villages lost fully half their population in a few years.

In addition to the bowhead whale decline and the 50 percent reduction of the northern Inupiat population, other populations were also adversely affected. For example, it has been estimated by Andrews (1947) that more than 100,000 walrus were taken by the whalers for their oil and ivory tusks in the decade 1870 to 1880. This concurrent drop in both the whale and walrus populations forced the Inupiat to make demands on the caribou, which was already under strong hunting pressure by the whalers and other whites in the Arctic.

The main impact on the caribou population from the whalers was between 1890 and 1904 when as many as 20 ships and over 500 men wintered along the coast from Point Barrow to the Mackenzie. The crew of the first three vessels that remained in the Arctic during the winter of 1890 off Herschel Island consumed 40,000 pounds of choice caribou hams. The ships' dogs were reported to have eaten over 400 caribou carcasses during one year. A naturalist who traveled to Herschel Island in 1896 estimated that each ship required more than 10,000 pounds of caribou a year (Bockstoce 1977). Also the whalers preferred the female and fawn for meat

and skins which imposed an added pressure on the caribou herds (**Sonnenfeld** 1957). One average female caribou yielded approximately a 100 pounds per carcass which meant one ship required 100 caribou each year.

Many **Nunamiut** whose primary food was caribou reportedly starved because of the lack of meat. Ernest **Leffingwell**, who conducted a series of expeditions for the U.S. Geological Survey, attributed the population decline of the **Nunamiut** to the diminished number of caribou (**Gubser** 1965). Starvation and epidemics of influenza and measles all took their toll of the **Nunamiut** population. In the late 1880's or early 1890's, a flu epidemic killed more than a hundred **Nunamiut** at a feast at the upper Noatak River (**Gubser** 1965). In the early 1900's, Charles Brewer reported the death of 200 **Nunamiut** who had contracted influenza at Barrow after a few whaling ships had arrived.

The **Nunamiut** began to immigrate to coastal communities toward the end of the century first to trade their furs and to hunt caribou for the whalers. However, the dramatic decline of the caribou population precipitated the disappearance of the **Nunamiut** from the arctic tundra by 1920 until the mid-1930's when the caribou population began to increase.

Spencer (1959) argued that the disappearance of the **Nunamiut** from the inland region resulted from the cessation of trade relations with the **Tagiugmiut**. He suggested that the **Nunamiut** were forced to immigrate to the coast, **not** because of the decimation of the caribou herds, but rather because the coastal people discontinued the traditional trading patterns.

If, as Spencer suggests, trade between the two groups did cease, it should have occurred during the commercial whaling period from 1848 to 1910 when the coastal Inupiat had access to the commercial whalers' trade items. However, scattered references throughout the literature suggest that trade continued. In 1881, Murdoch (1892) mentioned trading transaction between the coastal and inland Inupiat at the mouth of the **Colville**. In 1886, Lt. George M. **Stoney's** assistant, Howard, traveled with the **Nunamiut** on their trading journey down the **Colville** River (**Gubsen** 1965). The U.S. Census recorded 200 residents at the **Colville** River trading center in 1900. In 1901, Schrader with the U.S. Geological Survey reported **Nunamiut** traveling down the **Colville** to trade (**Gubsen** 1965). Charles Brewer (1942) from Barrow was also sending items to the **Colville** to trade for **Nunamiut** products. The disappearance of the **Nunamiut** from the arctic tundra can be attributed to a number of factors, but the decline of the caribou population was perhaps the most significant.

The establishment of the onshore commercial whaling stations introduced modern equipment into Inupiat whaling and increased the adoption of traditional methods by whites. The commercial whalers decided to follow the Inupiat's example and hunt directly off the shorefast ice. They soon discarded their wooden boats for the lighter, quieter skin-covered **umiak**. Inupiat taboos and supernatural restrictions were relaxed, for they had seen that the commercial whalers broke all the rules and were still successful in their hunt.

The Inupiat soon began signing on as crew members for the commercial

whalers. The whaling stations began to compete for Inupiat whalers, especially the harpooners and shoulder gun men. Inupiat came from **the** Kotzebue region and the Noatak and Kobuk Rivers to work for the stations. Although most returned home after the whaling season, many intermarried with the local Inupiat during the 25 years the station operated. **Steffan-**son (1966) reported that by 1908 the more affluent Inupiat whalers had as many as six of their own crews whaling commercially. Although the Inupiat participated in the commercial hunt, they also maintained their traditional subsistence pursuits which continued to be their major support for their livelihood.

By the time commercial whaling activity came to a close the Inupiat had been introduced to the system of working for wages and hunting the whale for its commercial **value**. He had adopted modern hunting equipment, and he had developed a dependence on a few white man's food staples. With the adoption of modern equipment and tools that he could not manufacture, food he could not acquire, and all of the other items of which he could no longer obtain by trade, the Inupiat became dependent on an external source. At the close of the commercial whaling period the Inupiat intensified their subsistence pursuits.

The secondary effects of the commercial whaling activities were the introduction of schools, Christianity, and the reindeer herding industry to the Inupiat. Dr. Sheldon Jackson, who was a missionary and the general agent for education in Alaska, was urged to come to the Arctic by Lieutenant **Commander** Charles A. Stockton of the **U.S.S. Thetis** who was

appalled by what he considered to be the desperate condition of the Eskimos. Dr. Jackson responded, and after negotiations with several Protestant mission societies, he awarded Point Hope to the Episcopal Church and Point Barrow to the Presbyterians in 1890. Initially the missionaries served as both preachers and teachers. In some instances, he also provided the medical services and supervised the reindeer herding industries. The influence of the missionary was pervasive. He introduced new religious beliefs; discredited traditional ideologies and taboos; influenced housing structures and dress patterns; and altered subsistence patterns such as prohibiting working or hunting on Sunday. Because of the unpredictability of environmental conditions which affects the presence of wildlife and the irregularity of the migratory patterns of caribou, marine mammals, and fowl, the prohibition against hunting on Sunday often led to a shortage of food and hunger.

The introduction of reindeer to the Arctic was originally initiated to feed the several hundred starving commercial whalers who had wintered off Point Barrow in 1897 (Olson 1969), but a further objective was to "help civilize the Native people and provide the basis for a future commercial economy" (Jackson 1893).

The reindeer industry, through the various federal management policy changes, had introduced the concept of individual ownership of a **biological** resource and also the concept of a corporate business. The reindeer industry involved relatively few Inupiat, and according to Van Stone (1962), ". . . even the most dedicated herders desired to return to the

village for spring whaling activities, and it was at this time that large numbers of deer wandered away and were lost." Another aspect of the government sponsored reindeer industry was its attempts to introduce a system whereby the government assumed full responsibility for feeding, clothing, and educating the herders.

Olson's (1969) study of the reindeer as an instrument of social and **economic** change among the Inupiat pointed out that the issue of starvation was more perceived than real, the reindeer was actually regarded by the Native population as an item of wealth and not food. He concluded that the reindeer did not basically alter Eskimo society but instead was adapted into it (Olson 1969). The effects of reindeer on Native subsistence patterns appear to have been few and transitory.

THE FUR INDUSTRY

The interrelations between the macro- and **microeconomies** that developed between the national market and the Inupiat society are clearly demonstrated in the rise of the fur industry in the early 1900's. The demand for a product at the national level fostered the development of the fur trading industry in the arctic and the commencement of fur trapping activities by the Inupiat. Fur had become a fashion craze, and when Europe, beset by **World War I**, could no longer meet the high demands of the market, emphasis shifted to New World supplies. Fox, particularly its white phase, was highly valued.

The decline of the baleen trade and the rising market in furs encouraged a population shift back toward inland areas and smaller coastal settlements. Fur trading posts were rapidly established at **Wainwright**, Barrow, Beechey Point, Demarcation Point, and Barter Island. Initially, transactions were limited to bartering food supplies, traps, shotguns, rifles, and **ammunition** for furs, but many older **Inupiat**s remember when cash was introduced. Vincent **Nageak** of Barrow related:

When I was young, we used to hunt polar bear for food, never sell hide. We needed the hide for mattresses for ice hunting since it never gets wet when we sleep. It was also used for sitting on, for mittens, or to cover the snow house hall doorway. After awhile, Brewer (Charles Brewer) pay \$15 for the hide. That was the first time someone paid for the hide. (**Worl** 1977)

Women and children were also affected by the fur trade. Bertha Leavitt of Barrow noted that sewing thimbles had traditionally been made out of **ugruk** (bearded seal) but related, "When I was young, I caught a white lemming and brought it home. My uncle took the lemming to Brewers and got me a thimble in exchange. **I was getting rich!**" (**Worl** 1977).

Sonnenfeld (1957) analyzed the impact of the fur trade on subsistence:

Unlike whaling, trapping thus required that the Eskimo give up a portion of their subsistence activity, mainly the early and mid-winter sealing, and the late winter-early spring caribou hunting. To this extent, trapping had a greater effect on subsistence activity

than had commercial whaling. The effects were less, however, in terms of adequacy of subsistence. By dispersal, the individual Eskimo had a greater hunting territory available to supply his subsistence. Fish were more available along the inland rivers than at Barrow. Caribou were more abundant along the east coast than at Barrow, and more easily available during the late **spring-summer-early fall**. Seal, though perhaps less abundant, were still plentiful along the east coast. During the late 1920's and through the thirties, reindeer were able to supplement subsistence. The only game **really** lost to the migrant Eskimo were the walrus and whale, but depending on the furcatch, which was more likely to be **adequate** than for those maintaining a Barrow residence, even these **could** be obtained by trade.

The Inupiat's purchasing power increased as the price of fur continued to soar during the 1920's. U.S. Office of Education report (1912-13) noted that one fox skin in 1913 had the same purchasing power as 28 fox skins in 1910-1911. Credit, not cash, was the primary medium of exchange at most trading posts.

The decline of fur prices during the depression of the early thirties drastically affected the Inupiat trapper. Unable to trade his furs or obtain credit, he was forced to revert to former subsistence patterns. During the 1930's hunting pressures had depleted the game in the inland areas adjacent to the coast. At this time, the Nunamiut, who through the years of living on the coast had maintained their group identity,

decided to return to the Brooks Range (Gubser 1965).

NAVAL PETROLEUM RESERVE #4 EXPLORATION

By the time major petroleum exploration programs on Naval Petroleum Reserve #4 began in 1944, the Inupiat were familiar with working for wages, but the exploration program which lasted until 1953 brought the true dawning of the cash economy to the region. The Navy contracted with Arctic Contractors (ARCON) to conduct the exploration project, and in 1947, the Navy also decided to establish the Naval Arctic Research Laboratory near Barrow.

ARCON had intended to import labor assuming that the Inupiat would not be able to adjust to the employment demands, but the Inupiat petitioned Alaska's delegate to Congress demanding that local labor be utilized. After a meeting between ARCON, Alaska Native Service, and the Navy, ARCON began hiring the Inupiat as laborers in 1946. ARCON adopted the policy of allowing the Inupiat to take off for brief periods to hunt. Participation in the winter, spring, and fall subsistence activities was unaffected since the peak period for ARCON activities was July through September.

Sonnenfeld (1957) gives a detailed review of Inupiat participation during the ARCON operation. During 1946-1953, ARCON hired 227 Inupiat, but turnover was high. About half worked continuously for one full year, but only half of those worked two or more consecutive years, and only one

worked during the entire seven-year period. The pay ranged from one to nearly three dollars an hour. The average annual salary for an Inupiat employed full time by ARCON in 1951 was \$5,800. **Sonnenfeld** observed that the work force could take advantage of wage opportunities without seriously affecting subsistence since the number of Eskimos involved was relatively small, and most of the population continued with traditional pursuits. He noted that the wage earner gave financial support to the whaling crews, thereby insuring his continued share in the whale and walrus catch. **Sonnenfeld** contended that the number of whaling crews actually increased as a result and that this enabled more effective utilization of the whale resources. With more crews to assist in taking the whale, losses would (assumedly) be less.

Following the close of the ARCON operation, as with the previous development periods, the Inupiat once more increased their dependence on the subsistence resources. **Sonnenfeld** noted that a few families emigrated to urban centers to pursue a wage economy and most returned to traditional activities. There were additional brief periods of wage opportunities during the Distant **Early** Warning (DEW) Line construction program during the mid-1950's. The 1960's found the Inupiat engaged in what has been described as a dual economy, consisting of a combination of cash and subsistence. Subsistence in the contemporary era, with a dependence on some cash income, is certainly different from aboriginal times; however, the resources it provides to the community are still substantial. The incorporation of the Inupiat into the monetary market system and the commercialization of the Inupiat economic system continued alongside

the traditional socioeconomic system. With the decline of each economic development period, the traditional Inupiat socioeconomic system reemerged as the primary economic system; however, it was never again as autonomous as it had been in the aboriginal period.

The Contemporary Period

POLITICAL DEVELOPMENT

Aboriginal Inupiat societies have been described in the classic ethnographic literature as devoid of formalized political institutions. Now, however, defining political institutions solely in terms of a non-kin based centralized state operating within a defined boundary has been rejected by many social theorists (Balandier 1970; Schapera 1967). Social scientists increasingly characterize political development less by type of institution than by the functions performed.

To date, a detailed analysis of the Inupiat aboriginal and early historic political sphere has not been done. However, many references are made in the literature to the organizational forms which helped to establish and maintain the internal cooperation and external independence of Inupiat societies. Additionally, traditional forms persist into the contemporary period for example, the whaling captains' associations, which demonstrate an interaction between the past and ethnographic present.

The contemporary period began with early attempts by the Inupiat to

politically organize themselves on a regional basis in the 1960's in response to state selection of Native land under the Alaska Statehood Act, the Native land claims effort, and the State's sale of oil leases at Prudhoe Bay. The communities had elected village councils long before then; in fact, several councils had been formally organized and functioning for as long as 50 years. These village organizations provided the base for regional awareness and development of the North Slope.

Village Councils

The western model of formalized political organization in the region began with formation of village councils, promoted by missionaries and teachers to encourage democratic forms of local leadership. However, while it appears that the formal council organization is recent, participation, function, and decision-making processes are well grounded in traditional law ways and values. These communities are said to be organized on a "traditional basis" or to have "traditional" governments.

The second form of village governments comes from provisions of the Indian Reorganization Act (IRA) of 1934, extended to Alaska in 1936. The objective of the IRA was the political and economic assimilation of Native American societies into the larger national society by changing the structure of Native communities. The IRA provided for the formation of autonomous economic and political institutions based on the United State Constitution. Such IRA organizations include federally recognized tribal governments but are not incorporated cities under state law.

There are other IRA villages which are organized according to the conditions of membership, regulation of internal affairs, rules of inheritance, and disposition of tribal property, established by IRA rules, but which are not formally incorporated by IRA. Some communities are organized under the IRA and also formally incorporated under state laws. State-incorporated villages have varying municipal powers and responsibilities depending on their class status. However, as Brøsted (1975) pointed out in his study of Ulḡunik (Wainwright), the differences between villages organized on a traditional basis and those formally incorporated under state law are actually negligible. He noted that traditional councils without a formal jurisdictional basis function as formally organized governments, assuming control of domestic affairs and external problems and relations.

The forms of government and populations of North Slope communities in 1970 were as follows (Federal Field Committee 1971):

<u>Community</u>	<u>Form of Government</u>	<u>1970 Population</u>	<u>Percent Native</u>
Anaktuvuk Pass	4th-Class City	99	98%
Barrow	4th-Class City	2,104	90%
Kaktovik	Traditional	123	88%
Point Hope	4th-Class City	386	97%
Wainwright	4th-Class City	315	97%

Those cities categorized as fourth class became second-class cities in 1972 as a result of legislative change. Barrow was later upgraded to a

first-class city. A discussion of the government of these communities now follows.

Wainwright. Brøsted's 1975. study of Ulḡunik (Wainwright) presents a fairly detailed description of the town council in the early 1970's and provides insight into the development of local responses to external affairs and the integration of the village into the emerging regional organization of the North Slope. This study may be fairly generalized to characterize all North Slope village councils. Brøsted's work is the only recent available documentation on the village council but it generally characterizes all village councils and will be used extensively. Other village councils will be discussed to illustrate the Inupiat adaptations of a western government model.

The State has vested formal legal requirements, responsibilities, functions, and authorities in city councils, but village councils as they operate today are also greatly involved in traditional affairs. Brøsted's study reveals that since not all internal social problems are regulated by ordinance, decisions are often based on unwritten laws. Council deliberations often encompass matters dealing with social control, and complaints are often brought before the council before they are referred to the magistrate.

The following excerpts from Brøsted's minutes of several council meetings demonstrate the informal relationships the council has with various social entities in the community, which serves to strengthen its authority.

Also, council meetings often involve people who are not present, in which case either someone goes to get him or he is asked to report to the council later. Discussion topics are characteristic of North Slope village life:

. . . suggestion was made by N. to open Bingo game for the city.

. . . the VFW reports that VFW will pay wages for one police for the whole year. Also reports that VFW can be of help to anybody. . . For one policeman is \$300 yearly. They are also putting **\$15** per bingo game for new Community Building.

There **shall** be dances held in **Wainwright** as of this date voted for . . . by the majority.

N. left to go get 0 for finding about Rec. Corn. (Recreation Committee) earnings. 0 reports that since he took over . . . had \$482.85 . . . Supposed to have \$678.94 . . . Committeeman had borrowed an amount of \$196.09 . . . Needs to pay \$50.59 to clear his name (debt).

Mayor's first subject was selecting 2 delegates to AFN (Alaska Federation of Natives). . . VFW will take care of one of the delegates and the Rec. Corn. the other. . . .

. . . **whaling** captains had told the mayor to let the council stop

the bingo games ~~till~~ the whaling season is over, this is due to hardly any men at the camps on some bingo nights, votes will be taken whether to have Bingo games during the whaling season. . . . No Bingo games till whaling season is over with exception of having it during blizzards.

The recreation committee referred to in ~~Brøsted's~~ minutes falls under the authority of the council because recreation is one of two powers of the City (fire protection is the other). It raises funds by holding bingo games. The Council determined that 70 percent of the money raised could be kept by the recreation ~~committee~~ while 15 percent is taken for tax and 15 percent for the Community Building Fund which the residents plan to build. Additional uses of these funds include the large feasts held during Christmas week and search and rescue efforts for those lost on the tundra.

Like other city councils, the village council is concerned with educational programs, health issues, public welfare matters, and utility projects. Presently, they serve only in an advisory capacity on educational matters since the Borough is now responsible for education. Although the council represents all village citizens, it is heavily involved with Alaska Native affairs and the integration of the village in the regional organization as the following excerpts from ~~Brøsted's~~ minutes show:

N is reporting that the meeting he attended at Barrow with ASNA (Arctic Slope Native Association). He reports the oil co. is

planning to put up a pipeline from Fairbanks to the Arctic Slope. The ASNA is trying to stop it so the caribou can be free to roam back and forth. Also water pollution in the rivers from chemicals from oil drillers. This water pollution might kill the fish. O is reporting while at Barrow that Fred Paul the Attorney for ASNA told him that the people here should unite to help the association at Barrow.

Mayor P read a letter from Attorney Fred Paul concerning starting a borough in the Arctic Slope. The members agreed to have a borough so the natives have more say over what they done or not.

Next is a **letter** from William **Hensely** concerning the endorsement of Byron Mallet for Rural Cap Executive-director. The council is now endorsing him for that post, also the people will sign their names when this paper is hung at the store.

Sam **Talaak** of ASNA, Barrow is now talking about the matters. He is saying that **Wainwright** should make out a charter for IRA of 1934. . O . The council would write to Peter Three Stars to find out how to go about the matter. Barrow, **Wainwright**, Pt. Hope, Barter Islands and **Anaktuvik** Pass will make out one corporation and chartered under about the **ASNA**. He is also saying that Stevens Village was recognized by the U.S. Court under its IRA Charter of 1934, while Beaver, **Wiseman**, and **Minto** were not, due to not having this Charter. . . . Barrow was in 1939 organized after the Indian

Reorganization Act, and in the part about the city's authority you can read: "The Village shall have the following powers:

. . . to stop any giving or taking away of Village lands or other property without its consent, and to get legal aid, as set forth in the act of June 18, 1934. (From Article 4, Constitution and By-Laws of the Native Village of Barrow.)

. . . people chosen as a committee to draft to Congressman Haley.

The letter is to express we need more land than what was passed on the last Bill in the Senate. Discussion on land claims: The 40 million acres should be retained agreed by the natives in 1967. . .

We want the 40 million acres of land agreed by our native leaders, even (though) we the people in this village do not think it is enough to take care for our substance. We always need about 750,000 sq. miles to hunt for our main diet. . . . T, is appointed to see about getting transportation to D.C. X drafted the letter to congressman Haley, Washington D.C. Copies of letter is to be sent to Tundra Times, ANB, ASNA, and the N.Y. Times. . . . N and Z is to explain to the people concerning writing letters on this land claims issue, each is to read the letter drafted and hunged at the store before they write themselves to Congressman Haley.

The letter on the Alaska Native land claims bill referenced in the minutes was written to Congressman Haley in September 1970. The letter demonstrates the degree of political sophistication and knowledge of the federal legislative processes the Inupiat had even then. The following

paragraph was abstracted from the letter written to the congressman from the Village of **Wainwright**:

May we make ourselves clear. We are concerned for our hunting grounds. This land has belonged to our fore-fathers since **all** remembrance. In that time it has been established that for our village to exist, we will need to retain a minimum of 150 miles to the south and 150 miles to the east and 45 miles to the north for a hunting ground. This land is not the type that is able to produce any type of crops even to a small garden. There is some grass and a few berries but not enough to exist on. Our only **live-li-hood** and food comes from the range animals, i.e. caribou, fox, moose, fish, wolf, wolverine, bears and game birds. 100% of the people's total subsistence depends on these hunting grounds.

The land is our prime concern. However we are concerned not only for ourselves but for our grandchildren and their grand-children. We would therefore ask that the 2% over-riding royalty on the mineral holdings that has passed the Senate; be changed to a perceptual (perpetual) 2% basis.

The letter identifies the area the people utilize and illustrates residents' view of their settlement pattern, a view which differs considerably from traditional government townsite surveys which treat communities in terms of residential, commercial, and community facility land uses.

Point Hope. Although Van Stone's account of Point Hope's council was written 15 years before **Brøsted's**, there are many basic similarities. Point Hope's council was originally organized in 1920 (under the church's influence) and was later incorporated under the IRA. Van Stone noted that the council was involved in many aspects of village life, including the settlement of minor disputes between individuals or families which they could not resolve themselves. The council acted as a rule-making and law enforcement body, and although it had no power to enforce its ruling, it was effective because of the pressure of public opinion and the prestige of the council members. In instances where the council must take disciplinary action, there is an attempt to avoid open conflict with the individual or between individuals involved. By the time the council has decided to take disciplinary action the decision is generally **unanimous**. Conclusions were reached after lengthy discussions. Occasionally formal votes were taken, but generally everyone was in agreement by the time a matter had been fully discussed. As at **Wainwright**, if the presence of a villager was required during the course of a meeting, the council **marshall** went to get him. From Van Stone's account, it is evident that traditional **law** ways governed the resolution of conflicts. He noted that decisions reached by the council were based on precedent and that the council was loathe to put aside any old customs. Although the traditional laws are still not codified, they are well known by the community, particularly those laws governing hunting behavior and distribution of animals caught (Van Stone 1962).

Kaktovik. Although Kaktovik was classified (page 55) as having a traditional form of government in 1970, Kaktovik may **also** be an IRA government. Chance (1966) reported that in spite of the rapid changes that had occurred in the village because of relocation and DEW Line construction, the effectiveness of the traditional leader was unimpaired and traditional kinship ties remained strong. The practice of extending kinship privileges to non-kin by means of traditional formal partnerships may have served to integrate non-kin into the community. This may explain why Kaktovik did not formally incorporate as a fourth-class city until 1971.

Anaktuvuk Pass. New communities such as Point Lay, Atkasook, **Nuiqsut**, and Anaktuvuk Pass, were established within areas which were traditionally used as hunting and fishing camps. Anaktuvuk Pass was the first new town in the Arctic. The settlers represented two interrelated nomadic groups who decided to form a community because they wanted their children to learn English and to trade with the trapper who had recently arrived in the **area**. R. Rausch, who was a biologist with the Arctic Health Research Center at the time, was present in the Brooks Range when the **Killik** segment joined the **Tulugak** group in the summer of 1949. He reported that they knew no English and existed almost exclusively by hunting (Rausch 1951). In 1960 two families living 20 miles north of the village were the last of the two original groups to move into town.

The impetus for formal incorporation of Anaktuvuk Pass as a fourth class city in 1947 has not been ascertained, but it was a year or two years

after the church was constructed and three years before a school was established. **Gubser** (1965) described the two original groups as factions but noted that internal tension between the two groups should not be considered a dominating force in Anaktuvuk Pass social and cultural affairs. Marriages occurred between members of both factions, and some persons changed their alignments from one group to another. When group effort was required or the group as a whole was threatened, the two factions acted together. **Gubser commented** that the factions were most evident in political conflicts and times of economic crisis. **M.S. Cline**, who was a school teacher at Anaktuvuk Pass from 1967 to 1969, reported that the two factions had persisted and that the **Killik** faction was larger and thus in a position to dominate the **Tulugak** faction. He described a conflict in 1967 that split the villagers and council along factional lines (**Cline** 1975). The disagreement arose when the community was faced with a shortage of willow which was the fuel source. One group wanted to move the village to **Umiat**, about 100 miles north, while the other group wanted to remain at Anaktuvuk Pass. Government officials were called in to assist in finding a solution, and they proposed that those who agreed to remain would be provided fuel oil, stoves, insulation, and plywood for their houses while those who moved would get no assistance.

Cline also described the village council as it was functioning in 1969. He stated that a primary function of the council was representing the people to the "**Tanik**" (non-Inupiat, white) world. The council dealt mainly with Bureau of Indian Affairs and state matters involving the village. Minor village affairs were handled as needed, but major policies

were decided at general meetings attended by all adult residents. As in other villages, the Anutuvuk Pass council intervened in matters of social control that go beyond the realm of most city councils. They helped settle marital difficulties, alcohol problems, and other individual conflicts which could not be privately resolved.

Barrow. The Inupiat from **Utqkeavik** and Nuvuk united to form the present **community** of Barrow. It was also populated by members of various inland groups and southern coastal communities who migrated to Barrow during the commercial whaling period. **During** the military construction period, Barrow attracted more Inupiat from **Wainwright** and other communities. More so than elsewhere, Barrow residents have kinship ties to all other arctic communities. In spite of the diverse population in Barrow, blending has been smooth since they all share a common cultural background.

This unity was clearly demonstrated in an incident that stimulated regional unification. The event, called the "Duck-In", occurred in the spring of 1961 when 138 Barrow hunters shot eider ducks after two hunters had been arrested by federal agents for hunting fowl out of season. The rights of the Inupiat to hunt and fish in their aboriginal homeland had never been challenged until 1961. However, the International Bird Treaty of 1916 between the United States, Great **Britian**, and in 1937 by Mexico, threatened this basic freedom. The treaty allowed Eskimos and Indians to take a few species of seabirds in any season but prohibited the harvest of other migratory fowl from March 10 to September 1. Birds which

could be taken were available to only a few coastal communities, and the treaty set the open season on migratory fowl during a time that they were not present along the Arctic coast (Day 1969).

From 1916 to 1961, the Inupiat continued to harvest eiders as they had for thousands of years. Probably few, if any, Inupiat were even aware of the treaty. Yet, 45 years after the treaty was signed, three Barrow Inupiat were arrested for violating it. The enforcement officer was called to a Barrow town meeting, the "Duck-In", where 138 hunters, each with an eider duck in hand and a written statement saying he had taken the fowl out of season, were waiting. A petition had been signed by over 300 Inupiat demanding that President Kennedy issue emergency regulations permitting them to hunt migratory waterfowl for food at any time of the year and that treaty regulations be renegotiated to reflect the Inupiat right to harvest.

Etok (Charlie Edwardsen, Jr.) from Barrow, stated, "We were so well organized that if they had arrested every man in Barrow, the womenfolk were going to be next. An then the children." (Gallagher 1974). Lantis (1973) wrote about the "Duck-In," "This unprecedented display of unity and determination by the men of the community, including a State senator . . . a president of the village council, and other leaders, obtained public attention through wide newspaper coverage." The story was carried in all major newspapers with most condemning the enforcement action. The U.S. Attorney representing the Department of Justice declined prosecution of the 138 Inupiat stating, "Although there were definite technical

violations, it is our decision in declining prosecution that since the problems of the federal agencies involved, it is our firm hope that the Eskimo people, having achieved national recognition of their difficulty, will rely in the future on the legislative process rather than intentional violation of federal laws." (Day 1969). With little support from the Department of Justice, the federal Fish and Game Bureau declined to risk an open "shooting war" during the following year's closed season.

The Barrow Inupiat also asserted aboriginal rights to the natural gas in the Naval Petroleum Reserve and requested that their homes be supplied with the fuel. It was already being provided to the five federal installations at Barrow. Lantis (1973) reported that they later did get natural gas for their homes, but it was granted "as a welfare measure."

Summary

Although the village councils are structures after a western municipal governmental model and fulfill the necessary obligations demanded by State laws, they appear to have extended the functions of the council. The Inupiat have been successful in incorporating the council into their traditional values, activities, leadership patterns, and methods of decision making. Traditional **lawways**, particularly those relating to hunting behavior, have survived. Council members maintain a close identity with the community by continuing to interact with community members. The councils, particularly in the smaller villages, appear to be effective in **controlling social** behavior and arbitrating interpersonal

conflicts. The councils tend to involve the entire community when major decisions must be made. Although, by law, the councils represent Inupiat and non-Inupiat, participation has been almost exclusively Inupiat. The councils also focus considerable attention on distinctly Native issues. The village councils have demonstrated a willingness and capability to respond to major crisis events. The councils were successfully integrated into the **community** and were ready to initiate and respond to increasing pressures for regional government development.

Regional Development

The political evolution of regional organization among Alaska Natives was described by **Worl** (1976) in her testimony before Senator James **Abourezk's** Senate Subcommittee on Indian Affairs. Hearings were held throughout the state to discuss the definition of "tribe" as it relates to Alaska Natives. Since the testimony was largely based on **Worl's** research in Barrow, sections will be abstracted to provide an introduction to the **centralized** organizations operating in the North Slope Beaufort Sea Region:

Political unification of various tribes within Alaska began when aboriginal land and hunting rights were threatened. Throughout various areas there was a movement towards regionalism. In Southeast Alaska, the **Tlingits** and **Haidas** followed by the **Athabaskans** and the North Slope Eskimos all united against common threats. Regional groups organized themselves on aboriginal concepts of land use and

occupancy patterns within regions. This natural evolution of regionalism in response to impinging forces could have occurred in aboriginal times. If they had, their regional entities would have been known as "tribes", but the fact that they occurred in **historical** times, they were **called** "Associations" instead, but the concept remains the same. It may seem that I am belaboring a point, but I would like to emphasize that the evolution of 12 regional entities was a self-initiated action. If the groups had decided to call themselves "tribes" it **would** have been as legitimate as calling themselves "Association".

The regional entities were further codified into law with the passage of the Settlement Act. However, there were basic differences with which we are **all** familiar. I am speaking of the mandated profit-making characteristic. For the purpose of this investigation (definition of tribe) the "membership" limitation defined by law, must be the primary consideration. While the original regional entities included full membership, (of all Natives within a region), the corporations will facilitate the disenfranchisement of children born after the date of the passage of PL 92-203. (Alaska Native Claims Act) Although it is foreseen that some children will **inherit** "shares", it is also a foregone fact that not everyone, even today shares equitably in the distribution of the economic and political benefits of the Settlement Act in terms of land, monetary income, and the right to vote or be elected to governing board of directors of village and regional corporation. Moreover, it is

just as certain that under present legislation, membership in these native corporations will include non-natives.

Thus, in Alaska we have regional entities which include (1) the self-created regional associations, and the **Tlingit** and Haida Central Council which is distinct from the other associations because of its previous legislative and judicial history. (2) the **profit-making** corporation created under PL 92-203 (3) the regional IRA of the North Slope, the Inupiat Community of the Arctic Slope (4) the North Slope Borough, a state municipal government (5) in addition, Alaska has a number of regional-wide Reserves.

It is my opinion that the North Slope Inupiat took a progressive step in their formation of the North Slope Borough along with their regional IRA. (Tribal Government created under the Indian Reorganization Act) Each Organization had its own function be it a **profit-making** orientation or providing governmental services. It is an action that I am certain will be repeated in other rural areas because of the potential benefits. In the words of Joe **Upicksoun**, President of the Arctic Slope Regional Corporation, "We created a government to take care of governmental functions and to deliver governmental services." Unlike the urban centers where natives are the minority and their influence in municipal governments limited, the North Slope Borough is a predominately Eskimo municipality.

Unquestionably, Alaska Natives are at the threshold of rapid and

significant cultural and social change. The situation in Alaska is complex, but perhaps the most critical factor to note is that Alaska Native Organizations are in a stage of flux. Although, the Settlement Act offers threats of potential conflict within the **intercorporate** relationships, these relationships and the delegation of functions and powers between regional entities and between local and regional organizations are currently being resolved.

Inupiat Paitot. In November 1961, several months after the "Duck-In" incident, the Northern Inupiat gathered together for the first time since the days of the great trading fairs. Village leaders met in Barrow at a conference named Inupiat Paitot (People's Heritage) to discuss their common problems. They discussed, among other issues, the right to hunt eider ducks and the proposed Project Chariot, which involved a nuclear experiment (later abandoned) to excavate a harbor at Cape Thompson. Other topics of discussion included construction of local high schools so that students would no longer have to leave home for secondary school and the practice by many contractors in the Arctic of importing their labor instead of hiring Eskimos. The introduction to the conference conclusion statement read: "We Inupiat have the same problems in all areas of Alaska. Now we know this, and we have joined together to solve these problems. . . . Our problems are two kinds: (1) Aboriginal land and hunting rights. (2) Economic and social development." (Lantis 1973).

A second Inupiat conference was held in 1962. Guy Okakok of Barrow, together with a representative of the Association on American Indian

Affairs which had rendered financial support, traveled to the villages. Lantis (1973) stated, "Their **communication** in English and Eskimo languages of ideas from village to village must have not only sustained people's interest in united action, but achieved some unity in their thoughts and attitudes."

Land rights were of continuing concern. The Inupiat **Paitot** brought Inupiat concern to the statewide meeting where it agreed to affiliate with the **Athabaskan's Tanana** Indian Conference and the Alaska Native Brotherhood representing the **Tlingit** and Haida Indians.

Arctic Slope Native Association. The Arctic Slope Native Association (**ASNA**) was the parent organization of the Inupiat Community of the Arctic Slope (**ICAS**), the Arctic Slope Regional Corporation (**ASRC**), and the North Slope Borough (**NSB**). While Inupiat Paitot included the Inupiat from northwestern and northern Alaska, ASNA (or as it was originally called the North Slope Native Association) would represent only the Native people north of the Brooks Range. The new organization, founded by Etok (Charlie Edwardsen, Jr.), had as its objective the resolution of aboriginal land claims of the Inupiat.

Etok wrote letters to all the villages, and the first meeting at Barrow on January 15, 1966 was attended by more than a hundred people from the region. Etok told the group that the land they had viewed as theirs was not recognized as such by the U.S. government. He told them that the Navy had taken Petroleum Reserve No. 4, the Department of Interior had

taken the Arctic **Wildlife** Refuge, and that the state and federal government had the **power** to take even the land on which their houses stood. He reiterated the **legal** rights the Inupiat had to the **land**. Land used and occupied by Alaska Natives was owned under **the legal** doctrine of "Indian" or "Aboriginal" Title and could not be extinguished until ownership was transferred to the federal government. Noah Itta responded:

I am happy that there are, at last, people taking action to protect the traditional hunting land of the Eskimo; in the past, we have **always** traveled the coast, the tundra, and the foothills of the mountain to the south in the ever-shifting pursuit of game to feed our families. Now I see these lands will be retained for my people and their children's children. My heart is happy. (Gallagher 1974)

Etok had met the **old Tlingit** warrior William Paul, Sr., who was the first Alaska Native lawyer and had pioneered the Alaska Native land claims effort since the 1920's. Paul was repeatedly to say to young Native leaders, "The **land** is yours. Why don't you fight for it?" Etok faced the conflict this challenge created, "To stay the way we are we have to fight. But if we fight, we are no longer the way we are." Etok chose to fight for the **land**. On January 5, 1966, Etok wrote to William Paul and requested his counsel. William Paul (1966) in **behalf of** the North Slope Inupiat filed a blanket claim to the U.S. Department of Interior for absolute title to all their aboriginal land, which included **land** north of the Brooks Range.

ASNA went on to become one of the most powerful regional organizations

in the Alaska Federation of Natives (AFN), which was the statewide Native organization. ASNA stood firm through the land claims battle, contending repeatedly that Congress was settling legal claims to land and not enacting an antipoverty or social welfare legislation. ASNA's position was that the land claim settlement must be based on a regional land-loss formula. Under the land-loss **formula**, each region would receive financial compensation and confirmation of fee title to land in proportion to its aboriginal land holdings within its region which would be extinguished under a settlement act. They advocated that since the Inupiat held aboriginal title to 56.5 million acres, which represented 15 percent of statewide acreage, ASNA should receive a proportionate share, of nine million acres, of the 60 million acres then proposed as the settlement. ASNA broke with the AFN unified front when the AFN board of directors voted for a distribution formula which allocated monetary portion of the settlement based on population.

Under terms of the Alaska Native Claims Settlement Act (85 stat. 688) which passed Congress in 1971, Alaska Native corporations, 12 regional and over 200 villages, would receive 40 million acres, both surface and subsurface, Village corporations would receive the surface estate to 22 million acres to be divided among the villages according to population. The regional corporations would receive the subsurface **title** to the 22 million acres patented to the villages and full **title** to 16 million acres, divided among the regional corporations on the basis of the total area in each region or a land-loss formula rather than on the basis of population. The remaining two million acres would be **alloted** for Native historical

sites, and for other communities which did not qualify for land entitlements or village corporation. The \$462,500,00, to be paid over an n-year period from U.S. Treasury funds and an additional \$500,000,000 from two percent of mineral revenues received from state lands, will be divided on a population basis.

An AFN convention was called for the same day that the settlement act was to be signed into law. The Native organizations planned to review the legislation as if they constituted a sovereign nation and then vote on ratification of the "treaty" with the United States. ASNA was not satisfied with a land claims act which they felt was unjust and inequitable. It sent a telegram to President Nixon urging him to veto the legislation. When the roll call vote was taken at the AFN meeting, ASNA was the sole Native organization to cast a negative vote.

The primary effect of ASNA, outside of the land claims resolution, was the political unification of North Slope groups. The **Nunamiut** (represented by those living in Anaktuvuk Pass), the Inupiat group at Kaktovik (who had closer ties to their Canadian relative at **Inuvik**), and the coastal **Tagiugmiut** unified in a centralized organization. This unification was achieved through the village councils, which sent representatives to ASNA meetings. The role of the village councils did not diminish, but greater activity occurred at the regional level. Village councils were increasingly exposed to proposed land claims legislation and new concepts of corporate ownership, land ownership, and resource utilization.

ASNA drew the Inupiat into statewide and national politics as well as interaction with other Native organizations. The local leadership role remained based in traditional patterns; however, **the** regional organization allowed for increasing participation by younger, more educated Inupiat males to deal with external affairs.

Although the land claims effort had focused on land for hunting and fishing, ASNA viewed the regional corporation's role to include the promotion of the health, welfare, education, and economic and social well-being of its stockholders by fostering industrial and economic development. ASNA promoted the establishment of a borough government under state **law** and a regional **IRA** tribal government under federal statutes so that leadership responsibilities would be shared.

The Inupiat Community of the Arctic Slope. Not highly publicized or generally well known was the formation of a federally recognized tribal governing body under the Indian Reorganization Act of 1934 (48 Stat. #378), extended to Alaska with the Alaska Act of May 1, 1936. (49 Stat. 1250). The Inupiat Community of the Arctic Slope (**ICAS**) was established before the North Slope Borough or the Arctic Slope Regional Corporation (**ASRC**) with the ratification of its constitution and bylaws on August 26, 1971. Of 1,190 qualified Inupiat electors, **541** voted for and 18 voted against their adoption.

The formation of ICAS was originally conceived within ASNA which recognized the merits of forming a region-wide IRA government. The **ICAS**

was originally designed to manage the political and business affairs of the Inupiat people. The positive powers and authorities of the ICAS flowing from tribal authority include contracting to administer BIA and Indian Health Service (IHS) programs, such as educational, social service, business, and health programs. Additionally, the ICAS has tax exemption possibilities and other potential advantages that have yet to be explored. Although the ICAS has as yet not functioned to its full potential which as yet has not been thoroughly explored, the ramifications can be significant. Possibilities of conflict with the NSB exist. Currently, the North Slope Borough is contracting health programs under the authority of the ICAS. ICAS is just now beginning to expand its operation. Clearly, a redundancy of functions could develop, but at this time it appears that the North Slope Borough and ICAS have established a cooperative arrangement to provide services.

The Alaska Native Claims Settlement Act (ANCSA) which provided for the conveyance of both property title and a monetary award in settlement of the Natives' aboriginal claim has been viewed by some Natives as a possible "Termination" vehicle which would sever the federal trust relationship with Alaska Natives. ICAS, together with several Indian legislative acts passed by Congress after 1971, reasserts a federal trust relationship with the Inupiat of the Arctic Slope. Its constitution provides for perpetual membership of Inupiat children.

The Arctic Slope Regional Corporation. The role of the Native regional corporations was specifically mandated under terms of the Alaska Native Claims Settlement Act. The Arctic Slope Regional Corporation (ASRC)

was incorporated to manage and invest its entitlement under the ANCSA of 5.6 million acres and \$36 million, and all other corporate assets on a profit making basis for the benefit of its stockholders. The 5.6 million acres was selected from unrestricted lands outside the 23 million acre National Petroleum Reserve- Alaska and the Arctic Wildlife Refuge. Villages located within the petroleum reserve and **wildlife** refuge were **able** to select their corporation surface entitlements within the reserve and refuge. Any Alaska Native who was 1/4 degree or more Indian, **Aleut**, or Eskimo born on or before the passage of **ANCSA**, December 18, 1971, was considered eligible to enroll as stockholders. Alaska Natives enrolled to regions where they resided in 1970 or regions where they were born or had lived for an aggregate of 10 or more years. ASRC identified approximately 3,900 stockholders eligible to receive 100 shares of ASRC stocks.

Many largely unresolved questions have been raised about the forces generated by the passage of the land claims act and its effect on the Inupiat life-style. How, whether, and to what extent would the **sociocultural** characteristics of the Inupiat be transformed or manifested in the new organization? The corporate structure appears to contradict many of the traditional Inupiat values of sharing, cooperation, and equality. Could the regional and village corporations be compatible with traditional economic subsistence systems and still fulfill their financial obligations? The Inupiat had adamantly maintained throughout the land claims effort that substantial acreage should be transferred and confirmed from aboriginal to fee title. How would the new relationship to the land affect the survival of the Inupiat? Would the regional corporation be

able to avoid the conflict inherent in owning the subsurface estate of land owned by the village corporation? Would the region, bound by a profit-making mandate, be put into the position of having to pressure villages to develop land which they might wish to maintain for subsistence?

ASRC opened for business in Barrow in March 1972. Approximately 3,900 Inupiat were eligible for 100 shares apiece in the corporation. Already this means that not all Arctic Slope Inupiat share equally in the corporation, including Inupiat born after December 18, 1971 who may never be able to participate in the village or regional corporation except by inheritance. Today there are Inupiat who own 100 shares, others who through inheritance own more than 100 shares, and others own less or none at all. Although by law the shares may not be alienated by Inupiat shareholders until 1991, it is considered possible that non-Inupiat may already have access to shares through a trust guardianship arrangement. High birth rates, interracial marriages, and sales of shares after 1991 will further dilute per capita ownership and create further inequities between shareholders.

Land Status Following ANCSA. Like the Migratory Bird Treaty of 1916, the establishment of the 23 million-acre Naval Petroleum Reserve No. 4 (NPR-4) in 1923 meant little to the Inupiat at the time; few even knew of its creation. There was no immediate evident change, and the Inupiat continued to use and occupy land in the reserve.

When mineral exploration in NPR-4 began, the Inupiat participated in the cash employment opportunities as they had during DEW Line construction. However, after exploration and construction activities ceased, the Inupiat were left with scarred and eroded tundra littered with debris and gas drums. They used what gas they could find remaining in the drums for fuel and began to use the drums as land markers.

In 1960, the Arctic National Wildlife Range including 8.9 million acres in the northeast of the Arctic Slope was established. The significance of the petroleum reserve withdrawal in 1923 and the establishment of the 8.9 million-acre Arctic National Wildlife Range in the northeast Arctic in 1960 was not fully realized until the land claims effort began. ASRC was not allowed to select **lands** within **NPR-4** or the Arctic National Wildlife Range. Barrow began to grow but could not expand into **NPR-4**.

The Alaska Native Allotment Act of 1906 authorized the Secretary of Interior to grant up to 160 acres of land to each qualified Alaska Native applicant. By December 1971, approximately 250 applicants were filed for land in the Arctic region, mostly for sites near the coastal zone from Harrison Bay to Cape **Lisburne** but also along rivers at traditional land use sites. Because the applicants had to prove they had personally used the **sites** prior to the establishment of the Naval Petroleum Reserve in 1923, the applications were not accepted, and court action is currently in progress.

Wainwright, Barrow, and Kaktovik were allowed to select their village

surface entitlements from both federal withdrawals, and **Atkasook** and **Nuiqsut** were allowed to **select** lands in NPR-4. Point Lay, outside **NPR-4** selected its lands from areas outside federal withdrawals.

The creation of the village of Anaktuvuk Pass and the reestablishment of traditional settlements at Point Lay, **Atkasook**, and **Nuiqsut** were reversals of the migration and settlement patterns that have characterized **rural** Alaska in the past. That trend was summarized as follows by Hippi er (1969):

There appears to be several stages in this process of agglomeration, some of which are completed and others **still** under way. With the advent of traders, missionaries and in more recent times, medical and educational practitioners in the outlying areas of Alaska, native Alaskans began to settle in groups near such services to take advantage of them... as natives came to need money to buy the newly discovered Euro-American material goods. The population began to concentrate more and more in communities large enough to offer some cash employment.

Anaktuvuk Pass, Point Lay, **Atkasook**, and **Nuiqsut** appear to reverse this process of agglomeration. The **Nunamiut** who had left Barrow in 1930 and 1938 migrated to the Brooks **Range** continued their nomadic lifestyle until they settled in Anaktuvuk Pass. Point Lay which was an aboriginal use area was resettled in the **historic** period and **Atkasook** and **Nuiqsut** also represent a return to their traditional homeland. While the three

resettled sites were never completely abandoned, the land claims settlement permitted the reestablishment move and construction of new homes. None of the new communities offered employment opportunities or the amenities of modern living, and life there generally required intense reliance upon subsistence activities.

In 1991 all landholdings of the region and village corporations become taxable to all property taxes, even if the land remains undeveloped. The village corporations, which have limited income, will be under great pressure to develop their land. The predominantly Inupiat North Slope Borough administration and elected assembly undoubtedly had the taxation of Native corporations in 1991 in mind when they adopted the extensive Capital Improvement Program.

The issue of land trust responsibility between the federal government and Alaska Natives will probably be raised. Arnold (1976) offered the following "restrictive" definition of this trust responsibility regarding land and resources: "The exercise of this trust responsibility exists because the lands and resources of Indian tribes and communities are typically held 'in trust' for them by the Department of Interior." Recent events suggest that the trust relation will persist, despite resolution of Native land claims. Recent legislation, such as the Indian Self-Determination and Education Assistance Act (PL 93-638) continues to recognize and extend trust rights to Alaska Natives.

Edwardsen vs. Morton. A complex legal case, **Edwardsen vs. Morton**, which eventually involved more than 100 defendants, including some of the world's largest oil companies, contractors, and the State of Alaska, began over property rights. In **1971**, just prior to the passage of ANCSA, Edwardsen and several other Inupiat filed a class action suit in federal court against Secretary of Interior Morton, arguing that all land dispositions on the North Slope prior to the settlement of their land claims were invalid. Charles Edwardsen, Jr. (Etok) claimed that the Interior Department had been derelict in its responsibility as a trustee in protecting lands claimed by Alaska Natives from third parties and that Inupiat hunting and fishing areas, graveyards, and consecrated areas were damaged by oil- and gas-related activities. Federal District Court Judge Oliver **Gasch** ruled in 1973 that land disposition and transfer of title could not be attached but that trespass action could be initiated against non-Native users of Alaska lands before December 1971. The decision required that the Interior Department, through the Justice Department, seek trespass damages from firms operating on the slope before passage of the settlement act. Federal attorneys filed the trespass suit in 1975 against **13** major oil companies, the State of Alaska and 112 other individuals.

In June 1977, Judge Fitzgerald of the U.S. district court ruled that the 1971 claims act settled all claims based on aboriginal title, use, and occupancy and granted the defendants' motion to dismiss the trespass case (Matthews 1977). The decision may be appealed.

The North Slope Borough. Creation of the North Slope Borough (NSB) was originally conceived by the Inupiat Leadership as a method to protect the arctic subsistence economy through zoning regulations, a means to select 10 percent of state-selected lands within the region, and a system to provide local services and education through tax revenues from oil development. A petition for incorporation of the North Slope Borough was filed before the State's Local Affairs Agency by ASNA in April 1971.

The creation of a borough government was overwhelmingly supported by the North Slope Inupiat. At the Alaska Local Boundary Commission hearing, Alfred Hopson made this plea for the borough:

Our people lived **here** before your ancestors ever came to the United States **and** here we are, begging for some land. The white man has gardens to provide his food. Our apples, our oranges and our potatoes were running around all over the country and we had to follow them if we wanted to eat. The struggle for survival is based on the fact that we needed the **whole** Arctic Slope to survive. (Shulman 1971)

The boundary commission approved creation of the North Slope Borough in February 1972. The seven major oil companies operating in the area immediately started **legal** proceedings to halt its formation. The companies had urged the courts to rule that they were deprived of property without due process of law because they owned 98.5 percent of the assessed valuation of the entire borough and would pay nearly all of the taxes while receiving little in the way of benefits (Getches 1973).

Borough formation survived these **legal** actions and **NSB** was incorporated in the summer of **1972**. Like the village council, the borough concept was non-Inupiat. The Inupiat had already demonstrated that they could adapt the council to respond to their traditional values; the question now was whether the borough structure was flexible enough to incorporate those same values on a regional scale. The Borough's home-rule charter was patterned directly on those of other borough governments in the state.

Volumes **have** been written and compiled on the North Slope Borough's operations, **CIP** projects, financial statements, community inventories, and numerous other reports and surveys. Other than noting the predominant Inupiat population, it might never be known from these reports that the Borough exists as part of a culturally distinct society. The NSB established administrative offices, commissions, committees, and a higher educational institution that reflect the **sociocultural** characteristics of its population.

The Inupiat are the predominant permanent population living in the traditional settlements and, as a result, hold most of the Borough's elected and appointed positions including the borough assembly and its commissions and committees. Naturally enough, the Borough reflects the people's desire to foster the Inupiat culture in **all** of its programs. This **cultural** preoccupation is unique in the state's boroughs to the North Slope Borough, and it manifests itself in many ways.

One of the primary incentives to formation of the borough was the desire to control the education of Inupiat youth and to end the practice of

having to send students to distant boarding schools. Culturally, the boarding school program had proved disastrous, and when 11 North Slope students were killed in 1971 enroute to the BIA boarding school at Mt. Edgecumbe, dissatisfaction with this system boiled over into a demand for change. The formation of the Borough permitted the establishment of a local school district and high school.

The mayor of the Borough, Eben Hopson, had been denied an education beyond elementary grades and he well expressed the intense emotional attitudes and the hopes of the people for a local school system. His statement on the Inupiat educational philosophy in **1975** received wide publication throughout the state and in educational journals, and portions of it are abstracted below:

We Inupiat are a nation of people occupying the **circumpolar** Arctic from Siberia through Alaska and Canada to Greenland. We share common values, language, culture, and economic system. Our culture has enabled us to survive when no other man or culture could. Among our entire international Inupiat, we of the North Slope are the **only** Inupiat who have achieved true self-government with the formation of the North Slope Borough. We have the greatest opportunity to direct our own destiny as we have for the past **millenia**.

Possibly the greatest significance of home rule is that it enables us to regain control of the education of our children. . . . Today we have control over our educational system. . . . We must now begin

to assess whether or **not** our school system is **truly** becoming an Inupiat school system, reflecting Inupiat educational philosophies.

Hopson reviewed the **assimilationist** philosophy of the BIA schools and questioned whether the Borough was simply exercising political control over an educational system that continued to transmit white urban culture. He argued that "Political control over our school must include 'professional control' as well if our academic institutions are to become an Inupiat tradition, values, and ideals." Hopson **also** assessed the role of teacher and curriculum, stressing the need for Inupiat/English bilingual and **bicultural** programs and teachers. He went on to chastise the isolationist attitude which characterized most teachers. He urged the desegregation of the privileged class of people who lived in quarters which resembled colonial forts and were subsidized by the Borough. He invited teachers to become contributing members of the community.

The formation of the Inupiat University of the Arctic, funded by the North Slope Borough, further demonstrated the Borough's commitment to the Inupiat language and culture. A primary stated goal of the university was to provide postsecondary education that will enable graduates to live within the traditional subsistence life-style or the urbanized technocratic society. The first president of the institution asserted that the programs would be based on the values and traditions of the indigenous people, and all course work would include as many aspects of Inupiat language and culture as possible (Vaudrin 1975). Although the university has been beset with continuous administrative and financial difficulties, the support of the borough administration and its **commit-**

ment to the maintenance of Inupiat language and culture has been critical to its survival. In January 1977 the borough formed the Inupiat Language Commission (Ordinance 76-31) to further sustain university and community efforts in this area. The Borough already had created the Commission on History and Culture (Ordinance 76-4) to develop a historical record of the land, people, and villages and to evaluate current developments and ongoing programs as they relate to the cultural and historical heritage of the North Slope. In this regard, Commission members have been **extensively** involved with National Petroleum Reserve- Alaska (NPR-A, formerly PET-4) research activities during the past year.

The Commission on History and Culture and the Borough Planning Commission have worked together to develop a traditional land use inventory to document all the traditional land use areas and historic sites in the North Slope region. The inventories will be used to develop a land use plan and to protect historic sites. This information is also being made available to **NPR-A** planning groups who **will** determine the best uses of the land in the reserve. Hopson, who worked on the inventory, stated, "The fact still remains that we, the Inupiat people, base our culture on the environment, nature and the land around us." (North Slope Borough, Planning Department 1976).

The Borough's Fish and Game Management Committee, with an appointed member from each village, was created in direct response to the drastic drop in caribou first reported in 1975 and resulting restrictive state regulations (NSB Resolution Serial No. 10-76). According to NSB Ordinance 76-9,

the committee is "to manage its fish and game resources and to regulate the harvest of the resources **in** such a manner as **to** be consistent with the needs and patterns of usage by residents of the Borough." The committee is also to recommend ordinances to the assembly relating to establishing fish and game reserve areas, recommend open and closed seasons for harvesting fish and game, set quotas and bag limits, and establish methods for hunting.

The Borough established an administrative office of Environmental Protection in 1977 "to provide **local** input on environmental matters affecting the lifestyle of the residents. . . ." A position of Caribou Protection Officer was created to assess the caribou crisis. The office also **investigates** other areas of major environmental importance to the Borough, such as offshore and onshore oil exploration, oil field and pipeline development, the gas pipeline, and uses of the pipeline haul road (NSB Ordinance 77-3).

The Federal Liaison Office, based in Washington D.C., was also established in 1977 (NSB Ordinance 77-3). The office was charged with the responsibility of obtaining support for the "protection of our traditional life style" through involvement with various federal agencies. Another cited priority was "insuring that all necessary environmental safeguards are taken prior to the start of any drilling for off-shore oil."

Almost immediately, personnel from these two devoted their undivided attention to the proposed ban on subsistence hunting of the bowhead whale by the International Whaling Commission. The Alaska Eskimo Whaling

Commission was organized through the cooperative effort of the Borough, the regional corporation, and the Barrow Whaling Association to challenge the proposed whaling ban. For the first time in history, **Inupiat** were members of a U.S. delegation to an international conference. The political sophistication they had gained through the land claims battle and the knowledge they had accumulated through the centuries of whaling argued their case effectively. Because of their efforts, the moratorium will not go into effect during the 1978 spring whaling season, but a quota of 12 whales taken or 18 whales struck was set.

The North **Slope** Borough also initiated an Arctic Coastal Zone Management Program. The program will assess outer continental shelf activities and nearshore and onshore developments and promote cooperative efforts for an international arctic coastal zone management program.

Although the North **Slope** Borough performs the usual functions of a borough government, its interests and activities have demonstrated a commitment to maintaining the traditional values, language, and culture of the Inupiat people. Its commissions, committees, and offices devote much of their time to protecting subsistence activities, subsistence resources, and the environment. Through tax revenues generated by the NSB, the most **immediate** effect of the Borough which involved a significant portion of its permanent population was the expansion of the wage economy.

Borough administrative personnel requirements and **CIP** construction created job opportunities in all the villages. **ASRC**, together with its corporate business subsidiaries and joint venture enterprises, and the village

corporations all created additional job opportunities for their **share-**holders. Jobs created by the Borough, ASRC, and the village corporations were available to persons who formerly **had** to leave the villages **to** obtain seasonal or other employment. The North Slope economy of the 1960's which was primarily subsistence based became a dual or mixed economy including both subsistence and cash. The increasing job opportunities also attracted a non-Inupiat population primarily into Barrow.

While the primary corporate **policy** of ASRC has been to obtain land title conveyances to which it is entitled under ANSCA, a North Slope Borough priority has been protection of the environment and natural resources on which the Inupiat depend. Through the land claims effort, the northern Inupiat gained a political education to further their objectives. The NSB provided the political vehicle for the northern Inupiat leadership to respond to statewide, national, and international issues such as the North Slope haul road, caribou crisis, and the bowhead whale controversy.

Through the interlocking membership between the NSB Assembly, the ASRC board of directors, the village corporations, and village councils, the Inupiat have maintained effective working relationships to further their common goals. Notably, many of the members are also whaling captains or members of whaling crews.

The Inuit Circumpolar Conference. The NSB initiated efforts to organize the **Inuit** (the Eskimo people of **Alaska**, Canada, and Greenland) to discuss their common problems posed by industrialized development threatening their culture and environment. An international conference was

planned to examine their mutual concerns and to plan for the formation of a permanent international organization.

The first **Inuit Circumpolar** Conference (ICC) was held in Barrow in June 1977. A primary focus was conservation and protection of the arctic environment with a view toward developing an international policy for the region. The expressed purpose of the conference was stated:

Within this lifetime, the possibility of extensive damage to the fragile environment of the Arctic has become a real threat. To those living in the Arctic, this possibility becomes a threat to the very foundation of **Inuit** society. As the quest for resources leads the dominant cultures to one of the most promising, unexplored areas of the world, the Arctic Polar region, exchange among **Inuit** (Inupiat/people) becomes not only important but essential. (North Slope Borough, Environmental Protection Office 1977)

Inupiat delegates from Canada, Greenland, and Alaska and **Yupik** delegates from south of the Brooks Range attended the conference. Seventeen resolutions were adopted dealing with the organization of an international body and developing an arctic **policy** with a primary focus on offshore and onshore arctic resource development. The resolutions indicated a primary concern **for** the protection of subsistence resources within their **ecological** systems. Other resolutions related to land claims, language, exchange programs, health, education, and technology. An interim **committee** has continued to meet periodically since June.

It is apparent that an international awareness is developing among the Eskimos of Alaska, Canada, and Greenland. Increasing interaction, communication, and cooperative efforts have already been noted. Canadian and Greenlandic Inupiat delegates to the ICC supported the Alaska Inupiat throughout the bowhead whaling crisis. One of the Canadian delegates to the December meeting of the International Whaling Commission, Sam Raddi, had also been a delegate to the ICC. An educational exchange program has already begun between Alaska and Greenland, and additionally, the Borough's Inupiat Language Commission is working to develop a **circumpolar** orthography. Financial support has been extended by ASRC to the Committee for Original Peoples Entitlement (COPE) of Inuvik to enable COPE to pursue the Canadian Western Arctic Inupiat land claims settlement.

SOCIOECONOMIC SUBSISTENCE PATTERNS

Subsistence Issues

In the past few years the term "subsistence" has received considerable attention, especially in Alaska where indigenous people still depend on a hunting and fishing economy. Recent subsistence issues include the decline of the caribou population and resulting restrictive regulations; the bowhead whale controversy; the interests of environmentalists, which often conflict with subsistence needs; current (d) (2) Lands legislation; and conflicts created by oil and gas exploration and development.

Current pending legislation under Section D-2 of the Alaska Native Land Claims Act which will prescribe the use of federal public lands in Alaska has drawn national attention to subsistence. Even as scientists, policy makers, and Natives discuss subsistence, its definition remains elusive. The subsistence issues on the North Slope relate to petroleum exploration and development activities, and to the increasing legislative and regulatory actions from the state, national, and international level. The most notable and emotional issues were the caribou and bowhead whaling crises.

The Caribou Crisis. An aerial photo census of the **Western** Arctic Caribou Herd in 1970 estimated a minimum population of 242,000. Alaska Department of Fish and Game reports in 1969 had indicated the annual harvest of 25,000 caribou from the western herd as "average" and "normal." A 1973 borough inquiry about a possible commercial harvest

at **Nuiqsut** was favorably met by the Department of Fish and Game as follows:

Your idea is interesting and I feel that if the hunting were kept at the proper level the herd might support it. The western Arctic herd is quite large now, and kill has probably declined in the past few years because fewer people are feeding dogs. (LeResche 1973)

The 1974 harvest was cited as "below normal" in a Department of Fish and Game report (Davis et al. 1976). A 1975 census established the maximum number of animals in the herd at that time at 100,000. By July 1976, the estimate had dropped to 50,000 caribou.

Another Fish and Game publication (1976) attributed the decline to human use and wolves:

From data that are now available, it is apparent this herd has declined to its present size because of excessive use of caribou by humans, in combination with the significant impact of natural mortality including predation, especially by wolves. . . .

Significantly, Fish and Game absolved sport hunters and the oil pipeline and related activities as causal:

Because of the region's remoteness, there has been little hunting in the area by conventional recreational hunters. . . .

It seems obvious to place some of **the** blame for the decline on construction of the **Trans-Alaska** pipeline. However, there is no evidence that the two events are related. (Alaska Fish and Game **1976**)

The Western Arctic Caribou Herd was a major source of meat and raw materials for boots, parkas, and mats **until** the caribou crisis. Commercial meats were sold in village stores on an extremely limited basis, if available at **all**. Until July 1976, Barrow, a community with a population of nearly 3,000, did not have a store with a meat department. Caribou meat is prized by the Inupiat above **all** others, even high-grade beef is judged as "too fatty" in comparison. Caribou is eaten boiled, frozen, and dried. Even the stomach lining and bone marrow are eaten, and the back fat is used in a delicacy called Eskimo ice cream.

In 1976 the State instituted the first regulations ever imposed on the harvest of arctic caribou. Permits were allocated to the residents of the villages based on population, availability **of** alternate food sources, and local employment opportunities. Sportsmen in Fairbanks reacted and filed a suit seeking to enjoin the allocation of permits. The Inupiat were prohibited from hunting **caribou** until the action was resolved. Permits were again issued in the fall of 1977.

The Borough's Fish and Game Management Committee was established in 1976 in response to the State's decision **to** limit the taking of caribou to 3,000 from the Western Arctic Herd in **1976**. The Inupiat challenged the reliability of the count, theorizing that caribou from the Western Herd

were stranded with the Porcupine Herd east of the trans-Alaska pipeline and haul road. The committee felt that construction activities and heavy traffic along the road may have interrupted normal migration and interaction between the herds. According to the Borough's Arctic Coastal Zone Management Newsletter, the Borough has been researching Alyeska's liability and the possibility of compensation from a \$100 million liability fund created by the Trans-Alaska Authorization Act of 1973.

Changes in wildlife populations can affect the settlement patterns of hunting and fishing societies. During the commercial whaling period, the disappearance of the Nunamiut from the Arctic tundra was attributed to the decline of the caribou. In the present period, the limitation on caribou hunting can be expected to increase the Inupiat's dependence on a cash economy. Hunting pressures on other resources can also be anticipated.

The Bowhead Whale Controversy. In June 1977 the International Whaling Commission (IWC) voted to cancel the right of Native people to harvest bowhead whales. The Inupiat challenged the validity of the scientific evidence used by the IWC to support the moratorium. Seventy-two whaling captains from nine communities met in Barrow in late August 1977 and organized the Alaska Eskimo Whaling Commission (AEWC). Jake Adams, a young whaling captain, borough assemblyman, and land chief for the regional corporation was later elected as chairman. All 72 whaling captains went to Tokyo in December 1977 as part of the United States delegation to the IWC to lift the ban. Among the official delegates were NSB Mayor Eben Hopson,

AEWC Chairman, Jake Adams, and Arnold' Brewer, Sr., President of the Barrow Whaling Association. After considerable negotiation, the Inupiat whalers reluctantly agreed to 18 whales struck or 12 landed as their quota.

The AEWC has adopted its own whaling regulations and is currently attempting to obtain state support through the legislature to conduct a scientific study of the bowhead whale population. The commission is also continuing its efforts to restore a full subsistence hunt without the restrictive quota, which they view as inadequate to meet their nutritional needs.

The bowhead whale, more than any other resource, is an integral element of Inupiat culture and society. The cooperative hunting efforts and the communal patterns of sharing form the foundation of Inupiat society. Continued limitation on hunting the bowhead whale and caribou hunting threaten the survival of Inupiat culture and the organization of their society. Restriction on the taking of bowhead whales and caribou have caused social and psychological stress at both the individual and community levels.

Petroleum Exploration and Development Activities. Besides the possible impact of oil- and gas-related activities on land animals and their habitat discussed earlier, there is great anxiety among the Inupiat about the effects of petroleum exploration on fisheries. They have repeatedly reported finding dead fish or a depleted number of fish in lakes, which they attribute to seismic exploration activities.

During a public hearing at Barrow on October 27, 1976 on regulations of the Naval Petroleum Reserves Production Act, ASRC urged protection of subsistence resources and that steps be taken to protect the fisheries. At a meeting in Anchorage on February 8-9, 1977 with members of the National Petroleum Reserve, Alaska's Land Use Task Force, North Slope representatives expressed their concern that exploratory work, seismic and drilling activities, and dewatering had adversely affected the fish populations in lakes. They further charged that caribou were becoming entangled in wires that were left by seismic crews, that wolverine dens had been bulldozed, and that aerial surveys might be disrupting caribou, birds, and other wildlife patterns.

During 1977 jurisdiction of the National Petroleum Reserve in Alaska, formerly known as Petroleum Reserve Number 4 located in the North Slope, was transferred from the Navy to the Interior Department. The Naval Petroleum Reserves Production Act of 1976, Public Law 94-258, allowed petroleum exploration of the reserve but prohibited development until authorized by Congress. The Act directed the Secretary of Interior to establish a task force to conduct a study to determine the values of, and best uses for the lands contained in the reserve. The study was to consider the Natives who live in or depend upon the reserve lands, the scenic, historical, recreational, fish and wildlife, and wilderness values, in addition to the mineral potential. While the task force will recommend the priority of land use, Congress will ultimately decide the final designation and disposition of the 23 million acre reserve. Since the Inupiat are highly dependent on the inland resources and continue to

use the inland areas extensively, the fate of their subsistence lifestyle can be largely determined by Congressional action. It is not known whether the Inupiat will continue to have an unrestricted access and use of the inland areas as they do today. Large scale petroleum development within the reserve is also conceivable. Development could be expected to have impacts on the environment, the migratory game as well as the Inupiat.

Offshore petroleum activities have also been resisted by the people in the region. A joint letter from ASRC and the NSB to the Alaska District Corp of Engineers expressed an objection to Union Oil's proposed construction of an ice island at Jones Island. NSB and ASRC were not convinced that the technology existed to safely proceed with the project and noted that the impact on the subsistence economy had not been assessed (Adams and Hopson 1975). Additionally, the **Nuiqsut** village corporation was concerned about the effects of the project on fish migrations. Recent proposed seismic refraction studies using explosives in the Beaufort and Chukchi Seas were also opposed by the Borough because of the potential threat to the subsistence resource base and damage to the ecosystem (Rosenstein 1977).

The NSB administration has also taken a firm position against offshore development:

We, the Eskimo people of the Arctic, are opposed to offshore drilling in the Beaufort Sea, or elsewhere offshore in the Arctic. . . . We have much to lose: our food chain, our homeland, our life as a

people. . . (Hopson, 1976)

The villages of Nuiqsut and Kaktovik which are the communities closest to proposed Beaufort Sea OCS development oppose any oil development activity. Both communities passed resolutions (1978) contending that oil development threatens their subsistence resources. They also noted that benefits to the local residents from Prudhoe Bay oil development and exploratory activities at Harrison Bay have been extremely limited. Currently, employment at Prudhoe Bay is limited to two persons from Nuiqsut and none from Kaktovik.

The North Slope Haul Road was turned over to the State of Alaska from Alyeska Pipeline Company after the trans-Alaska pipeline construction was completed. It was generally presumed that the haul road would be open for general public use. However, both the state administration and the North Slope Borough questioned the value and costs of maintaining unrestricted public access to the road. The North Slope Borough opposed the opening of the haul road north of the Yukon to the general public citing an estimated cost of \$20 million annually to maintain the road as an extreme fiscal burden to the state. North Slope Borough Mayor Hopson (1978) also expressed concern about the adverse effects of the road and traffic to the environment and subsistence resources. He noted that the road and pipeline had already affected caribou migration and group formation patterns. Hopson pointed out the potential damage to the fish migration caused by plugged culverts which were used instead of bridges. The North Slope Borough recommended limiting the road to industrial use

and a controlled tour bus operation on a seasonal basis. Above all, the North Slope Borough appeared to be concerned about another threat to their subsistence lifestyle and the potential damage to the wildlife resources and the Inupiat traditional land use sites. They recommended that the management system be designed to protect and enhance Native cultures.

At the present time, the Inupiat subsistence **lifestyle** appears to be threatened unlike any other period of time. The limitations on subsistence harvest imposed by the caribou and bowhead whale hunting restrictions, the potential damage to the environment and wildlife and fisheries posed by petroleum exploration and development both on and offshore together with an increasing traffic to the North Slope by sports hunters by air transportation and possibly on the haul road endanger the Inupiat **sociocultural** system. **Worl** (1978) attributed the persistence of the Inupiat culture through the past development periods to the continued Inupiat:environment relationship. She noted that the direct relationship formed the basis of Inupiat social and cultural systems.

Worl's (1978) study of subsistence, in which she proposed included three basic elements: economic, social, and cultural, utilized a qualitative approach. While she recognized the quantifiable variables of subsistence in reference to the resource population, the harvest, and the expenditure of time and financial costs, she noted that quantification could not add significantly to an analysis of the dynamic interactions and changes that occur in the human ecological system nor to holistic

understanding of ecological interactions between the human social and cultural systems and their environment. She added that an inadequately based quantification might advance misleading interpretation. A quantitative subsistence study of an entire socioeconomic system and its interrelationship with a monetary economy integrated within the social and cultural system awaits further research.

Subsistence Elements

Contemporary subsistence systems in the North Slope region are composed of three basic interrelated elements--economic, social, and cultural. Social scientists have traditionally viewed subsistence solely in terms of hunting and fishing activities to satisfy the basic physical needs for food, clothing, and shelter. However, it is now recognized that the methods by which a group organizes itself to appropriate the resources affects the overall harvesting patterns. The adoption of the term socioeconomic is utilized to designate the social unit engaged in the economic activities of subsistence.

Economic Aspects of Subsistence. Presently, the economic aspects of subsistence relate to the appropriation of natural resources, primarily food and clothing. Modern equipment and supplies require money, so contemporary economic subsistence systems in the Arctic are interrelated with the monetary economy. The present economy has been described as "mixed" or "dual." Analytically, the economic systems can be held distinct, but the Inupiat experience demonstrates an interrelationship of the two economic systems.

Worl (1978) described the current patterns which may be utilized singly or in combination to obtain cash:

The subsistence participant may alternate between subsistence activities and cash employment. This method may take various forms, with the subsistence participant working part time or on a temporary job.

Or the hunter may have a position whereby he works for a short period and is off for another period. Other forms involve seasonal employment during construction periods. Another pattern is that of the hunter who works for a period, quits his employment during peak subsistence periods, and then seeks other employment.

The subsistence participant may receive financial support from one or more relatives, a spouse, or a hunting partner. A common pattern is for the wife to seek employment while the husband devotes the greater part of his time to subsistence-related activities. Another observed pattern is where one member of the family works while other members hunt and fish. Family members often alternate between the enterprises. It is also common for a woman to be financial sponsor for her brother or father's subsistence or whaling activities. The sponsor may provide cash directly to the subsistence participant, or he or she may furnish equipment and supplies in exchange for sharing in the subsistence harvest. A financial sponsor may establish reciprocal relations with one or more hunters.

The subsistence participant may also sell or trade his surplus products for other subsistence goods, or trade for other items such as ammunition or gas. The object of selling Native goods between the Inupiat is the maintenance of the subsistence system, not financial gain or profit. The cost of the Native product is not related to actual harvest or production expenditures but to an informal determination of the level the community members can afford.

By-products or raw materials from the harvested resource may be used directly by the subsistence participant or his wife for cash income from the sale of arts and crafts or Inupiat clothing or footwear. Raw material, such as baleen, furs, or bones may be sold or traded directly to a craftsman. The arts and crafts cottage industry is an important source of cash income.

A subsistence trapper may sell his furs to commercial buyers, but there is also a significant internal traffic in furs used for production of Inupiat clothing, which has tested far superior to commercial clothing.

Worl further noted that interrelationship of the economies has facilitated the survival of the Inupiat culture and that cash income opportunities have remained compatible with the subsistence system.

The Socioeconomic Unit. The appropriation of resources is achieved through an organized system of social relations. Spencer (1959) suggested

that the Eskimo family was the key to understanding the sociology of the Barrow Eskimo. He noted that the Eskimo culture tried to raise individuals as useful members of the family, which was the basic economic unit, by promoting cooperation and a level of equality between members of the group. Hippiar (1969) believed that the family explains the cultural persistence of the Eskimo. Burch (1975) characterized Eskimo societies in terms of interrelated domestic and local families that together constituted a social network. He noted that major subsistence efforts by males, even in 1970 in the villages, were carried out either on an individual basis or in terms of kin-based hunting and fishing crews. Burch also describes Barrow, which has had the greatest and most intense contact with white influences, as exhibiting a high degree of organizational continuity.

Worl, in her recent study of North Slope subsistence, concluded that economic action is conducted by the social unit and that analysis of subsistence must include:

. . . the production, consumption, and trade of all subsistence products must be considered cumulatively, since the products are exchanged or traded for other subsistence commodities within a network of social relations. To review the harvest of only one subsistence resource independently would not reveal the exchange-and-reciprocity system which is an integral aspect of the total economy.

Worl described the socioeconomic units and roles as occurring in:

(1) the kin-based level, (2) the trading/hunting partnership, (3) the voluntary whaling association, (4) the community, and (5) the regional organization. The strength and continuity of defined and structured relations decreases as the scale of smaller to larger socioeconomic unit increases.

With the incorporation of a monetary economy, the roles may now include: (1) Subsistence Harvesters, those who actively engage in subsistence pursuits and related activities within the existing patterns of the division of labor by sex and age; (2) Subsistence Users, those who are recipients of subsistence products through the various sharing mechanisms, or trading or purchasing habits; (3) Financial Sponsors, those who render financial support for subsistence activities. . . . The individual role may vary, depending on circumstances, or the individual may combine the functions of more than one role. Subsistence resources and by-products are shared by the majority of people in all communities, but the role of sharing beneficiary is especially important for senior or physically handicapped citizens who can no longer actively engage in subsistence activities. The Financial Sponsor's investment in a subsistence enterprise is not economically comparable to a profit making venture. A whaling captain and/or his supporters may expend up to \$6,500 during a season with no financial gain to themselves. The return cannot be analyzed in quantitative measurements, but

rather in qualitative conceptual categories which escape formal economic analysis. (Worl 1978)

Cultural Values of Subsistence. Cultural values are the most elusive element of subsistence; yet if subsistence appears to be threatened, its importance to the culture is most strongly defended. Evaluated solely in monetary terms, it is likely that subsistence would be judged as a net loss venture. However, it is the absence of economic rationale among participants that may help to explain their cultural values and emotional attachment to the land and environment. The **umealik** (whaling captain) may spend as much as \$6,500 to support his crew and activities associated with whaling because this, not monetary gain, gives him status in the **community**.

Cultural elements reflect the environment with which a group is interacting. The Inupiat believe that their cultural survival is based on a direct and intimate relationship with their environment. This is demonstrated in their act and dance forms and by the feasts held during various times of the year. The rituals also serve to integrate the community and strengthen **community** bonds.

Settlement Patterns and Land Use

The North Slope Borough's Traditional Land Use Inventories describe intensive use of coastal and inland areas. Hopson (North Slope Borough 1976) documented more than 140 sites in the **Tasikpak** Lake and **Nuiqsut**

areas alone. The listing includes both contemporary and historic sites of cabins; graves; cemeteries; ruins (including sod houses); fishing, trapping, hunting, and camping areas; ice cellars; and other important resource sites. The report cited 107 persons who lived within these areas during some part of their lives during the last 170 years. The wide range of the occupants' ages suggests that the areas were used even when the caribou population was quite low, and the number of people involved suggests extensive use. The sites are primarily located inland along rivers and lakes, so 119 of the 140 sites are listed as fishing areas.

Although the populations are centered in permanent communities, the inventory demonstrates a continuing use of inland areas. Fish camps are generally occupied by various members of a family from spring through fall. Most families leave their permanent homes in May, or as soon as school is out, and return when school begins again in September or October. Fish camps may be continuously occupied throughout the summer, or they may be visited periodically. Husbands often leave their wives and children at the fish camps during the day or week to work in town but return on weekends or evenings, depending on the distance. Many Native Allotment applications, discussed earlier, were made on traditional family fishing sites. Inland areas are also used as temporary campsites, which may be frequented by various family groups throughout the year. Hopson's work also identified defined, consistently used access routes between campsites, fish camps, and the permanent communities as well as major historic trails that are still used.

The number of sites and extensive access routes identified by the inventory testify to the high degree of mobility of the Inupiat. These inland areas are probably utilized to near the extent they were in the aboriginal period and certainly more than during the early historic period when the population had suffered a drastic decline. With the aid of the snow machines, which have replaced the dog teams, a hunter may range hundreds of miles away from his permanent settlement. Additionally, air charter flights are available to many of the fish camps.

The following account of subsistence use is largely drawn from Worl's 1978 study. The primary subsistence activities in inland and coastal areas are caribou hunting, fishing, fowling, and trapping. The inland area is the source of caribou, which provides high protein meat as well as raw material for parkas, boots, and mats. However, since the caribou crisis the Inupiat have had to increase their use of commercial meats.

The principal summer activity at inland camps is gillnetting, primarily for white-fish. Nets can also be used under the ice in winter. Ling cod in the early spring and grayling after freezeup are caught with a hook and line. Enough fish is taken for the family's winter supply and to sell and trade.

Duck hunting remains the dominant coastal activity from spring through fall. Some families move out to the camps in the spring and remain until the fall migration has ended. The inland region also provides an abundant source of other fowl. Although fowl is not a major subsistence item, the meat and eggs are an important dietary supplement.

During winter, trapping is done in the inland area for fox, wolf, wolverine, and ground squirrel; however, this is less a subsistence activity than a supplement to cash income. Trapping can be fairly lucrative, depending on the intensity of the pursuit. Many high school boys have traplines that they tend after school and on weekends.

Ice Hunting

The following account is from Worl (1978) with a few changes and deletions.

The essence of contemporary Inupiat culture is nowhere as evident as in the whaling complex. Whaling, governed by patterns of cooperation and an elaborate structured system of sharing and distribution, serves to integrate the community as a social and cultural unit. The sharing and distribution of the whale to other communities strengthens ties with those communities and families. For the individual crew member, the exhilarating experience of the chase and sense of accomplishment when a whale has been caught can be summed up by one whaler's statement: "There is no greater reward than knowing your whale has fed the community, "

The Association of Whaling Captains is a modern version of a traditional organization. It evolved from the aboriginal karigi (men's meeting house). Today, the association's membership includes all umialgich (whaling captains). They meet each year in early April before the whaling season to discuss the rules which govern the whale hunt and distribution and to determine if they are still acceptable to all the captains. Although some rules are never codified, they are accepted, e.g., snow

machines are not used too close to **the** camps since the noise frightens the whales. They also discuss any problems from the previous season, distribute a list of each captain's identification mark for his property, and make plans for construction of the ice trail out to the leads.

Whaling is an expensive undertaking, as the following list, which does not include all necessary items, shows:

Snow machine	\$2,000.00
Sled	250.00
Tent, frame	200.00
Camp Equipment	200.00
Gas, food, bombs	2,000.00
Clothing	300.00
Ugruk skins \$50 each x 6	300.00
Skin sewing for umiaq	300.00
Umiak frame	<u>600.00</u>
Total	\$6,150.00

As in the past, only the wealthy can afford to support an average-sized crew of eight during the whaling season, which may last up to six weeks. Some captains pay their crew members a token sum, while some pay more or nothing. Other costs assumed by the successful captains include hosting a feast for the entire community when a whale has been caught. Also, a successful captain and his wife must sponsor the summer feast called Nalukataq for the community if he caught a whale. The costs for each feast may range up to \$1,000.

The total labor force actively and steadily engaged during the summer whaling season can involve more than 500 people, not including the Nuiqsut and Kaktovik crews engaging in fall whaling. Each crew requires eight men, one or more women, perhaps a young apprentice, older women who prepare and sew the ugruk (bearded seal) skins for the Umiak, and up to 50 or 60 people intermittently involved to pull the whale up onto the beach and butcher it. This number may be even greater since as many as 20 men may be considered members of one crew but only participate periodically during the season.

Preparation for whaling begins with the hunting of ugruk (bearded seals), primarily during June and July but also in October and November and occasionally through the winter. The bearded seal is of particular value to the whalers because its skin is used to cover the umiak and for boot soles. Seals are also important for their meat, oil, and skins used for parkas which are mostly sold. The traditional umiak remains superior to all other types of boats because of its light weight and quietness in the water. A few crews have tried aluminum skiffs, but generally they are considered too noisy.

The appearance of seals and success of the hunt depends on the presence of sea ice. Hunting conditions are best when a lead is narrow and the migrating ugruk are concentrated in this area. Hunting is very poor if the ice breaks up and the seals disperse. Nelson (1969) gave an extensive description of the various hunting techniques, including breathing-hole hunting, ice-edge sealing, sleeping-seal hunting, and hunting by umiak--all of which are employed along the coast. The bearded seal is

divided between the participating crew members with the skin going to the owner of the boat.

Many other tasks are completed before whaling actually begins. Ice cellars are constructed, expanded, **or** renovated, These cellars are **built** approximately 15 feet down into the permafrost where whale meat can be stored for as long as two years. During March and early April, sleds are constructed or repaired, all whaling equipment is meticulously cleaned, and the **umiak** skin is cleaned or replaced,

The whaling season begins in early April in Point Hope and a few weeks later in **Wainwright** and Barrow. The arrival of the snowbirds is the first sign that the opening of the whaling season is near. People begin scanning the horizon for evidence of a lead opening, Surveys are made of the ice pack to map out and construct trails to selected camp areas. Wedging out a trail through several miles of sea ice is arduous, and knowledge of the sea-ice environment is imperative. The captain must check the surface of the ice for cracks and flaws to insure the safety of his crew. Camps are moved in the event of dangerous changes in the ice. The Inupiat must be able to understand and predict the movement of the sea ice, which is impacted by both wind and sea currents.

Although camp life on the ice is laborious, it can also be enjoyable. The division of labor is well defined between the sexes. Lookouts are posted, and many tedious hours are spent patiently watching for the arrival of the bowhead whale. Seal, migratory fowl, and ducks are also obtained during this period. Meat not eaten by the crew is shared with

their families. When a whale is finally spotted, the whalers' knowledge of the whale's behavior **must be** as extensive as their knowledge of the ice. They must be **able** to predict the whale's movement as they pursue the 30- to 60-foot whale (weighing between half a ton to one ton a foot) in their tiny boats. They must be **able** to forecast where the whale will surface and then maneuver the **umiak** so that the harpooner can get a **good shot** into a **vital** organ.

Once the whale has been struck and the take is assured, word spreads quickly through the camps and community. Several crews rush to assist the successful crew in towing the massive whale (which can weigh a half ton to a ton per foot) to the ice. A crew member is dispatched to the village to raise the captain's flag over his house. In Barrow an announcement is made over the local radio station, Offices, schools, and homes empty as people rush to the camp to assist the whaling crew. All those who assist are given fresh muktuk (skin with a layer of blubber) and also receive a share of the whale meat.

Rules governing sectioning of the whale and sharing and distributing patterns vary from community to community, but they are well defined and strictly followed. The most complex system, which most likely has remained the most conservative and has its roots in great antiquity, is at Point Hope. Barrow's method is simpler and probably reflects the commercial whaling influence and adaptation to an increasing population. One whaling captain recently remarked that sharing a whale in Barrow is now like sharing a seal.

The meat and muktuk are important sources of protein and other nutrients for people throughout the entire North Slope area. **Other** edible parts are the white gum material from the base of the baleen, the liver, brain, heart, and kidneys. The baleen and shale bone are important for arts and craft products **which** may be sold.

Sharing begins with distribution and a feast on the ice **which** progresses to a feast at the captain's house. The captain's wife may select elderly members of the community and those known to be in need and distribute additional shares to them. Subsequent feasts include the **nalukataq** (captains' celebration) in June sponsored by successful captains. This feast is a time of great festivity with the traditional blanket toss and Inupiat dancing. Formal Thanksgiving and Christmas feasts are served to community members, and muktuk, whale meat, and fish are distributed to all families. A family may receive one to three boxes of fish and meat **weighing** up to one hundred pounds each. In Point Hope a special feast of whale tails is **held** in the fall when the first "slush ice" forms in the ocean.

The **most** important subsistence activities conducted on and from the ice are whaling; hunting **ugruk** and other seals, walrus, polar bears, and ducks; and fishing. As previously mentioned, some of these activities may coincide with the whaling season but are secondary when the whales are migrating. Smaller sea mammals are also harvested at other times, but with the exception of duck hunting, they depend on the presence **of** ice.

Beluga herds (white whales) generally arrive **prior** to and with the **bow-**heads. They are hunted from the ice edge or from **umiaks**. There have been rare occasions when **belugas** have been trapped **in** the ice, and hunters were able to catch 20 or 30 at a time. One **beluga** provides several hundred pounds of meat, and they can be important when the **bow-**head catch is low.

The best season for walrus hunting **is** during July and August, and some families leave Inland camps to participate, **Walrus** commonly lie sleeping on the ice floes and are hunted from **umiaks**. Crews must exercise extreme caution hunting among the floes lest they get caught and **carried** away with the moving ice. Although the walrus hunt is maximized if several crews joint together, there is indication that the present walrus hunt is pursued by a single crew. The meat, blubber, and skin are divided between the crew members. The ivory tusks belong to the owner of the boat whether or not he was on the hunt. The walrus, which may weigh **asmuch** as 2,000 pounds, is distributed throughout the extended family. The range of sharing became apparent **in** the summer of 1975 when an **epidemiological** investigation was initiated after eight people in Barrow got trichinosis. The investigation involved individuals from 23 different nuclear families who had all **shared in** the same walrus.

The catch from marine fishing activities **is** not as significant as that from fresh-water fishing. It is **not** considered a major subsistence resource and is conducted **mostly by older people and children**. In early fall after the sea ice has formed, they walk a short distance from the

shore to fish through ice holes. Tom cod is caught both in **fall** and in early spring.

Most polar bears are **killed** incidental **to** other activities. Polar bear meat **is** highly prized, and the fur is important because it is waterproof.

Interethnic Relations

Reviewing the historical literature, one finds that the Native population of arctic Alaska was viewed as aberrant **in** most respects and part of the resources to be exploited, and often they were. The Russians were the first Westerners to reach the sub-Arctic, beginning in the 1700's in areas inhabited by the **Aleuts** and the **Yupik** Eskimos of southwest Alaska. These groups were also the first to experience contact with the whaling fleet, which eventually pushed northward through the Bering Straits to the Mackenzie River delta.

These **early** contacts, particularly in southwest Alaska, were less than harmonious. The greatest impact was the elimination of large segments of the indigenous population by murder and disease. **Whole** villages were pressed into slavery by the Russians and forced to assist in the depletion of the natural resources they depended upon for their own survival. Later contacts further north with the Yankee **whalemen** were a bit less severe, but the goal remained the same: exploit the resources upon which the Native population depends while using them as a key **tool**.

This pattern of conquering Native-held lands **in** America and settling therewith often less than **savory** elements of Europe, Asia, and the east coast of the United States is of great significance in Alaska. From what is now known of early cultural contact situations and the role of continuous contact in shaping new directions for indigenous people, it is important to recognize the influence on these Native peoples of their earliest lessons in the behavior of Western man and the model of "civilization" they provided. The majority of these men were not bold, courageous adventurers, but instead were often rapacious, ruthless, and avaricious. They had been thrust out to fringes of their own **society**, outcasts among their countrymen except as sources of furs, minerals, and information as explorers of frontier areas.

Available data on the relations between the men of the whaling **fleet** and the Inupiat are sparse but at about the same time (late 1800's) accounts of whaling voyages and exploration became popular and detailed scientific description of indigenous peoples began. Two categories **of** literature therefore emerged--accounts of whaling experiences and ethnographic descriptions of the Inupiat. Literature in the first category mainly treats information about the Inupiat as a "sideshow" of alien and repugnant life-styles, customs, and appearance. This information is mostly useful as a basis for understanding the interaction between the two groups. Mention is also made of the Inupiat as a hunter, guide, and as a crewman for the whaler. Data from the second category focuses on the description of the Inupiat as a compact self-contained cultural group. Because of the nature of this material, there is little mention of Inupiat contact with outsiders.

John Murdoch's description of the Point **Barrow Inupiat** is one such work. He briefly recounted contact with the Inupiat, beginning with an 1826 visit from a barge of the HMS Blossom, under the command of F.W. Beechey, and with the Plover in 1837. These were followed by sporadic contacts varying from a few days to a number of weeks until the Plover overwintered in 1852-53 and 1853-54, during which ". . . , the officers and crew, after some misunderstanding and skirmishes, established very friendly and sociable relationships with the natives. " Also, that ". . . though there was considerable intercourse between the sailors and the Eskimo women, there are now **no** people living at either the village who we could be sure were born from such intercourse." (Murdoch 1892. Pp. 52-53)

The year 1854 seems to have been the turning point of contact in northern Alaska. The whaling fleet penetrated to Barrow and began years of continuous contact and trade. Murdoch seemed to think that the Inupiat remained culturally remote from their white visitors **for** the most part and showed little inclination to change, being essentially a conservative people. Murdoch disagreed with Petroff (1884) who stated that the Barrow Inupiat regulated their movements according to the whaling fleet location and proximity. Murdoch does mention the cessation of autumn whaling for themselves, "possibly on account of the presence of the whaling fleet at that season." Following are some excerpts from Murdoch's work that illustrate contacts between the sailors and the Inupiat:

. . . The one unmitigated evil of their intercourse with the **whites** has been the introduction of spirits, . . . Our two years of friendly relations with these people were greatly to their advantage. . . . In all **their** intercourse with the whites they have learned a little English, chiefly a few **oathes** and exclamations like, 'Get out of **here!**'. . . (Murdoch 1892)

A more contemporary book covering the periods 1884 through the 1940's was written by Charles Brewer. Entitled Fifty Years Below Zero, this popular book is still in print and still sold at **his** son's store in Barrow. **It** chronicles **his** life in the Barrow area as a whaling entrepreneur and documents the effects of that industry on the Inupiat, Brewer covers many facets of change in the Inupiat life, He discussed the spread and effect of the use of liquor and the subsequent debauch of the villages up the coast from Point Hope where a trader introduced it; changes in whaling practices; employment of Inupiat by Brewer and others in commercial **shaling**; the application of white man's law to the relationships between the Inupiat and the outsiders; the usurping of marriageable women (sometimes married by whalers who wintered over); the unruliness of the whalers from the east coast; the rapid decline in the Inupiat take of whales; the effects of the introduction of religion; and disease and its effects on the population,

Charles Brewer was a notable exception to the transient pattern set by most of the non-Inupiat in the Arctic. **Borwer** became the chief contact for all who came to the northern Alaska coast. He often acted as mediator for the various **communities** in the Arctic and encroaching outside

world. His occupational experience in the Arctic included being the store owner, chief trader, operator of the shore whaling stations, U.S. Commissioner with the responsibility of taking the census, and administering the law when necessary.

Generally, relationships with outside people at this time appear to have been poor in quality. With few exceptions they were episodic, with few of the whalers or traders staying longer than the winter months. The whalers were a diverse lot from many different parts of the world. With rare exceptions they were single, uneducated, and unruly, as evidenced by the journals of the whaling captains, Charles Brewer, and the various member of the U.S. Revenue Service.

Sometimes ships were crushed by the ice, and whole crews had to spend the winter or longer on shore. Even during these times when crews were dependent on the good will of the Inupiat, they often acted abominably towards their hosts. Brewer (p. 208) related the wholesale robbing of graves for clothing and wood in the Barrow area. Further south, **over-**wintering whalers and those manning the shore stations are said to have introduced the skill of distilling "**liquor** from molasses and flour to the Natives so that they would have a ready supply themselves. The literature also indicates that there was tremendous competition for eligible women between men in the villages and the men from the whaling ships and shore stations.

AREAS OF CONFLICT

Economic Factors

By 1900, areas of economic conflict had already developed between Natives and whites. The whites controlled access to rifles, ammunition, flour, tea, sugar, molasses, cloth, and metal items which the Inupiat wanted and were finding more and more use **for** in their daily lives. The Inupiat had to deal with traders to obtain these goods, and the principal mediums of exchange were furs or baleen which could be sold in the United States for a handsome profit. **This** caused a shift in Native hunting patterns from game which could be eaten to furbearers for trading purposes and disrupted the traditional economy.

Not **a**ll traders conducted themselves **in** a reputable manner. It was not uncommon for a trader to obtain a tremendous amount of fur or baleen for literally worthless materials. Many masters of the whaling ships also engaged in trading liquor for furs and baleen in order to compete with others in the area, although several noted that they abhorred this practice. Nevertheless, the transient nature **of** their contact and their economic motivation cause them to continue to wreak havoc on the **local** people. (Brewer, 1942)

Employment opportunities in the shore-based commercial whaling stations contributed to the centralization of the population on the coast, Brewer mentioned that some of the members of his own crew were Inupiat either banned from participating in traditional whaling because of taboos or were from the inland.

Social Factors

There were numerous areas of social conflict fostered by the lack of a mutually intelligible language. Only a very few Inupiat spoke English, and English and Portuguese were the two most common languages of the **non-Inupiat**s. This situation created many misunderstandings between parties bargaining over the **sale** price of furs or the trade value of non-Native products.

Inupiat life was circumscribed by a wide array of taboos relating to almost everything in the environment from eating habits and choices of food to when and where they would hunt and whom they could take as a spouse. The Inupiat saw the weather, the seasons, and the migratory patterns of game animals as being greatly affected by their ability to understand and observe these taboos. **O**n the other hand, the traders and whalers as a groups saw no value in these taboos. **I**n many instances, they went out of their way to break them and show their Inupiat companions or employees that such behavior was **foolish** and only interfered with their ability to get on **w**ith the business at hand, whether it was hunting, whaling, or traveling.

The Inupiat society was a complete matrix of prescribed personal relationships developed over many generations. Law ways developed around the same circumscribed matrix. There was no **law** enforcement personnel in Inupiat society, so order depended on adherence to traditional roles and patterns of behavior. The threat of banishment, or death were strong

detractors. A person acted or behaved in a certain manner towards other individuals because it **was** prescribed through taboo or through social relations developed through generations.

While Inupiat society was capable of incorporating outsiders into this system, outsiders generally saw themselves outside of the context of Inupiat society and became disruptive by not complying with Inupiat norms. For example, Charles Brewer recorded the first murder of a non-Native by an Inupiat when an Inupiat male killed a Portuguese whaler because he **had** been living with the Inupiat's spouse. Brewer indicated that had this occurred between two **Inupiat**s, the family members would have settled the matter in their own way. The murder of a non-Native posed tremendous problems, particularly since the outcome would set an example to both the Native and non-Native community in dealing with situations where anger or hostility had been generated, Brewer and the other members of the shore whaling teams chose to deal with it in a manner compatible with their understanding of the laws of both societies. They took the offender into custody, held a trial, found him guilty, and executed him.

On another occasion where a murder had occurred, Brewer was prevented from intervening on behalf of the Inupiat community by relatives of the victim who handled the problem themselves, thereby establishing a system in which white man's **law** prevailed where non-Natives were involved. Inupiat law remained the sanction employed when only Inupiat were involved in a **crime**.

Institutional Factors

The late 1800's saw the arrival of another significant group of non-Inupiat--missionaries. Missionaries had multiple roles. Their intent was to save the souls of the Eskimos, but besides holding church services and proselytizing, they also established schools for the children, and provided medical services. In the Barrow area, for example, the Presbyterian minister was also a medical doctor.

Accompanying the missionaries, were two related institutions--schools and hospitals. The schools were first associated with missionary activities, but after the 1930's lay teachers were hired. The hospitals, originally sponsored by the Presbyterian Church, were later taken over by the Alaska Native Service. Thus, three powerful institutions from the outside world became resident and powerful within the world of the Inupiat.

Murdoch (1892) documented the chronology of the introduction of Christianity into arctic Alaska. While initially meeting with little success in converting the Inupiat, their control of clothing, food, and money, coupled with the fellowship of the church situation, began to attract the people. As the missionaries learned some of the language they were able to communicate better. The provision of medical services in conjunction with their spiritual responsibilities began to make the people more responsive to conversion.

Murdoch specifically cites the ability of the missionaries to break the apparent powerful influence of the shaman over the community. While most writers recalled this as a very positive step, it also disrupted one of the most intricate and deep-rooted area of the value system-- taboos. This system not only supported the role of the shaman, it also functioned as a primary social control mechanism. Because the shaman could not effectively deal with many of the newly introduced problems, particularly disease, medical missionaries, such as Dr. Marsh, who could cope with these diseases with some degree of success, strengthened their position. This drew the Inupiat community closer to the church and away from traditional beliefs regarding illness, the spirit world, and taboos.

Sociocultural Impact of New Technology and Rate of Change

The literature clearly indicates that the Inupiat were quick to adopt technological and institutional changes from outside their culture to meet their own needs (Murdoch 1892; Milan 1964; Nelson 1969, 1974).

Inupiat involvement with the non-Native world was compressed into a short period of time, and this, coupled with their cultural adaptability, leads to a great deal of confusion regarding the actual transitional or "acculturative" status of the North Slope population. Many observers (Chance 1966; Hippier 1969; Cline 1975) have interpreted this as indicating a rapid change from traditional cultural integrity and traditional communities to a more urbanized lifestyle. They cite as evidence the

establishment of urban centers, such as Barrow, and the **outmigration** from these centers to **larger** cities of Alaska and the **lower** 48 states. Chance pointed to the immigration of 100 residents from the **community of Wainwright** to communities outside the North Slope region as one strong indication of this trend. Hippiar stated that the declining population of the villages throughout Alaska as well as the Arctic **Slope** area and the swelling of the populations in regional centers such as Barrow and Kotzebue indicates the same tendency.

Since **1969**, however, a new phenomenon has begun, particularly on the North Slope. The population of smaller, more traditional villages is growing, and three communities, **Nuiqsut, Atkasook,** and Point Lay, have been resettled. **This** is largely due to settlement of Alaska Native land claims in late 1971, the formation of the North Slope Borough **in** 1972, and the population's preference for a life-style which vastly differs from that postulated as favored by the preceding authors.

The important point **is** not that the theories were wrong but that the suppositions did not take into account that the Inupiat were reacting to the only alternatives available to them. Schools, health care, transportation, access to other necessary supplies, and the availability of cash work were primarily centered in Barrow and, to some extent, communities outside the region. The smaller communities, Kaktovik and **Wainwright**, had growing populations because of the jobs that were available through the DEW Line and a conscious choice on the part of the people for a more traditional life-style.

Spencer (1959) recognized that the communities have weathered a great many economic changes as a result of **their** relationship to non-Inupiat institutions and pointed out that there remains a strong base of Inupiat culture that sustains them. In particular, he emphasized that the cooperative family unit maintains the

. . . core of contemporary **Barrow** Eskimo society. For, despite the cash economy, the social organization of the aboriginal Eskimo is still the potent force. The series of benign interrelations between individual **within** the family setting can be made effective **in** promoting the cooperative effort again to live off the land should the necessity arise. To be sure, members of the group once accustomed to the advantages of the outboard motor, the washing machine, mail order luxuries and the like, may find life more burdensome if these are removed or curtailed. However, as long as mutual interdependence can be kept to the fore, it is unlikely that such deprivation will bring dire consequences with it. This point emerges more clearly, perhaps, in the analysis of the social and familial relationships.

The emerging picture of the individual, then, must be viewed as one in which control of one's **life** and destiny has shifted from Inupiat institutions which were well understood by all to foreign institutions of a culture outside the Inupiat sphere of knowledge.

As contact **with** the outside **world increased** after the turn of the century, particularly after the **oil** and gas deposits of the North **Slope**

became of national significance, these conflicts intensified at the interpersonal and institutional levels. Inupiat began to take control of the non-Inupiat institutions, particularly the church, governmental entities, economic entities, and the court system, as population grew and understanding of these institutions and the potential Inupiat role in them increased.

Until World War II, there were few outsiders who had any long-term experience **in** the area. The exceptions were a very small group of **non-Native** entrepreneurs and missionaries **who** generally stayed from two to five years before **going** to another assignment. This pattern of temporary contact between individuals probably has had the most lasting effect. Long-standing relationships have not had an opportunity to develop, and the Inupiat have ended up relating only to outside institutions over time.

Increase and Diversity of Social Contacts

World War II and its aftermath brought an **increase** in the **number** of non-Natives on the North Slope. Some came to organize and train units of the Territorial National Guard, some to explore for oil and gas in the central part of the North Slope now known as the National Petroleum Reserve-Alaska, and many more to build and operate **DEW** Line sites and the Naval Arctic Research Laboratory at Barrow.

Taken together, these developments have created more full-time and **long-term** employment opportunities in the cash labor market for Inupiat

residents. As **the** Inupiat have developed the **skills to** compete in a construction-oriented economy, they frequently find themselves in competition with non-Natives from outside the region for these jobs. Many of these jobs **allow** a person to earn relatively high wages with a minimum outlay of cash, and the high profits to be made from **such jobs** attract many nonresident competitors. Those outsiders who secure work generally do so on the basis of past experience with a given trade **or** company or through experience and being considered a resident at the time when jobs are advertised or where hiring is actually being done, often Fairbanks or Anchorage. This is particularly true if a union is involved as a trade representative since only a few Inupiat have become union members and attained seniority that **allows** them a better chance to secure these jobs.

The immediate effect **of** this situation remains unexplored. One impact noted by the author is to increase the frustration at a community level when criticism of hiring practices is thwarted by the few examples of successful hiring from the **community**. It was recently reported by one employee of a contractor that only six of over 100 employees at an exploration staging area were Inupiat. Significantly, in a report of Alaska Native hires on the **trans-Alaska** pipeline project (TAPS) done by the University of Alaska, Institute of Social and Economic Research (February 1978) the North Slope area had one of the lowest hiring rates in terms of numbers and percentage of population.

This access to a relatively **stable** cash economy has made it possible for a number of non-Inupiat who originally came to the Arctic to work on such

projects to start small businesses, such as stores and guiding services, or to find stable employment within the community. Most of these individuals have married into the community and become part of it.

The vast majority of those who come to the Arctic **still** leave within a very short period of time and never expand their relationship with the community beyond economic exploitation. These transient individuals have no ties to the **community** and, as a group, tend to disrupt it. The areas of primary conflict involve their seeking local female companionship, their role as a source of alcohol, and drugs, and more importantly, as competition for jobs. Recently, most of the transients working in the region are isolated in camps that are far enough from communities to minimize the occurrence of disruptive situations. This was ostensibly the case when the Navy and the **community** of Barrow had a "gentlemen's agreement" to keep those disruptive people out of the community. The same situation held true near the community of Kaktovik, and also **Wainwright** during a construction phase. These gentlemen's agreements, **however**, are very difficult to enforce and those who view the communities as a place and a source of recreation are free to mix with the townspeople.

Resident Inupiat. Against this sketchy backdrop, we can begin to assess some trends in intergroup relations. The most important group is the resident Inupiat, who call the region "home." They have long been considered by others and themselves as experts on living in and from the arctic environment. Their right to travel the land and use it to meet

their own needs has remained unchallenged **into** the present century, Only in the last 30 to 40 years have they come **into** intensive contact with the outside world and the western institutions which characterize it, **In** the past the Inupiat relationship to these Institutions **has** been one of control, either through incorporating the values of the institutions, as in the case of the church, **or** through maintaining a symbiotic relationship to the institutions, as is the case with both the legal system and the educational system. The passage of the Alaska Native **Claims** Settlement Act which created the Arctic Slope Regional Corporation was in a large part due to the strong solidarity and **leadership** shown by Inupiat participants in that effort. **Their** concern at that time was **for securing to** themselves the right to continue to hunt and use their own land base, and they were less concerned with the monetary aspects **of** that act, When major portions of the act were centered around financial provisions, the Arctic Slope voted "No", the only one of 12 organizations to do so. This action is indicative of a **desire to remain** as a cultural enclave and not to become a part of the greater society through its purely economic values.

This view of themselves is severely threatened by the necessity of **active** participation through corporate and municipal programs recently developed in the North **Slope**. **In** large part; the formation of the regional corporation and the formation of the North **Slope** Borough, which occurred in 1972, may be taken as indicators of this strong sense **of** cultural solidarity.

Associated with the formation of government and business entities on the North Slope has been an influx of **non-Inupiat** to fill many key positions, many of them highly paid and carrying a measure of prestige in the communities. This may have done a good deal to lessen the Inupiat feeling of actually controlling activities within their own area. Many of the non-Inupiat workers **filling** positions within these organizations **fall** within two categories yet to be discussed, non-Inupiat residents and transients.

Resident Non-Inupiat. The non-Inupiat residents are a small group who, as previously mentioned, are characterized by having made long-term **Commitments** to the area and, in many instances, have married local people and become members of a **community**. Originally, most of these people came to the Arctic as part of the construction industry or the educational system or as entrepreneurs providing services. In almost every instance, these residents have positions of some influence within the community because of their business activities and personal rapport with other residents of the community. Many of these individuals have done well financially and play a large part in the supply of goods, the control of property, and the accumulation of money. None of these people has yet reached retirement age, but indications are that most feel at least a working life commitment to their communities. Due to family and economic ties within the communities, there is probably a great deal of mutuality between the Inupiat and the non-Inupiat residents.

Transients. Transients fall into two major subcategories which exert quite a different influence in the communities than the two preceding groups.

The first type of transient is the well-educated professional who comes to the North Slope to take a position with either the regional corporation, municipality, school district, or federal government. Many are somewhat adventurous and service oriented, and most arrive hoping to make some lasting contribution to the area. Others in this category are those who serve in a professional consulting capacity to the various governmental and institutional entities on the North Slope. The role of these transients in a larger urban environment would probably deserve little mention, but on the North Slope they are highly visible in the day-to-day operations and overall functioning of various organizations. While actually in residence for only a very short period of time, their impact is perceived as great by the residents and as one more element isolating them from those organizations set up for their benefit. Many in this category are relatively young, single males with no or very small families.

The second category of transients is also predominantly male and young, but with few exceptions, less educated than the first category. Most are single or divorced and are principally motivated by the high wages that are available in the region. Many of these individuals in Barrow, for example, have had serious problems with the law, poor work records, or low skill levels, which makes it difficult for them to obtain work where there is high competition for jobs. In Barrow it is relatively

easy to get a well-paying job in most skilled and unskilled trades because of high turnover and low competition. Additionally, most transients arrive on the North Slope with some contact who can provide them with a job or information or references that will lead to a job. This causes friction as it effectively locks local residents, particularly the Inupiat, out of certain sectors of the job market,

Almost all transients seem to have one thing in common, they live in enclaves separate from the rest of the community. The most obvious examples of this in Barrow are the residents of the Naval Arctic Research Laboratory and attendant camp, the North Slope Borough School District facilities, and Indian Health Service housing. The pattern in other communities is similar.

This type of enclave system is maintained by social pressure from both the residents and the transients. Residents seem to feel that until a transient has spent a relatively lengthy period of time in the community and has demonstrated not only his willingness, but also his ability to get along in a number of social situations away from work, he will receive very little overt acceptance from them. Transients invariably tend to view the social mood of residents as hostile. Transients, government workers, school teachers, and researchers have fostered this image of the North Slope, particularly Barrow. During 1977 this general attitude spilled over into press coverage of several unfortunate incidents, which reinforced this image of hostility in the eyes of the general public outside the North Slope. Illustrative of this problem are the following incidents:

- In the fall of 1977, a representative of a state agency refused to send personnel to any of the North Slope communities for fear that they might be involved in some type of violence.
- A Medical Specialist refused to visit two North Slope communities in the fall of 1977 because on his last visit to one community, someone had thrown rocks at the house in which he was staying, and he viewed the people as being, therefore, ungrateful and hostile towards his presence.
- Two professionals who had applied for positions with the North Slope Borough called and withdraw their applications, ostensibly due to a double murder which was covered in a sensational fashion by the Fairbanks News Miner and picked up by the Associated Press.
- Alaska Natives, some Inupiat from the North Slope, reported that they were roughed up, had eggs and debris thrown at them and were verbally harassed in Fairbanks after this coverage.

Indications of Negative Impact

The history of contact between Inupiat and Western cultures involves several key areas of negative social impact. These will be briefly enumerated and discussed.

Alcohol and Drugs. As mentioned previously, alcohol has been considered a widespread problem in the region almost from the first contacts

with the outside (Murdoch 1892; Brewer 1942; Spencer 1959; Milan 1964; Chance 1966), and alcohol abuse continues to be a major area of concern. The circular impact of alcohol is particularly destructive. Excess consumption constrains individual and group effectiveness in dealing with daily problems, which in turn inhibits participation in healthy social, economic, and family activities. This often leads to increased feelings of frustrations, hostility, and rejection and more drinking to combat these feelings. While consensus is that alcohol is a major problem, how to deal with it is a major area of conflict.

There have been two main sources of liquor on the North Slope--Barrow City Liquor Store and the DEW Line sites. A bar was opened in the hotel in 1974 but was subsequently closed due to damage to the facility and the amount of fighting that took place on or near the premises. Individuals traveling in the region often transport liquor to the smaller communities. The increase in wage employment, influx of non-Inupiat, and the increase in travel associated with borough, regional corporation, and construction activities have heavily contributed to an apparent increase in access to and consumption of liquor.

Drinking behavior on the North Slope seems to follow patterns discussed by Lubart (1971) in the Mackenzie delta region of the Canadian Arctic where similar social and economic conditions are impinging,

Generally speaking, drinking was begun with the express purpose of getting drunk. . . . While most subjects interviewed professed at first to drinking because of tedium, it became apparent that

motivation was far more complex than this. Many males showed anxiety about their future, and complained of tension and mild to moderate depression. They expressed bitterness toward the government, toward white men in general. . . mainly because so many women preferred their company. . . , there were many evidences of emotional disturbances which were temporarily relieved by alcohol. . . . In some instances there were outbursts of violence, sometimes temporary and controllable; at other times, markedly impulsive, assaultive, not subject at all to reason and ending in arrest. . . , Individuals involved in these incidents tended to be less euphoric and sociable when drinking, but were rather sullen, tense, irritable, surly and quarrelsome. Fights would commence on slight picayune provocation. . . In no instance, . . . was there a case of assault against a white man, even though bitter feelings about them were so frequently expressed during drunkenness, Instead men assaulted Eskimo acquaintances, generally with much shame on becoming sober. . . . Violence against whites occurred during the act of arrest. . . . In some instances, men who were ordinarily good-natured, hard working, gentle and good humored within daily contacts would, after a few convivial rounds of beer, suddenly burst forth in wild, assaultive, unprovoked violence. They seemed out of contact, unreachable even by close friends, and bent on a destructive course. . . .

In discussing a major aspect of inter-racial and cross-sex drinking Lubart notes that women and teenage girls usually obtain' liquor from men "usually native, but often white. 'The goal of males was generally to provide alcohol as a means toward sexual ends."

Lubart also succinctly described at least the pattern of alcohol use across wide stretches of the Arctic.

Drinking can be disruptive in other ways as well. Since there are no accessible bars, except the Dew Line, drinking occurs in the home. This has had ill-effects beyond those stated above. Younger children are encouraged to drink via example and if a party is long, school children will be kept from completing homework, and often from getting to school on time and/or sleeping or being extremely sleepy in school.

Another impact of this is that whole households and families are often affected by violent or abusive behavior. On several occasions people have expressed feelings of extreme helplessness over this situation, yet being unwilling to involve the police. Others have stated that they find participating to be the only way to cope with such situations.

Alcohol as recreation has been discussed by Lubart. Several young people in Barrow have pointed out to the authors the lack of alternative activities: "Usually you just visit around. It's boring after a while. But if you wake up with a hangover, you know you had a good time." (1976 fieldnotes)

The Department of Public Safety, in an undated Memorandum (?976), points out that most of the activities are oriented to the school gym and are accessible from after 5 p.m. to 10 p.m. only. This Memorandum suggests that rapid economic "boom" with a large influx of "outsiders" has stimulated a shock wave to the morale of the community, increasing tensions,

particularly during the winter months when the need for organized recreation is the highest:

"The limited environment, house space, and social activity within the community are the major constituents. . . in confining our daily activity. . . . It is obvious that our youth and adults become restless and aggressive; therefore, when they become intoxicated they tend to be violent towards the values and standards of the dominant society. That is, they become very disruptive and contemptuous towards the dominant society's technological inventions--motor vehicles, guns, the white man and public buildings"

For the transient, similar problems with alcohol arise. Frustrations regarding isolation, lack of recreation, inter-cultural conflicts and other personal problems find release through alcohol, marijuana and/or drugs. At such times, hostility towards the Inupiat seems to become a focal point of all pressures. It is not unusual to hear a white transient holding forth about Inupiat as lazy, dishonest, mentally ill or dangerously prejudiced. Such talk appears to be prompted by pre-existing prejudice and perceived tension within the community. Minimal socializing occurs between this group and the Inupiat. That which does occur is usually between young Inupiat women and white males. Some socializing with Inupiat men from work may occur but quality of relations is generally poor and characterized by mistrust and occasional violence. The general character of alcohol use is quite similar. Many transients arrive in the Arctic with serious pre-existing alcohol problems.

Teachers and other professionals are not immune from problems with alcohol. The relative isolation (teachers usually only socialize with teachers or other professionals), perceived racial tensions, and frustrations of the job often lead to alcohol induced expressions of hostility towards the Inupiat:

"The parents don't care enough to support education, the kids are all extremely prejudicial against us, what can you do?"

Many teachers express resentment at the fact that they are not more overtly revered within the community. "My reward has been to hear 'honky' behind my back in class, and to my face in town,"

Teachers in the smaller communities tend to fare somewhat better, Opportunities to become more familiar with a wider section of the community and the necessity of sharing more of the Inupiat lifeways (albeit through necessity) create a more harmonious situation. Controlling access to the school facility which is needed for meetings and activities, controlling the 2-way radio, controlling a few part-time and fulltime jobs, and having the most experience generally with the white society provide the teacher with prestige. In turn, the Inupiat generally control adequate clothing (which must be made locally), skills in securing necessities such as water, keeping snow machines running, hunting, fishing and recreation outdoors. Thus, small community relations provide more mutually beneficial contact and chances to isolate oneself become limited. (Good discussion of this is contained in Cline, 1975.)

Partially through self-selection and partially due to community scrutiny and enculturation, these teachers are not as susceptible to alcohol problems, personal or social.

The situation in Barrow becomes complicated at the institutional level. The city-owned liquor store produced profits of approximately \$300,000 in 1975. These funds supported the city police department, volunteer fire department, and the city offices. A subsequent move to close the liquor store, vocally supported by the administration of the North Slope Borough, was viewed by some as largely a political move to gain financial control of those city services. Police powers were soon transferred to the Borough, and a boroughwide public safety program was established after the closure of the liquor store by election in the fall of 1975.

The liquor store was opened again after an election the following year, but it was reclosed in the fall of 1977. This seesaw pattern seems to stem from the fact that a tightening in the availability of liquor produces an immediate drop in social disruptions. For example, the City and the Borough mutually agreed on a moratorium on liquor sales after a double homicide, a stabbing death, a death in a car accident, and two reported shooting and beating incidents occurred in Barrow within a few days of each other in 1977, which may explain the subsequent vote that fall to again prohibit liquor sales in the community. In 1977 13 of the 18 unnatural deaths in Barrow were alcohol related according to Department of Public Safety statistics.

Closure of the liquor store only means a ban on retail sales. Private clubs (Lion's, Veterans of Foreign Wars) can sell liquor for on-premises consumption, the DEW Line Bar remains open, and the PX at NARL sells beer to employees. Also, it is legal to mail liquor through retail outlets in Fairbanks and Anchorage to "dry" communities, A Wien Air Alaska employee estimated that nearly as much alcohol was being shipped to Barrow after the closure in 1975 as before. The price of liquor varies with supply, demand, and retail cost, For example, the going price for a fifth of Calvert's whiskey fluctuates between \$20 and \$40 or more. This commerce is consistently conducted by a cross section of Barrow residents during "dry" periods but is only sporadic in the smaller communities except when the Barrow City Liquor Store is open.

Statistics related to alcohol problems are difficult to acquire. The Barrow Service Unit Hospital does not record alcohol as a cause of death or injury separate from the physical ailment involved. If a person is injured and drunk, only the injury is recorded. The exception is a diagnosis of alcoholism, but since this designation is problematic it is seldom made.

During 1967 to 1969 the Barrow Service Unit recorded no diagnoses of alcoholism. In 1974 one death due to alcoholism was recorded. Statistics on outpatient visits to the Barrow hospital may be showing a trend of increased visits due to alcohol, Alaska Consultants (1978) reported a large increase in diagnosis of acute/chronic alcoholism, and schizophrenia and other psychoses (see Tables 1 and 2).

TABLE 1

ALCOHOL AND MENTAL HEALTH DIAGNOSES
Percent of Annual Total and Year
Barrow Service Unit

	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
Alcoholism				(2%)	(2%)	(3%)
Acute/Chronic	NA	NA	NA	413	451	597
Accidents and Injuries	(8%) 825	(8%) 875	(8%) 802	(11%) 1,903	(13%) 2,576	(9%) 2,215
Schizophrenia and Other Psychoses	(3%) 257*	(3%) 272*	(3%) 249*	(1%) 226	(2%) 397	(2%) 414
% Previous Year		+1%	-1%	+43%	+16%	+13%
Total OPD Visits**	10,101	10,697	9,801	17,122	20,462	23,393

*1966-1968 The category heading is "Mental, Psychological, and Personality Disorders." This is a much more inclusive term than the 1974-1976 term.

**OPD visits are for the Barrow Service Unit which excludes two North Slope Borough communities--Point Hope and Anaktuvuk Pass.

Sources: (1) Alaska Consultants, Inc. "Baseline Studies of the Man-made Environment" for the OCS Socioeconomic Studies Program; January 1978.
(2) 1970 Program Support Statistics, Indian Health Service, Alaska Area Native Health Service.

TABLE 2

REPORTED INCIDENCE OF ALCOHOL- AND DRUG-RELATED VIOLATION

<u>Category of Violation</u>	<u>1976</u>	<u>1977</u>
Juvenile arrests, total	119	129
Minor consuming alcohol	50	70
Drugs	--	5
Adult arrest total	--	384
OMVI (drunk driving)	24	--
Unnatural death total	--	18
Alcohol Related	--	13

Source: Department of Public Safety, North Slope Borough.

Drug usage (marijuana is included for purposes of discussion) follows very much the same pattern as alcohol. The use of LSD and similar hallucinogens has declined slightly with the increase in availability of marijuana and cocaine. Amphetamines and depressants are still widely used, particularly by young people (age 18 to 25). To date, heroin use is not widespread, but there have been some disturbing reports about the results of its use.

Of all drugs (excluding nicotine and caffeine) marijuana is most widely used and available in North Slope communities. If there is a choice, it is often preferred over alcohol. The intent of use is to get "stoned" in most cases, not just "high" or "mellow". Often it is used in conjunction with alcohol and many believe it has a calming influence on the

socially disruptive behavior often associated with alcohol use. It is highly valued as an adjunct to virtually any social occasion, especially among the young. Its use by grade school children is reportedly frequent but there are no statistics. Marijuana can be expensive, from \$30 to \$100 per ounce depending on the quality. Sources of marijuana, as with liquor, cut across ethnic and social lines.

Amphetamines, prescription medicines, and hallucinogens are used more on the basis of convenience rather than choice. However, there have been several break-ins at village health clinics, ostensibly to secure valium, antihistamines, and other medicines that can produce a "high". Amphetamines and hallucinogens seem to produce some of the same social problems as alcohol.

Heroin has occasionally been used by Inupiat youth but appears to be more prevalent among transient construction workers. One recorded episode of heroin use by residents occurred last year. Reportedly, a young man from an outlying community was partying at the hotel in Barrow and injected some other young people with either heroin or an amphetamine. This situation came to light only because two badly frightened youths showed up at the hospital, one of them badly needing treatment for what appeared to be a psychotic episode. As many as 10 youths, many of them juveniles, appear to have been involved.

Documentation of this kind of impact is scarce, but it is fair to say that these kinds of incidents as well as alcohol abuse and mental

dysfunction will increasingly recur as long as there is a wide availability of cash and a lack of integrating alternative social activities.

Family Discord and Violent Behavior. Problems within the family unit are predictable given the circumstances in North Slope communities-- increased outside contact through travel; visitors; increased transient workers; more governmental interaction; and increased pressures on traditional values, social roles of individuals, and the perceived locus of community control. Pressures in these areas usually increase tensions within families. The following factual example is offered as a qualitative verification:

"A" is a man approximately 35 years old. He has gone to school through his junior year in high school. He is married to "B" and they have two young children. Up until 1970 "A" has worked sporadically and earned about \$4,000 annually. He has depended almost entirely upon his skill as a hunter to provide the principle meals for his family. Work has always been secondary in importance and he would often quit a job to hunt, to join a whaling crew or to spend up to three months at a fish camp maintained by his family (parents). The products of his hunting activities have always been shared according to need or on the basis of traditional values held by his family. "B" has graduated from high school, has had some business college experience and has been sought as a worker by several institutions as clerical help with training is in short supply, "B" is considered an excellent worker, while "A" is considered erratic and

undependable although generally a capable worker,

In the year of courtship and **first** two years of marriage "A" and "B" **got** along reasonably well. Each expressed some jealousy of the other but there had been only one major argument which had led to violence. Each had struck the other and he had a black eye which everyone smiled at. In 1972, "A" took a job at a pipeline camp through an opportunity provided by a Regional Corporation, "A" made more money in six weeks than he had the previous year. "A" worked the usual 9 and 1 shift (9 weeks working at a remote camp, one week off), for nearly a year. "B" and the two infants moved to Fairbanks after several months where they had a **small** apartment, television and friends primarily from home, Their diet changed somewhat, television was greatly enjoyed, and for "B" there was more socializing outside the family unit and more drinking while "A" was **working**.

In 1974 they moved back home. During the interim, "A" had made **good** money, most of which was spent or given to relatives and only some of which was saved. Their move home was prompted by a series of violent episodes with "A" accusing "B" of infidelity and beating her on at least three occasions, two of which sent her to see the doctor. "B" threatened to leave him and, in fact, precipitated the move by doing so, returning home with the children. A contrite husband **followed** a month **later** and a reconciliation took place. Upon returning home, "A" began hunting again to provide meat and

"B" took a clerical job that paid about \$1,000 monthly, This eliminated any real need for "A" to work at all,

With the income of "B", more material things became available. Also, alcohol and marijuana were purchased occasionally for parties. "A" continued to drink frequently when he wasn't hunting. "B" began making more and more of the major decisions, pre-empting what "A" saw as his role. "B" often chided him about his lack of cash income, violent family arguments were frequent and they separated twice more in a year, except these occasions found "A" moving to another community for a month or two months before they reconciled. When drinking, "A" would frequently alternate between deep depressed silence, and abusive violent temper tantrums. He complained that they ("A" and "B") were being sucked into a system which had no place for them. He was angered that "B" could work steadily while he could only find work tolerable for short stretches. It galled him to take orders from taniks (white people) that he felt were uninvited to his country. He found it doubly frustrating to find that there were some that he liked. This created an ambivalence that found him alternately raging when drunk and quite hospitable when sober. He became convinced by "B"'s success and her easy manner with taniks (especially males who are greatest in number) that she may consider running off with one of them. "A" became almost speechless when he first heard about not being allowed to hunt caribou, as this was one of his greatest joys and provided him with the basic food he and his family ate (several times a week). He resolved,

without fanfare, **to** continue hunting. Conversation with him, when drinking or not, usually turned to this subject. Drunkenness always led to rage and any **tanik** around him became a target of invective, insults, taunts and occasionally blows. This happened infrequently as he seldom drank or socialized at all where there were whites-- either he or they would leave. Fights between "A" and "B" became frequent. "B" would not leave him because of their families, and the attachment and loyalty to him and their children. Both sets of parents encouraged them to "work **it** out" and to ignore the bad times. "B" also **felt** that quitting work would be helpful but was fearful of losing the income since they had bills regularly for rent, **utilities**, store and snow machines. Both "A" and "B" **felt** trapped, **unable** to extricate themselves from their involvement in a system which they called "foreign". Both vaguely attributed all **tanik** presence to oil, never to the intermediary institutions. (Personal notes, 1977)

Violence is not confined **to** the Inupiat. The **following** example, **also** factual, examines another North Slope life-style.

"A" is a teacher in his early 30's. He has been on the North Slope for 1½ **years**. He is single, very active, and a reasonably dedicated teacher. He hails from the South. At the beginning of the second year, his girl friend, "B", came to the Arctic. Both got along well with their fellow teachers, and she developed good rapport with many students. "A" did not fare so well; having an older group of

problem children, he was frequently frustrated. Their socializing consisted of frequent parties at which "A" drank heavily, as did some others. When "A" drank heavily he became morose and argumentative. "B" often tried to calm him down and get him to leave the party. On one occasion they left and "B" called the party asking for help as "A" had gotten his gun out, had abused and threatened her and was acting very wild. Through deceit, the gun was gotten away from him. Little more was said about the incident but "A" did not return the following year, though "B" stayed. (Personal notes, 1978)

Barrow teachers and school personnel generally socialize within their own group, but until very recently they **lived** primarily in enclave housing with services such as running water, flush toilets, laundry, and warm and cold storage. In 1977, teachers began occupying housing (albeit new housing) interspersed in the community. This arrangement could either intensify or ameliorate interracial tensions, but there are no numbers, case counts, or other statistics to help evaluate the situation.

Intergroup violence is presently on the upswing. Again without a **case-by-case** examination of magistrate records and detailed interviewing, no statistics are available. It is clear that opportunities **for** intergroup socializing are much more frequent than in the past, primarily because of the higher non-Inupiat population and the increased working relationships between groups at the Borough, regional and village corporations,

and construction. As mentioned previously, alcohol often releases hostile feelings among both groups, and **it is** not uncommon for a fight (or an attempt at one) to occur at a party. These instances are almost always quickly halted by mutual friends. An exception to this follows:

A tanik worker, new to the Arctic boasted that he would not "be intimidated by any Eskimo!" He usually carried a .22 calibre derringer attached to a belt buckle "just in case". There was general knowledge about this "Honky's" attitude and some young people made a point to antagonize him. One evening an Inupiat man was drunk and pounding and kicking his door. The tanik fired his gun through the door, hitting the other man in the foot.

There have been a few reports of guns being fired at white males, and shots have been fired through the window of the FAA station at Barrow. Another incident involved a white worker, quite drunk, firing a gun in the air and at the ground, threatening to kill all Eskimos. Such events do happen, but not with any regularity. Tragically, one exception occurred in 1977, when two hikers were shot to death near Point Barrow. A young Inupiat man has been convicted of this crime, but press coverage so sensationalized the story that severe **repercussions** resulted. Among others, Native people in downtown Fairbanks were harassed, pushed, and had eggs thrown at them, and in Barrow, already strained by the event, accusations and paranoia increased.

Fortunately, most hostility is expressed through **verbal** baiting and a refusal to mix on the part of some within each ethnic group.

Suicide and Mental Illness. Self-destructive behavior is another area frequently associated with social and cultural disruption. In an analysis of suicide and suicide attempts in the North Slope area, **Schall** (no date) analyzed records from 1965 to 1971. Noting that suicide is generally underreported, **Schall** listed four successful suicides between 1965 and 1967 and none from 1968 to 1971. There are no easily accessible figures for 1972 to 1975, but from 1975 through 1977 there were seven known suicides. This apparent resurgence after a period of relative dormancy should not be interpreted as anything other than an indication of heightened dynamic social processes impinging on individuals to an extreme degree. **Schall** found positive correlations between suicidal behavior and alcohol use at the time, loss of a loved one, high degree of Inupiat to white blood, previous suicidal behavior in the family, and low family income. R. Kraus (quoted in **Schall**) postulated that self-destructive behavior is closely related to disruption of valued patterns of mutual support focused in the Inupiat nuclear family. The suicides in **Schall**'s study all indicated elements of this pattern. It is also significant to note that again the young, ranging in age from 17 to 35, are most susceptible.

Predictably, in an area where self-destructive behavior is rated high, the incidence of psychological illness is also high (see Figure 1). In 1975 the Barrow Hospital Service Unit recorded one of the highest regional rates of hospitalization at the Alaska Psychiatric Institute in Anchorage with a total of 12 cases--a rate of 4.3/1,000 (pers. comm., Jack McCombs, Alaska Div. of Mental Health).

The **rate** of absenteeism from work and **school** is another good indicator of adjustment at both the community and individual levels. Absenteeism has been mentioned **to** the authors as a coping strategy for expressing embarrassment over a mistake, and also more frequently as expression of antipathy towards bosses **or** co-workers. Complete records of job absenteeism were unavailable except for notations that it was occasionally high especially during peak subsistence seasons. If a person had a record of absenteeism, **it** was most commonly either morning lateness or blocks of days. **Non-Inupiat**s were reported to miss days **sporadically**. Associated with this phenomenon is high job mobility for many. The school reports chronic **tardiness** as a major problem and attributes **it** to a lack of concern for punctuality and crowded living conditions that make it difficult to get to bed early enough.

Indicators of Positive Change. The preceding discussion has focused principally on negative impact. Too often, positive impacts are overlooked, and areas that **could** be mitigated are not identified.

As mentioned previously, the Inupiat provided a strong segment of the support and leadership for the Alaska Native Claims Settlement Act, which was and is a source of immense pride to the majority of the people. From their ranks and with their support a strong voice of the **people** was heard, and their leaders have proved they can take active roles in national and state issues,

The ability to form new organizations in response to recent events has been critical. When the people start an organization they are generally

very supportive even though they may verbally attack **at** points in its evolution. Through the Indian Reorganization Act governments, Arctic Slope Native Association, Arctic **Slope** Regional Corporation, North Slope Borough, and borough school district, they have been able to insure that they **are** capable of responding to each new situation as it arises.

Through this variety of entities, each with its own constituency and functions, the individual is assured of a platform for his views as well as capable representatives to air those **views** beyond the sociopolitical boundaries which restrict the Individual.

The "Duck In" is a good example of the solidarity and activism that can be generated against outside interference. At another level, the **Inuit Circumpolar** Conference demonstrated the same type of unity across national boundaries. These and similar responses may both derive from and support a feeling of autonomy and control, which often leads outsiders to label some past and present leaders as "militant" and unreasonable. No Inupiat leader need fear a lack of support when dealing with outsiders; however, there is often a good deal of political infighting at home. This has often led outside analysts to assume a highly fictionalized population, only to actually encounter a unified front.

To satisfy the need or desire for cash income no longer means moving south. Borough, regional and village corporations, and private sector jobs are more plentiful and pay better than ever before. This new economic situation has done much to encourage young people to go beyond high school and then return to the village and has also attracted many who

had left the area back. Roles with **real** opportunity and prestige await the Inupiat who feels challenged by this change.

These events have allowed the populace to isolate itself from many of the pressures of the outside **world** and carry on their traditional lifestyles. New leaders are emerging, and it is critical that they retain **community** support while often having to work far away from the lifestyle they may seek to protect. Many new institutional responses are in process, and it is important to understand: (1) what outside or inside pressure triggers a response; (2) to what extent the response is apparently effective; and (3) to what extent individuals are **able** to relate to this response. Indications are that **outmigration** of the individual from smaller communities to larger and from the larger communities to outside the region as described by Milan (1954), Hippier (1969), and Bloom (1972) may be ending. Since 1972 there have been instances where those who had left the area returned, many to work within the new institutions. Schools through the twelfth grade **now** serve to keep many families together. There is more employment. At the very least, these trends indicate a new vitality in the communities.

Vigorous efforts to retain the Inupiat language may serve as another thread in the fabric which provides the Inupiat with a sense of control and **participation** in the emerging community,

Traditional food remains not just as a symbol but as an important dietary item. The role of subsistence foods is immense **as** it relates not only

to physical health but also to major areas of sharing and cooperation within the **community**. Whaling **and** other subsistence activities are presently threatened by international treaty and national legislation, but the Inupiat have strongly and effectively defended their rights to their traditional ways against powerful forces.

If these events are true indications **of** the effectiveness of the Inupiat in dealing with pressure from the outside world, it has been achieved through the strength of old and new institutions and the Inupiat's ability to insulate themselves culturally and personally from the pace of the outside world.

III. REGIONAL POPULATION, ECONOMY, AND SERVICES

Population

PAST TRENDS

It is difficult to trace population trends before 1970 in the area now encompassed by the North Slope Borough. Population figures are available for individual towns; however, areas outside traditional communities have periodically experienced large, though usually temporary, influxes of people for specific purposes, such as oil and gas exploration or military and scientific programs. Since the region was within three census divisions for the 1960 and 1970 censuses and within two completely different divisions for several censuses before 1960, it is almost impossible to derive a complete picture of population trends in what is now the North Slope Borough, even for the period since World War II. A further complication is that before about 1950 some of the Eskimo population (most notably the **Nunamiut** Eskimos who settled at Anaktuvuk Pass) was still migratory and was probably missed by the census takers.

While figures on the total population of the North Slope region between World War II and 1970 are unreliable, a review of the three major population immigrations to areas outside the traditional communities during this period does convey some idea of the impact. The first of these was associated with oil and gas exploration in Naval Petroleum Reserve #4 (**NPR-4**) now called the National Petroleum Reserve-Alaska (**NPR-A**); the

second with military construction after World War II; and the third with oil and gas exploration and development activities in the Prudhoe Bay area.

During the period 1944-1953, the Navy and its contractors conducted a major exploration program in NPR-4. This involved a large influx of military and civilian personnel and brought lasting change to Barrow, which was used as a base for exploration activity. A camp was built near Barrow on a site now occupied by the Naval Arctic Research Laboratory (NARL), an airport was built, and a road was developed between the camp and the village of Barrow in 1944. During the exploration period about 80 Eskimos were employed, but these jobs ceased when the exploration program ended in 1953.

The next major immigration of people to areas outside traditional communities of the North Slope region occurred during the 1950's with construction of the Distant Early Warning (DEW) Line system and associated Aircraft Control and Warning (AC & W) Sites. The main station for the entire system was built at Barter Island and resulted in the village of Kaktovik being moved in 1952 and again in 1953 when the Air Force determined that it needed the site for its facilities. DEW Line stations were also built near other villages in the region, notably Point Lay, Barrow, and Wainwright. In addition, an AC & W site was constructed in 1956 at Cape Lisburne, a location remote from the region's traditional settlements.

After these military facilities were built, the construction crews left the region. However, personnel required to man the facilities stayed, and although some DEW Line stations have since been closed, a significant defense-related presence remains in the borough today.

After the Navy's exploration program in **NPR-4** ended, some interest remained in the oil and gas potential of the North Slope. However, it was not until the State's lease sales in the Prudhoe Bay area in 1964, 1965, and 1967 that further intensive oil and gas exploration took place. Following the announcement of major oil discoveries in 1968 and the State's "bonanza" lease sale in 1969, another immigration of people to the North Slope occurred, many of whom remain there to this day.

Between 1939 and 1970 the population in the traditional communities in the region rose 144 percent, from 1,258 in **1939** to 3,075 in 1970 (see Table 3). Two main factors were involved in this very substantial rate of growth, despite some **outmigration**, primarily for educational purposes. The first was a very high birth rate of the Eskimo population accompanied by an increasing life expectancy. The second was an influx of government personnel to provide such services as health and education to the Eskimo people of the region or to undertake scientific research.

While the overall population of the North Slope's traditional settlements rose significantly between 1939 and 1970, not all of the communities shared in this growth. During this period, Atkasook, **Nuiqsut**, and Point Lay were abandoned as permanent towns. By contrast, Barrow's population

TABLE 3

POPULATION ESTIMATES
NORTH SLOPE BOROUGH REGION
1939 - 1977

Community	1939	1950	1960	1970	Jan. 1974	Jan. 1975	July 1975	Dec. 1975	July 1976	Jan. 1977	July 1977
Traditional Communities a/											
Anaktuvuk Pass	---	66	35	99	134	134	129	129	150	150	151
Atkasook (Meade River)	78	49	30	---	---	---	---	---	---	---	86
Barrow	363	951	1,314	2,152	2,163	2,163	2,141	2,107	2,294	2,294	2,220
Kaktovik	13	46	120	123	141	141	119	119	123	123	134
Nuiqsut	89	---	---	---	145	145	149	149	152	152	157
Point Hope	257	264	324	386	404	404	384	403	408	408	412
Point Lay	117	75	---	---	27	27	48	48	51	51	54
Wainwright	341	227	253	315	354	354	341	344	357	394	398
	<u>1,258</u>	<u>1,678</u>	<u>2,076</u>	<u>3,075</u>	<u>3,368</u>	<u>3,368</u>	<u>3,311</u>	<u>3,299</u>	<u>3,535</u>	<u>3,572</u>	<u>3,612</u>
Oil & Gas/Pipeline Camps b/											
Prudhoe Bay/Deadhorse Area	NA	NA	NA	279	927	3,158	5,022	5,531	8,801	7,765	5,318
NPR-A	NA	NA	NA	3	5	5	5	5	55	505	33
				<u>282</u>	<u>932</u>	<u>3,163</u>	<u>5,027</u>	<u>5,536</u>	<u>8,856</u>	<u>8,270</u>	<u>5,351</u>
Military Stations c/											
Cape Lisburne	---	---	NA	83	112	112	112	112	112	112	92
DEW Line	---	---	NA	111	111	111	111	111	111	111	108
				<u>194</u>	<u>223</u>	<u>223</u>	<u>223</u>	<u>223</u>	<u>223</u>	<u>223</u>	<u>200</u>
TOTAL				<u><u>3,551</u></u>	<u><u>4,523</u></u>	<u><u>6,754</u></u>	<u><u>8,561</u></u>	<u><u>9,058</u></u>	<u><u>12,614</u></u>	<u><u>12,065</u></u>	<u><u>9,163</u></u>

a/ Population for traditional communities since 1970 based on actual counts or Borough Planning Department estimates. The estimates for Barrow appear low. In the opinion of Alaska Consultants, Inc., the community's 1977 population was at least 2,700 persons.

b/ Population for oil/gas and Pipeline camps since 1970 provided to the North Slope Borough by industry groups. Estimates for NPR-A from January 1974 through December 1975 provided by the U.S. Geological Survey.

c/ Population for Cape Lisburne since 1970 provided to the North Slope Borough by the U.S. Air Force. Population for DEW Line stations (excluding POW-Main) provided to the North Slope Borough by FELEC Services, Inc. for the period December 1975 through July 1977. DEW Line populations back through 1970 assumed by Alaska Consultants, Inc. to be at December 1975 level.

Sources: U.S. Census.
North Slope Borough.

increased **almost** 500 percent, mainly because **it** had become a regional center for government services and arctic scientific research. An influx of government personnel took place, and the community also attracted Eskimo residents from smaller villages on the North Slope. Today, it is clearly the dominant permanent community in the region.

Since 1970, population trends in **all** areas of the North Slope Borough are fairly well documented. According to borough estimates, 9,163 people lived in the region in July 1977, an increase of 158 percent since the 1970 Census. However, **Alaska** Consultants, Inc. believes that the Borough's estimates for Barrow since **1970** have consistently been too low. Using a common Alaska ratio of three persons for every job, **Alaska** Consultants derived its own estimate of 2,700 people living in this community in 1977. If this estimate is used instead of the Borough's, the region had a **total** population of 9,643 in July **1977**, an increase of almost **172** percent since 1970.

The population of the region's traditional communities rose a healthy 33 percent between 1970 and 1977 (using Alaska Consultants' 1977 estimate of Barrow's population). The largest numerical increase occurred in Barrow, where the population grew an estimated 25.5 percent to 2,700 people. Significant rates of **growth** were also recorded in **Anaktuvuk** Pass (52.5 percent) and **Wainwright** (26.3 percent) but Kaktovik and Point Hope had only limited growth. The 1970-1977 period saw another important development, the reestablishment of three of the region's traditional **communities** -- Atkasook, **Nuiqsut**, and Point Lay. These three **communities**

had a combined population of 297 in 1977, most of them outmigrants from Barrow who claimed some cultural affinity with the settlements though they had not necessarily been born there.

While the North Slope's traditional communities have grown since 1970, the major source of population increase in the region was caused by development of the Prudhoe Bay field and the resulting construction of the trans-Alaska pipeline. These activities brought large groups of workers into the region and were the major factor in the 225 percent increase in the borough's population between 1970 and July 1976. They were also the cause of a 27.6 percent decline in the borough's population between July 1976 and July 1977 (using borough estimates of Barrow's population). Construction of the trans-Alaska pipeline officially ended in August 1977, and the only people now in the region associated with this project are maintenance, security, and pump station personnel. According to industry figures, there were 4,904 pipeline employees in the borough in July 1976 but only 1,814 by July 1977, a 63 percent drop.

Although the presence or absence of oil and gas-related populations has little direct impact on the region's traditional communities, indirectly their absence has had an enormous impact because the ability of the North Slope Borough to tax oil and gas property for operating revenues has been tied to a \$1,500 per capita formula through the current fiscal year. Thus, when the Borough's population declines, so do its tax revenues. (Oil and gas industry-related populations and all other people in the Borough are counted as residents if they are physically present

in the region as of **July 1** in a given year. The **July** figures are then certified by the Alaska Department of Community and Regional Affairs for both state revenue sharing and oil and gas property taxation purposes.)

The only other event in the North Slope region since **1970** which has resulted in a significant population increase in areas outside traditional communities has been renewal of oil and gas exploration in **NPR-A**. A total of 505 persons working in **NPR-A** were counted as borough residents in January 1977. Exploration work in **NPR-A** intensifies in winter, so the apparent decline to 33 people in July 1977 actually reflects only a seasonal variation in employment.

Military subcontractors constitute the third major population group in the North Slope Borough. However, unlike oil- and gas-related populations, the number of people in this group has remained virtually unchanged since 1970.

POPULATION COMPOSITION

The outstanding feature of the population composition of the North Slope Borough in 1970 was that most people living in the region were Inupiat Eskimos. Because the area now encompassed by the North Slope Borough was within three different census divisions in 1970, statistics for the Barrow Census Division were combined with those for the traditional villages of Point Hope and Kaktovik and the pipeline camps at Deadhorse and Prudhoe Bay to obtain a regionwide perspective on population compo-

sition. It should be noted, however, that these figures are incomplete since they include only 3,384 of the 3,551 persons living in the region in 1970. For example, no figures were available for the Barter Island DEW Line station, which had a complement of 58 white and two Eskimo employees living on base in 1977.

Within the above limitations, the population of the North Slope region in 1970 was about 83 percent Alaska Native (assuming that all persons categorized as "other" in the Barrow Census Division were Alaska Natives). However, the Native population was not evenly distributed. The populations of all five traditional communities then in existence were at least 85 percent Alaska Native (ranging from Kaktovik with a population that was 87.8 percent Native to Anaktuvuk Pass with a 98 percent Native population). By contrast, the three nontraditional settlements for which 1970 statistics by race are available (Cape Lisburne, Deadhorse, and Prudhoe Bay) all had populations that were at least 90 percent non-Native. In fact, blacks were the second largest ethnic group at Cape Lisburne in 1970. (Cape Lisburne was then manned by 83 air force personnel, 70 of whom were white, 10 black, two Indian, and one was listed as "other.")

Since 1970 the racial composition of the North Slope Borough's population has changed dramatically. Alaska Natives are no longer the dominant group regionwide. Persons engaged in oil- and gas-related activities in the Prudhoe Bay area and in NPR-A plus those associated with military stations accounted for 57.6 percent of the borough's total population

(even using Alaska Consultants' estimate of 2,700 people living in Barrow) in July 1977. While no breakdown by race of the region's 1977 population is available, it is assumed that the population associated with the military and **oil-** and gas-related activities is still **at** least 90 percent non-Native. By this definition, non-Natives clearly outnumber Natives in the region today.

The population of the North Slope's traditional communities remains overwhelmingly dominated by persons of Inupiat Eskimo origin. However, it is believed that there are significantly more white residents in these towns now than there were in 1970. The professional employment opportunities opened up by the North Slope Borough and the Arctic Slope Regional Corporation have attracted a new group of whites to the region since 1970, most of them to Barrow. While there are virtually no hard statistics on the impact of this new migrant group, a survey of population in **Wainwright** in 1977 by Alaska Consultants, Inc. found that the proportion of Eskimos had fallen from 97.5 percent in 1970 to 93.4 percent in 1977. Virtually all whites in the region's smaller communities are school teachers. Since the Borough has upgraded education services regionwide, the increased presence of whites in **Wainwright** is probably repeated in the other small towns. In Barrow, however, the proportion of whites has undoubtedly risen more significantly as this is the location of the borough school district's central offices plus those of the Borough's general government and the Arctic Slope Regional Corporation. All three agencies have opened up new job opportunities for whites. Furthermore, although Barrow has continued to attract new Eskimo resi -

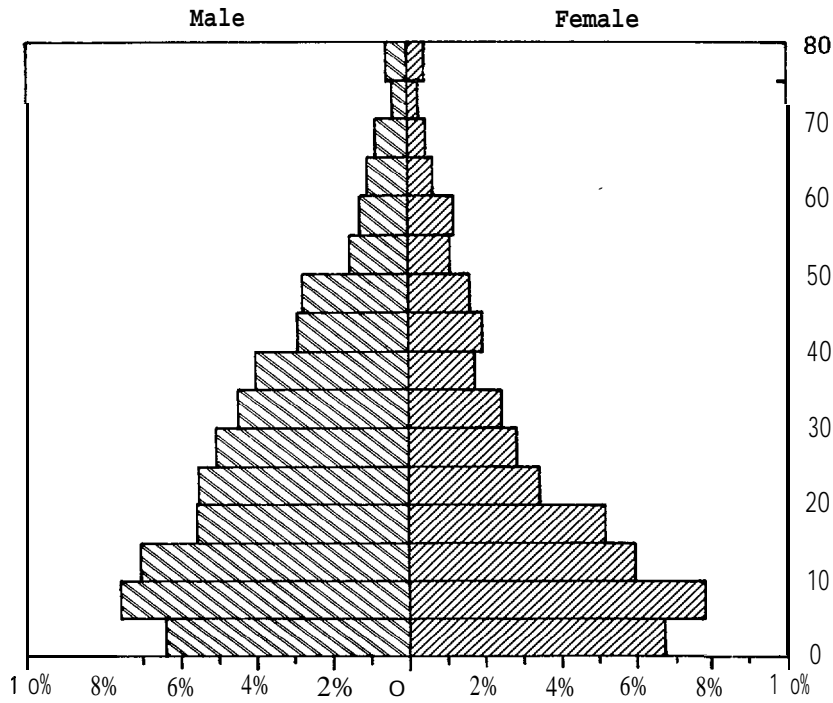
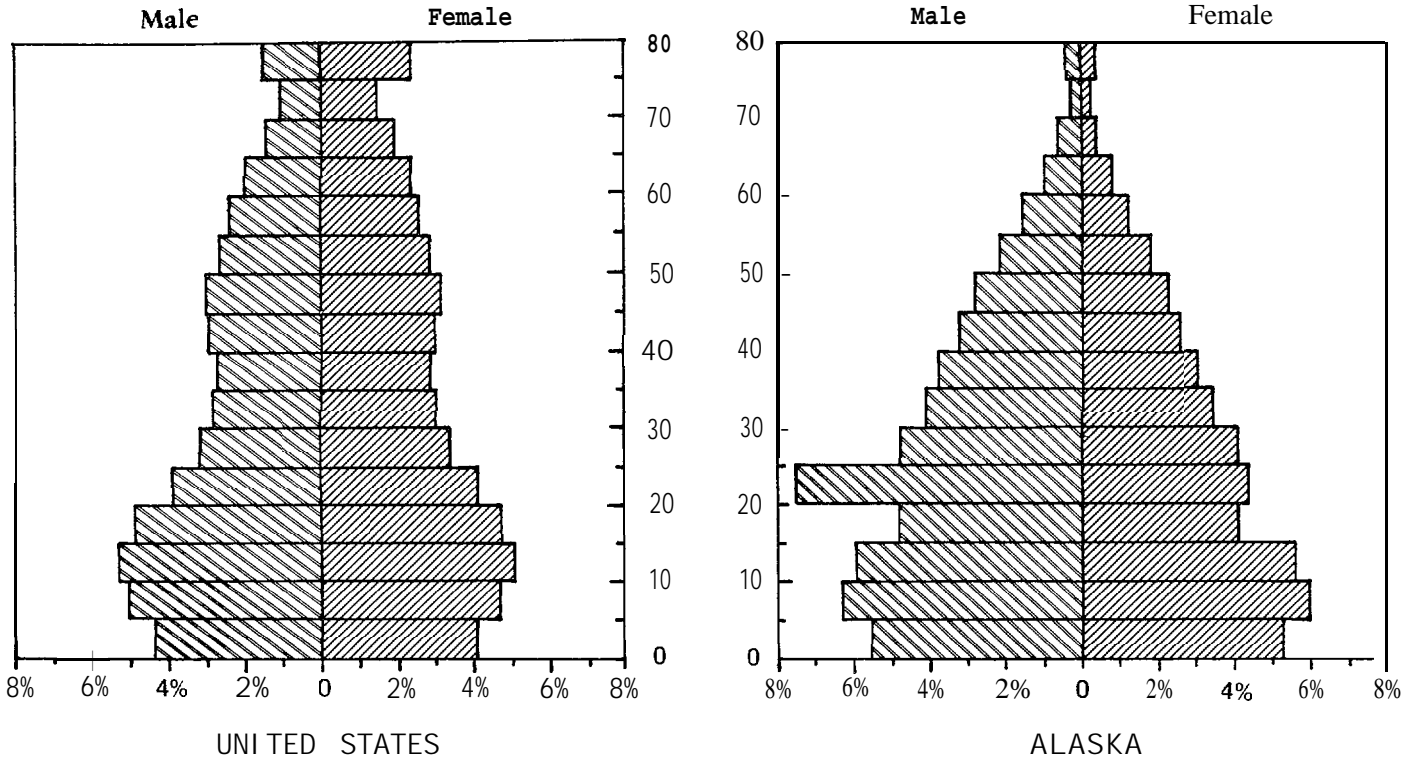
dents from the region, **this** has been offset to some extent by an **outmi - gration** of Eskimos **from** Barrow to resettle **Atkasook**, Point Lay, and **Nuiqsut**.

A review of the age and sex characteristics of the North Slope Borough population as measured by the 1970 census indicates that the population composition of this region is fundamentally unlike national **norms** (see Figure 3). Furthermore, although the Borough exhibits some typically Alaskan characteristics in the youth of its population and the predominance of males, it possesses these characteristics to a much more extreme degree than does the state as a whole.

The North Slope Borough's population in 1970 **was** very young. The median age as noted by the 1970 census was 18.7, compared to 22.9 for the state and a nationwide median of 28. The median age of females (16 years) in the borough was much lower than that of males (21.3), **mainly** because of the presence of a numerically **significant** group of working age males in the **Prudhoe Bay/Deadhorse** area. (There were no females recorded by the 1970 census at either Prudhoe Bay or Deadhorse). However, except for **Wainwright** and Kaktovik, the median age of males was also older than that of females **in** the region's traditional communities.

Males outnumbered females by 57.2 to 42.8 percent in the North Slope Borough in 1970. This disparity was more extreme than the male to female ratio for the state (54.3 percent males to 45.6 percent females) and completely unlike the 1970 national norm of 51 percent females to 49

FIGURE 3



NORTH SLOPE BOROUGH
COMPOSITION OF POPULATION

1970

percent males. Although the presence of an **all** male population in the **Prudhoe Bay/Deadhorse** area contributed **to** the extreme differences between the number of **males** and females in the region, males also outnumbered females in all of the borough's traditional communities. The imbalance between male and female Native populations in the North Slope occurs in post-high **school** age ranges, indicating that more **outmigration** by females than males from the region has taken place.

The composition of the North Slope Borough's population in **1977** is fundamentally different from that in 1970. In 1977, the **Prudhoe Bay/Deadhorse** area accounted for over half of the borough's total population, whereas it was a relatively minor element in 1970. **While** no current age or sex statistics are available, the population of the region as a whole is undoubtedly now much older and has an even higher proportion of **males** than was the case in 1970. (In 1970, no one counted by the census at **Prudhoe Bay** or **Deadhorse** was younger than 18 or older than 66.)

GROWTH PROSPECTS

In the future the North Slope Borough region as a whole is likely to continue its recently established uneven pattern of population growth. Populations related to oil and gas exploration and development are likely to continue to fluctuate, depending on the **scale** and type of activity underway at a given time. The region's total population has dropped following completion of construction on the **trans-Alaska** pipeline. However, construction of the planned gas line and the scheduled Beaufort

Sea state and federal offshore lease sales will bring a new influx of workers into the borough. Once the gas line is completed, the construction workers associated with it **will** leave. The number of workers associated with offshore exploration activity will depend on the stage of development and, ultimately, on the exploration program's degree of success. There is also a potential for oil and gas discoveries in other areas of the borough which, if realized, **would** certainly influence population growth. In addition, future decisions as to the development of NPR-A could have a direct impact on the number of **people** living within the North Slope Borough's boundaries.

While there are a wide range of possibilities influencing future population growth in the borough as a whole, the growth prospects of the region's traditional communities are much more **easily** defined. Excluding Barrow, growth in the villages is expected to be related primarily to rates of natural increase and **outmigration**. No significant immigration to any of these communities is anticipated. It is assumed that rates of natural increase will continue to follow state and national trends and decline, so **outmigration** rates are the key to determining how much these villages will grow.

Migration rates from North Slope villages to larger settlements have slowed in recent years. The Borough capital improvements program, largely possible because of the discovery of oil in the region and provisions of ANCSA, has raised the standard of living in these communities and increased local employment opportunities. The ability of the North

Slope Borough to sustain its program of community improvements in the villages will largely determine their growth rates, as will the continued access by these people to their traditional subsistence resources.

Growth prospects for Barrow will be affected by the same factors as the region's smaller villages as well as by continued substantial immigration both from within and outside the region. The rate of immigration will largely depend on continued expansion of borough services and facilities. In turn, these activities will be affected by the number of people in the borough, including oil- and gas-related workers located within borough boundaries within the 3-mile seaward limit, if current per capita or other population related formulas for determining local government operating revenues continue to be used. The extent of local investment by the Arctic Slope Regional Corporation and the degree of success of its investments elsewhere will also be significant determinants of Barrow's future growth rates.

Economy

COMPOSITION OF EMPLOYMENT

According to Alaska Department of Labor statistics, nonagricultural wage and salary employment in the North Slope Borough averaged 6,932 jobs in 1976 (see Table 4). The three largest employment sectors were contract construction, mining, and government. Contract construction alone accounted for more than half of the region's nonagricultural wage and

TABLE 4

NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT DISTRIBUTION
NORTH SLOPE BOROUGH
1976

<u>Industry Classification</u>	<u>Number</u>	<u>Percent of Total</u> %
Mining	1,271	18.3
Contract Construction	3,738	53.9
Manufacturing	<u>a/</u>	
Transportation, Communications and Public Utilities	316	4.6
Trade	<u>a/</u>	
Finance, Insurance and Real Estate	<u>a/</u>	
Service	445	6.4
Miscellaneous	0	---
Government	892	12.9
Federal	(239)	(3.4)
State	{ 652 }	{ 9.4 }
Local		
<u>TOTAL</u>	<u>6,932</u>	

a/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Department of Labor.

salary employment, but a large share of jobs in this sector have now ended as they were associated with construction of the trans-Alaska pipeline. Mining jobs made up close to 20 percent of the nonagricultural wage and salary employment and were mainly located in the Prudhoe Bay area, although some were associated with exploration activities in National Petroleum Reserve-Alaska (NPR-A). It is significant that these two sectors, which accounted for almost three quarters (72.2 percent) of the jobs in the borough in 1976, employ people in areas remote from the region's traditional communities. Furthermore, most employees in these sectors are whites and are only temporary residents.

By contrast, almost all jobs in government, the third largest sector with 12.9 percent of the region's nonagricultural wage and salary employment in 1976, are located in the borough's permanent communities. Most of these jobs are in the state and local government categories, principally with the North Slope Borough.

Of the remaining sectors, the only ones for which employment information could be disclosed by the Alaska Department of Labor in 1976 were services and transportation, communications, and public utilities. Together these two sectors accounted for 11 percent of the region's nonagricultural wage and salary employment. The three sectors for which information could not be disclosed made up a combined total of only 3.9 percent of total nonagricultural wage and salary employment. Since there is essentially no manufacturing activity in the borough, virtually all remaining jobs are either in trade or in finance, insurance, and real

estate. Both sectors are represented in all of the region's traditional communities, with most employment in finance, insurance, and real estate being associated with the Native regional and village corporations established under the terms of the 1971 Alaska Native **Claims** Settlement Act (ANCSA).

Overall, the composition of employment in the North Slope Borough is **fundamentally** unlike that of the state (see Table 5). Government was the state's largest employment sector in 1976, followed by contract **constuc-tion**, services, and trade. Federal employment accounted for the largest share of the government sector statewide in 1976, although local and state government were not far behind. In the North Slope Borough, however, local government was by far the most important government sector. Federal government employment was significant, but there are very few state government jobs in this region.

Contract construction was the second largest employment sector statewide in 1976, with 17.6 percent of total nonagricultural wage and salary employment. This is low when compared to the borough figure. However, although contract constructⁱon is usually an important element of the state economy, it too was **distorted** in 1975 and 1976 by work on the **trans-Alaska** pipeline.

Compared with state figures, the North Slope Borough has relatively undeveloped trade and services sectors. This is **common** in rural Alaska where people with limited incomes and local high costs of living rely

TABLE 5

NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT DISTRIBUTION
NORTH SLOPE BOROUGH AND STATE OF ALASKA
1976

<u>Industry Classification</u>	<u>North Slope Borough</u> %	<u>Alaska</u> %
Mining	18.3	2.3
Contract Construction	53.9	17.6
Manufacturing	<u>a/</u>	6.0
Transportation, Communications and Public Utilities	4.6	9.2
Trade	<u>a/</u>	16.1
Finance, Insurance and Real Estate	<u>a/</u>	4.1
Service	6.4	16.2
Miscellaneous	---	.7
Government	12.9	27.6
Federal	(3.4)	(10.5)
State	{ 9.4)	(8.2)
Local		(8.9)
<u>TOTAL</u>	<u>100.0</u>	<u>99.8</u>

a_/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Department of Labor.

almost exclusively on mail order purchases and make few demands on the service sector. However, in the North Slope Borough it is believed to be more a reflection of the presence of a sizable transient population housed in camps associated with the pipeline and similar activities which makes virtually no demands on the region for goods and services.

Mining employment in the North Slope Borough in 1976 accounted for almost one third of the total statewide employment in this industry. Since employment in the borough as a whole accounted for only 4 percent of the state's nonagricultural wage and salary employment during that year, mining jobs are obviously much more significant in the North Slope Borough than they are in the state as a whole.

In **summary**, the composition of employment in the North Slope Borough is fundamentally different from that of the state. The Borough is a mixture of traditional communities where government is the major employer sector and of isolated enclaves where mining or contract construction is the dominant activity. The two groups are united only in terms of their general geographic location within borough boundaries.

UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT

According to statistics published by the Alaska Department of Labor, the Barrow-North Slope division had an unemployment rate of 3.7 percent in 1976, the lowest in the state and well **below** the 8.2 percent statewide average. However, while this unemployment figure may be reasonably

accurate for the region as a whole, it does not represent conditions in all areas. In July 1976, 71.1 percent of **the** borough's population lived outside traditional communities, mainly in the **Prudhoe Bay/Deadhorse** area and in pipeline camps. All of these people were employed and, when their jobs ended, they simply left the region. One can therefore conclude that in some of the borough's traditional communities unemployment rates are relatively high.

Another factor contributing to an apparently low **level** of unemployment in the North **Slope** and in other rural areas of Alaska is that state statistics count as unemployed only those people who are actively seeking work. As there are very few jobs available in most rural Alaska communities, many people in these areas are outside the labor force and are therefore not counted as being unemployed.

Although unemployment in the region's traditional **communities** is higher than indicated by boroughwide statistics, unemployment rates have declined recently in the region's villages, mainly because of new employment opportunities afforded by the North Slope Borough and the regional and village Native corporations. The **availability of** jobs associated with the **trans-Alaska** pipeline has also been a temporary factor in reducing unemployment in the region's traditional communities.

No unemployment statistics are available for individual **communities** within the borough. However, a review of employment in Barrow, **Nuiqsut**, and Kaktovik undertaken in December 1977 by Alaska Consultants, Inc.

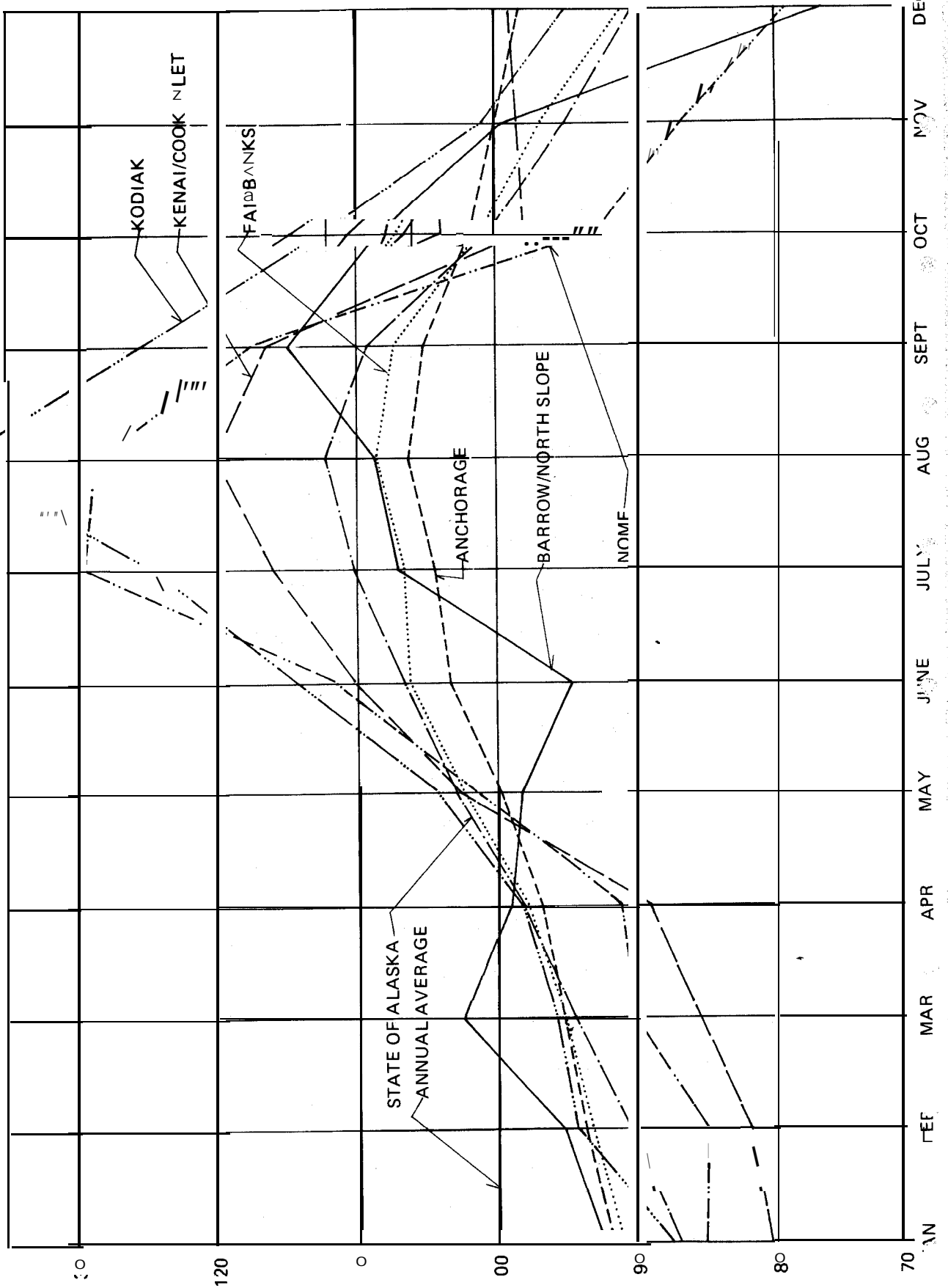
indicate that while there is a good deal of underemployment in these communities, unemployment is much **less** of a problem here than in most rural areas of the state. A survey of employment in **Wainwright** conducted by Alaska Consultants, Inc. in April 1977, however, found a higher rate of unemployment in that community **as** there was only one **local** job for every 6.6 residents (compared to about one for every 3.8 residents in **Nuiqsut** and **Kaktovik**). **Wainwright** is a relatively large village, and some economies of scale can be realized in the provision of government services here. As a result, a higher proportion of **people** are not able to be accommodated by a combination of borough and village corporation jobs. In such a case, a choice between leaving the community or remaining unemployed must be made. A comparable situation may exist at Point Hope, a village about the same size as **Wainwright**.

A review of month to month nonagricultural wage and salary employment for the Barrow-North Slope division in 1976 indicates that employment in the region showed more seasonal variation than it did in the state as a whole (see Figure 4). Employment in the North Slope region peaked in September at 115 percent of the **annual** average and dropped to a **low** of 76.8 percent in December, whereas that for the state as a whole ranged between a high of 112.5 percent of the annual average in August and a low of 87.5 percent **in** January.

A look at conditions in Anchorage in 1976 indicated that this community experienced even less seasonal variation than the state, with employment ranging between a high of 106.6 percent of the annual average in August

MONTHLY EMPLOYMENT AS A PERCENTAGE OF THE ANNUAL AVERAGE

FIGURE 4
 SEASONALITY OF NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT
 SELECTED ALASKA DISTRICTS
 1976



SOURCE: Alaska Department of Labor, Employment Security Division

and a low of 92 percent in January. Employment in Fairbanks showed only slightly more seasonal **ity**. However, areas like Kodiak and Kenai-Cook **Inlet**, where fishing and fish processing are important segments of the economy, generally exhibited more employment **seasonality** than the North Slope. The same was true of the Nome area, where a combination of mining, tourism, and construction activities normally contribute to a high degree of employment **seasonality**.

When individual sectors of the Barrow-North Slope division are analyzed, it is apparent that contract construction was the major contributor to seasonal variations in employment in the region in 1976. In December 1976, employment in contract construction was about 1,700 jobs **below** that recorded in this sector during the previous month. Peak employment in contract construction occurred in September, as did that for the Barrow-North Slope division as a whole. Employment in services also showed a high degree of **seasonality**. However, this sector has **many** fewer employees. By contrast, employment in government is relatively stable. Peak employment in this sector in 1976 occurred between June and September, probably reflecting the Borough's ongoing construction programs.

Employment **seasonality** statistics for the Barrow-North Slope division are not representative of conditions in the region's traditional **communi-**ties. During 1976, employment in the region was dominated by construction of the **trans-Alaska** pipeline, by oil and gas development in the Prudhoe Bay area, and by related transportation, communications, and

service activities. Employment in the Borough's traditional communities, however, is dominated by the government sector.

As a part of Alaska Consultants' count of employment in Barrow, employers were asked to indicate average **annual** employment and whether additional employees were hired at particular times of the year. While no precise measurements can be derived, it was apparent that the major elements contributing to **seasonality** of employment in the community were tourism and construction activities. Tourism adds jobs in trade, services, and transportation during the summer months. Construction activities are also highly seasonal because of the region's harsh climate. However, seasonal variations in employment in Barrow do not approach the extremes registered for **the** region as a whole.

In the smaller communities, seasonal variations in employment usually result from the closure of the **local** schools during the summer months and from **summer** construction activities. School teachers generally leave the region during the long summer vacation, and other positions associated with the schools except for maintenance jobs also cease temporarily. The number of construction jobs in these communities varies from year to year, depending on the projects scheduled. However, **while** seasonal variations in employment do occur in these communities, they are less extreme than those experienced boroughwide.

RECENT TRENDS AND CHANGES

The composition of employment in the North Slope region has undergone a fundamental change during the past 10 years. Four main events precipitated this change: the discovery of a major oilfield in the Prudhoe Bay area which was announced in 1968; the passage of the Alaska Native Claims Settlement Act in 1971; the formation of the North Slope Borough as an areawide unit of local government in 1972; and the construction of the trans-Alaska pipeline between 1974 and 1977. Because of severe limitations in available data, figures measuring trends in employment caused by these events are generally incomplete. However, within these limitations, the following trends and changes have been noted.

According to statistics provided by the Alaska Department of Labor (see Table 6), non-agricultural wage and salary employment in the Barrow labor area (boundaries the same as former Barrow Census Division, previously described) plus insured employment for the remainder of the region totalled 1,065 jobs in 1970. By 1974 this combination of employment types accounted for 3,062 jobs, or an increase of 187.5 percent over the 1970 figure. However, rates of increase in different parts of the North Slope region and in different employment sectors varied widely. Insured employment in the region outside the Barrow labor area rose almost 1,732 percent, from an annual average of 88 jobs in 1970 to 1,612 in 1974, while nonagricultural wage and salary employment in the Barrow labor area rose by a more modest 48 percent, from an annual average of 977 jobs in 1970 to 1,450 in 1974.

TABLE 6

COMPARISON OF INSURED EMPLOYMENT
NORTH SLOPE BOROUGH AREAS OUTSIDE BARROW LABOR AREA a_/

1970 AND 1974

Employment Sector	1970		1974		1970 - 1974 % Change
	Number	% of Total	Number	% of Total	
Mining	<u>b/</u>		580	36.0	
Contract Construction	<u>b/</u>		697	43.2	
Manufacturing	<u>b/</u>		<u>b/</u>		
Transportation, Communications and Public Utilities	<u>b/</u>		160	9.9	
Trade	<u>b/</u>		<u>b/</u>		
Finance, Insurance and Real Estate	<u>b/</u>		<u>b/</u>		
Service	<u>b/</u>		<u>b/</u>		
Miscellaneous	<u>b/</u>		<u>b/</u>		
Government	<u>b/</u>		18	1.1	
Federal	(27)	(30.7)	(15)	(.9)	(-33.3)
State and Local	<u>b/</u>		(3)	(.2)	
<u>TOTAL</u>	<u>88</u>	<u>100.0</u>	<u>1,612</u>	<u>100.0</u>	<u>1,731.8</u>

a/ Includes Point Hope/Cape Thompson, Deadhorse, Crazy Horse Camp, Prudhoe Bay and an assortment of smaller centers, not all of which are within the Borough's boundaries.

b/ Employment figures withheld to comply with disclosure regulations or no employment recorded.

Source: Alaska Department of Labor.

The largest increases in employment in the region outside the Barrow labor area between 1970 and 1974 were in mining; contract construction; transportation, communications and public utilities; and in services. Disclosure regulations prevent the measurement of changes in individual sectors. However, increases in employment were largely due to the development of the **Prudhoe Bay field** and construction of the **trans-Alaska** pipeline and increased needs for transportation and communications and services generated by these activities. Some idea of the impact of pipeline construction on this area can be gauged by the fact that total insured employment in 1974, the first year of work on this project, was 418 percent above that in 1973.

More complete statistics on trends and changes in employment are **available** for the Barrow **labor** area (see **Table 7**). Nonagricultural wage and salary employment in the labor area increased 48 percent between 1970 and 1974. However, significant gains in employment were recorded in only two sectors -- government and transportation, communications and public utilities. Employment in mining rose slightly; contract construction and services employment declined, while that in manufacturing, trade, and finance, insurance, and real estate was affected by disclosure regulations.

By far the largest increase in employment in the Barrow **labor** area between 1970 and 1974 occurred in state and local government, where the number of persons employed rose from 37 to 358, an increase of 940 percent. This dramatic rate of growth was due almost entirely to the incorporation of the North Slope Borough in 1972 and the subsequent extension of a

TABLE 7
TRENDS IN NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT
BARROW LABOR AREA
1970 - 1974

Employment Sector	1970		1971			1972		
	Number	%	Number	%	% Change	Number	%	% Change
Mining	280	28.7	119	14.0	-57.5	117	12.8	-1.7
Contract Construction	173	17.7	137	16.2	-20.8	104	11.4	-24.1
Manufacturing	<u>a/</u>		0	---		0	---	---
Transportation, Communications and Public Utilities	86	8.8	80	9.4	-7.0	95	10.4	18.8
Trade	<u>a/</u>		<u>a/</u>			<u>a/</u>		
Finance, Insurance and Real Estate	<u>a/</u>		<u>a/</u>			<u>a/</u>		
Service	142	14.5	150	17.7	5.6	175	19.2	16.7
Miscellaneous	0	---	0	---	---	0	---	---
Government	165	16.9	282	33.3	70.9	334	39.6	18.4
Federal	(128)	(13.1)	(168)	(19.8)	(46.9)	(173)	(18.9)	(3.0)
State and Local	(37)	(3.8)	(114)	(13.4)	(208.1)	(161)	(17.6)	(41.2)
<u>TOTAL</u>	977	100.0	<u>848</u>	<u>100.0</u>	<u>-13.2</u>	913	<u>100.0</u>	7.7

a_/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Department of Labor.

TABLE 7

TRENDS IN NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT (Cont.)
 BARROW LABOR AREA
 1970 - 1974

Number	1973		Number	1974		1970 - 1974
	%	% Change		%	% Change	% Change
103	9.8	-12.0	290	20.0	181.6	3.5
70	6.6	-32.7	119	8.2	70.0	-31.2
0	---	---	0	---	---	
168	16.0	76.8	145	10.0	-13.7	68.6
<u>a/</u>			<u>a/</u>			
<u>a/</u>			<u>a/</u>			
187	17.8	6.8	96	6.6	-48.7	-32.4
0	---	---	0	---	---	---
395	37.5	18.3	641	44.2	62.3	288.5
(171)	(16.2)	(-1.2)	(283)	(19.5)	(65.5)	(121.1)
(224)	(21.3)	(39.1)	(358)	(24.7)	(59.8)	(940.5)
<u>1,052</u>	<u>100.0</u>	<u>15.2</u>	<u>1,450</u>	<u>100.0</u>	<u>37.8</u>	<u>48.4</u>

range of local government services to communities in the region. Federal government employment also increased during the 1970-74 period, registering a 121 percent gain, but most of this increase is believed to be related either to activities in NPR-A or to deficiencies in state statistics. Employment in transportation, communications, and public utilities increased by a healthy 68 percent during this same period.

After 1974, nonagricultural wage and salary employment information is available for the entire borough. However, it is not directly comparable with the combination of nonagricultural wage and salary and insured employment information provided for prior years, and few if any reliable conclusions can be drawn about employment trends from only two years of data.

Overall, nonagricultural wage and salary employment in the North Slope region increased slightly more than 12 percent between 1975 and 1976 (see Table 8). Healthy but relatively modest increases were recorded in mining (9 percent), services (7 percent), and government (almost 11 percent). A much greater rate of increase (close to 19 percent) was registered in contract construction, with 1976 being the last full year of work on the trans-Alaska pipeline. However, the largest increase took place in the state and local government portion of the government sector where employment rose 24 percent. Virtually all of this increase was in local government. Federal government employment, on the other hand, declined almost 15 percent between 1975 and 1976. Much of this decline and the corresponding increase in local government employment may result from

TABLE 8

TRENDS IN NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT
NORTH SLOPE BOROUGH
1975 - 1976

Employment Sector	1975		1976		1975 - 1976
	Number	%	Number	%	% Change
Mining	1,166	18.9	1,271	18.3	9.0
Contract Construction	3,152	51.1	3,738	53.9	18.6
Manufacturing	<u>a/</u>		<u>a/</u>		
Transportation, Communications and Public Utilities	434	7.0	316	4.6	-27.2
Trade	135 <u>b/</u>	2.2	<u>a/</u>		
Finance, Insurance and Real Estate	<u>a/</u>		<u>a/</u>		
Service	415	6.7	445	6.4	7.2
Miscellaneous	<u>a/</u>		0	---	
Government	805	13.0	892	12.9	10.8
Federal	(280)	(4.5)	(239)	(3.4)	(-14.6)
State and Local	(525)	(8.5)	(652)	(9.4)	(24.2)
<u>TOTAL</u>	<u>6,172</u>	100.0	<u>6,932</u>	<u>100.0</u>	<u>12.3</u>

a/ Employment figures withheld to comply with disclosure regulations.

b/ Retail trade employment only.

Source: Alaska Department of Labor.

the Borough's takeover of the school system from the State and the U.S. Bureau of Indian Affairs between 1974 and 1975.

Employment in the transportation, communications, and public utilities sector also declined between 1975 and 1976, with employment dropping by 27 percent. However, this decline is believed to be unrelated to services provided to the traditional communities of the region since no drop in employment in this sector was encountered in Barrow. The transportation, communications, and public utilities sector is an insignificant element in the economies of other traditional communities of the region.

One very significant recent change in employment in the North Slope region is not indicated by employment statistics because jobs in finance, insurance, and real estate are usually affected by disclosure regulations. This category includes central office jobs of Native regional and village corporations formed under the terms of the Alaska Native Claims Settlement Act. In addition, jobs with subsidiaries of these corporations are often submerged in the trade, services, and other sectors of the region's employment picture. Nevertheless, given the very substantial land and cash entitlements of these corporations, they are an important element in the regional economy and should continue to be so through the foreseeable future.

The discovery of oil and gas at Prudhoe Bay and the decision to construct a pipeline across Alaska to transport oil (and eventually another line to

transport natural gas) have had far-reaching effects on employment in the North Slope region as well as in the state as a whole. In the North Slope region, a very large share of employment is presently engaged in mining and related construction activities. Borough taxes levied on these activities support most local government employment in the region and, through greatly increased levels of spending by the borough government and its employees, **also** help support employment in other sectors. A similar situation exists in Alaska as a whole since revenues from the 1969 Prudhoe Bay oil and gas lease sale and from petroleum taxes have been used to greatly increase the level of state spending (and the number of state employees, although not in the North Slope Borough). This increased state spending, in turn, has had a major impact on employment in other sectors throughout the state, particularly in urban centers.

There is no published information available which indicates trends in employment in individual communities of the North Slope region. However, it can be said that the incorporation of the North Slope Borough and the formation of Native village corporations and the Arctic Slope Regional Corporation have had a major impact on the number of jobs available to the region's permanent residents. Before the borough and the corporations existed, the employment pattern in the region's traditional communities was probably typical of most rural areas in the state -- that is a highly skilled group of people, almost exclusively white, providing services such as health and education to a largely unskilled and unemployed group of **people**, almost exclusively Alaska Native. Today, however, Eskimos in this region have many more opportunities for employment in their home towns.

New employment opportunities outside the region's traditional communities have also been available to borough residents during the past few years as a result of the development of the Prudhoe Bay field and construction of the trans-Alaska pipeline. It should be noted, however, that relatively few Natives presently work in permanent jobs in the Prudhoe Bay area. (Alaska Consultants counted only 2 Nuiqsut residents and 4 Wainwright residents who were regular oil company employees although some people from Barrow also work in this area). By contrast, a large number of Alaska Natives from the North Slope region and elsewhere in the state worked at least temporarily on the construction of the trans-Alaska pipeline. Nevertheless, these jobs, plus those associated with the Borough and the regional and village corporations, have provided local Eskimo residents with a range of well paid jobs not available elsewhere in rural Alaska.

OCCUPATIONAL SKILLS

There is little comprehensive information available on the skills of the work force in the North Slope region. The Barrow Manpower Center maintains a list of skills as classified by the U.S. Department of Labor of persons who register there when looking for work. Registrants at the center are generally people from the region's traditional communities, and their skills are not typical of those of the region's work force as a whole. (For further details, see the occupational skills section for Barrow in this report.)

Overall, the population of the North Slope region is highly skilled. Persons working at Prudhoe Bay, NPR-A and on the Pipeline accounted for over half of the region's July 1977 population. All of these people were hired because they possessed specific skills. While there are no statistics available, **it** is apparent that the **skills** possessed by the majority of people working in areas outside the region's traditional communities **fall** into the structural, miscellaneous, and services groups as defined by the U.S. Department of Labor

INCOME LEVELS

According to Alaska Department of Labor statistics, individual wage levels in the North Slope Borough in 1975 and 1976 were among the highest in the state (**see** Table 9). The average monthly wage in the region in 1976 was \$3,897, a figure exceeded only in the Southeast Fairbanks, **Valdez-Chitina-Whittier** and **Yukon-Koyukuk** census divisions. Unfortunately, statistics are not available on a boroughwide basis prior to 1975, and it is apparent that wage **levels** in all of these four census divisions were distorted by pipeline-related salaries during 1975 and 1976. The average monthly wage statewide in 1976 was \$1,928, but this, too, was distorted by pipeline construction activities.

A review of monthly wage levels by industry sector in the Barrow-North Slope Census Division for 1975, **1976**, and the first quarter of 1977 indicates very clearly why boroughwide wage figures are so high (see Table 10). The average wage in the construction sector in the region

AVERAGE MONTHLY WAGE
ALASKA CENSUS DIVISIONS
1976

<u>Census Division</u>	<u>Average Monthly Wage</u>
Aleutian Islands	\$ 1,499
Anchorage	\$ 1,613
Angeon	\$ 899
Barrow-North Slope	\$ 3,897
Bethel	\$ 940
Bristol Bay Borough	\$ 1,309
Bristol Bay	\$ 1,142
Cordova-McCarthy	\$ 1,220
Fairbanks	\$ 2,161
Haines	\$ 1,093
Juneau	\$ 1,414
Kenai-Cook Inlet	\$ 1,742
Ketchikan	\$1,294
Kobuk	\$ 1,161
Kodiak	\$ 1,287
Kuskokwim	\$1,577
Matanuska-Susitna	\$ 1,316
Nome	\$ 1,286
Outer Ketchikan	\$ 918
Prince of Wales	\$1,493
Seward	\$ 1,178
Sitka	\$ 1,377
Skagway-Yakutat	\$1: 229
Southeast Fairbanks	\$3,956
Upper Yukon	\$ 2,009
Valdez-Chitina-Whittier	\$3,932
Wade Hampton	\$1,349
Wrangell-Petersburg	\$ 1,290
Yukon-Koyukuk	\$4,082
<u>STATE OF ALASKA</u>	<u>\$ 1,928</u>

Source: Alaska Department of Labor.

AVERAGE MONTHLY WAGE BY INDUSTRY SECTOR
 BARROW-NORTH SLOPE DIVISION
 1975 - 1977

	1975				1976				1977
	1st Qr	2nd Qr	3rd Qr	4th Qr	1st Qr	2nd Qr	3rd Qr	4th Qr	1st Qr
TOTAL NONAGRICULTURAL INDUSTRIES	\$2,654	\$2,879	\$3,439	\$3,310	\$3,092	\$3,904	\$4,311	\$4,230	\$3,224
Mining	\$2,709	\$2,662	\$2,686	\$3,201	\$2,924	\$2,946	\$3,254	\$3,162	\$3,437
Construction	\$3,793	\$3,738	\$4,337	\$4,055	\$3,733	\$5,103	\$5,820	\$6,120	\$5,158
Transportation, Communications & Utilities	\$2,231	\$2,745	\$2,692	\$2,245	\$2,889	\$2,760	\$3,093	\$2,502	\$2,799
Wholesale Trade	<u>a/</u>	<u>a/</u>	<u>a/</u>		<u>a/</u>	<u>a/</u>			
Retail Trade	\$ 457	\$ 428	\$ 483	\$ 447	\$ 612	\$ 551	\$ 508	<u>a/</u>	\$ 642
Finance, Insurance & Real Estate	\$1,013	\$1,038	<u>a/</u>	\$1,456	<u>a/</u>	<u>a/</u>	\$2,540	\$1,564	<u>a/</u>
Services	\$2,498	\$2,282	\$2,475	\$2,939	\$3,060	\$3,251	\$3,519	\$3,094	\$2,918
Federal Government	\$ 916	\$ 885	\$ 939	\$ 992	\$ 668	\$1,039	\$ 962	\$1,078	\$ 980
State & Local Government	\$ 852	\$1,213	\$1,442	\$1,638	\$1,007	\$1,746	\$1,453	\$1,578	\$1,426
Miscellaneous & Manufacturing	<u>a/</u>	<u>a/</u>						<u>a/</u>	<u>a/</u>

a/ Figures withheld to comply with disclosure regulations.

Source: Alaska Department of Labor.

was more than \$5,000 per month after the first quarter of 1976, peaking at \$6,120 per month in the fourth quarter of 1976. Most of this activity was associated with the **trans-Alaska** pipeline.

Average wage levels in mining, services, and in transportation, communications, and utilities in the North Slope Borough were also high when compared with those of other sectors. The average wage in mining exceeded \$3,000 per month after the second quarter of 1976, with a peak of \$3,437 per month recorded for the first quarter of 1977. All of this employment was in areas remote **from** the region's traditional communities, mainly in the vicinity of Prudhoe Bay or in the National Petroleum Reserve-Alaska.

Wages in services jobs also averaged more than \$3,000 per month in 1976 (with a peak of \$3,519 per month in the third quarter of 1976), although average wage rates in this sector dropped to slightly below \$3,000 in the first quarter of 1977. The largest share of these jobs was related to oil and gas development and pipeline construction activities.

Wage levels in transportation, communications, and utilities were slightly below those in mining and services but were still high when compared with **all** other sectors except for construction. The highest average monthly wage recorded to date in this sector was \$3,093, which was reached during the third quarter of 1976. Again, most jobs in this sector were based outside the region's traditional communities servicing **oil** and gas or pipeline activities or associated with the DEW Line sta-

tions. However, Barrow has a fairly large transportation, communications, and utilities sector, and this probably lowers average monthly wage levels in this sector for the region as a whole.

While individual wage rates in construction, mining, services, transportation, communications, and utilities are obviously very high in the region, this is partly due to the fact that employers in these sectors maintain small or no office staffs in the region. The Alaska offices of most companies in these sectors are based in Anchorage, or Fairbanks, or both. As a result, the lower salaries normally paid to clerical and junior technical personnel are not reflected in North Slope Borough figures. Another reason for the high average monthly wage rates in these sectors is the very large number of overtime hours, particularly in jobs associated with the trans-Alaska pipeline.

The salaries recorded for the Barrow-North Slope Census Division in trade and government are much lower. The highest average monthly wage in trade recorded for the region between 1975 and the first quarter of 1977 was only \$642 (in the first quarter of 1977). Wages in trade are normally relatively low. However, the average monthly wage in this sector in the North Slope region during the first quarter of 1977 was significantly below that of Anchorage (\$976), Fairbanks (\$1,042), and most other census divisions in the state.

Average monthly wages in government were higher than those in trade in the North Slope Borough between 1975 and the first quarter of 1977. The average for the federal government sector was \$980 per month in the first

quarter of 1977. The average for the federal government sector was \$980 per month in the first quarter of 1977 (down from a high of \$1,078 in the fourth quarter of 1976), while that for state and local government was \$1,426 (with a high of \$1,746 per month during the second quarter of 1976). Wage rates for federal employees in the North Slope region are lower than those recorded for most other census divisions. However, a high proportion of federal employees in the region are associated with the Public Health Service hospital, and hospital employees generally receive relatively low wages. Furthermore, the salaries of many federal employees in Barrow are supplemented by employer-provided housing.

Almost all employment in state and local government sector in the North Slope Borough is based in the traditional communities, principally Barrow. Since there are very few state employees in the region, the state and local government sector here is mainly made up of borough employees. The average monthly wage in the state and local government sector in the first quarter of 1977 for the North Slope region was comparable to that received in local government in Anchorage [\$1,458] and the state (\$1,376) but was significantly lower than that received in Fairbanks (\$1,804). Given the high cost of living in North Slope communities the buying power of wages in this sector in the borough is undoubtedly below state averages.

There is obviously a wide disparity in the incomes received by people who live and work in traditional communities of the North Slope Borough and those received by people who are based in camps along the pipeline,

in the Prudhoe Bay area, in National Petroleum Reserve-Alaska, or other isolated locations in the region. However, since the population of the region in 1974 and 1976 was dominated by people who lived outside the region's villages, the incomes of permanent residents are difficult to determine from regionwide figures.

Income data which are more representative of the region's traditional communities were obtained from the 1970 census, from a **1974** survey conducted by **Dupere** and Associates, and a 1976 survey carried out by the North Slope Borough School District. In addition, information on welfare payments, which have from time to time, been important sources of supplemental income in the North Slope region, **was** obtained from the Alaska Department of Health and Social Services and the U.S. Bureau of Indian Affairs.

At the time of the 1970 census, 86.6 percent of the population of the North Slope region lived within traditional communities (compared with only 42.4 percent in July 1977 even using Alaska Consultants' revised population figure for Barrow). Data are not available for the entire region because it was then within three census divisions; however, the median family income for the Barrow Census Division (which included the communities of Anaktuvuk Pass, Barrow, and **Wainwright** but excluded people in the **Prudhoe Bay/Deadhorse** area) was found to be \$8,575 (see Table 11). While this was higher than that recorded for any census division in northern or western Alaska except in the Bristol Bay Borough, it was well below the statewide median of \$12,443.

TABLE 11
 FAMILY INCOME DISTRIBUTION
 BARROW CENSUS DIVISION AND STATE OF ALASKA
 1969

<u>Family Income</u>	<u>Barrow Census Division</u> %	<u>State of Alaska</u> %
Less than \$ 1,000	5.3	2.2
\$ 1,000- \$ 1,999	6.9	2.3
\$ 2,000- \$ 2,999	6.5	2.7
\$ 3,000- \$ 3,999	13.2	3.2
\$ 4,000- \$ 4,999	1.4	3.7
\$5,000- \$5,999	5.8	5.0
\$ 6,000- \$6,999	1.2	4.9
\$ 7,000-\$7,999	7.2	4.6
\$ 8,000- \$ 8,999	4.6	4.7
\$9,000- \$9,999	6.5	4.3
\$10,000 - \$11,999	13.6	10.2
\$12,000 - \$14,999	12.5	14.3
\$15,000- \$24,999	9.5	28.2
\$25,000- \$49,999	6.0	8.7
\$50,000 or more	---	.8
<u>TOTAL</u>	<u>100.0</u>	<u>100.0</u>
<u>Median Income</u>	<u>\$8,575</u>	<u>\$12,443</u>

Source: U. S. Census.

TABLE 12
 FAMILY INCOME DISTRIBUTION
 NORTH SLOPE BOROUGH TRADITIONAL COMMUNITIES
 1973

<u>Family Income</u>	<u>Number of Families</u>	<u>Percent of Total</u>
Less than \$ 1,000	14	3.9
\$ 13000- \$4,999	106	29.8
\$ 5,000- \$10,999	93	26.1
\$115000- \$15,999	37	10.4
\$16,000- \$20,999	30	8.4
\$21,000 - \$24,999	17	4.8
\$25,000 or more	15	4.2
No Response	44	12.4
<u>TOTAL</u>	<u>356</u>	<u>100.0</u>

Source: Dupere and Associates.

A comparison of the results of surveys undertaken by **Dupere** and Associates and the North Slope Borough School District indicates that, except in Kaktovik, median family income levels in the region's traditional villages underwent a significant increase between 1973 and 1975 (see Tables 12, 13, and 14). For example, the **Dupere** survey found a median family income of \$8,560 in Barrow in 1973. According to the school district survey, this had risen to \$22,676 in 1975, an increase of about 165 percent. Even greater increases between the two survey periods were found in Anaktuvuk Pass (180 percent) and **Nuiqsut** (213 percent). Significant increases were also registered in Point Hope (77 percent) and **Wainwright** (almost 53 percent). A comparatively modest increase was recorded in Point Lay (25 percent) and a slight decline (about 7 percent) in Kaktovik. **Dupere** and Associates found a median family income of \$6,962 for the region's permanent villages. While no more recent figures are available boroughwide, it is apparent from the results of the school district survey that the region's median family income is now probably well in excess of \$12,000.

Surveys of income conducted by the Alaska Department of Administration in Barrow in December 1976 and by Alaska Consultants, Inc. in **Wainwright** in April 1977 indicate a continuing rise in local incomes. The Alaska Department of Administration estimated average household income in Barrow in 1976 to be \$27,507 (although this may not be very reliable as it was based on a survey of only 10 households). Alaska Consultants, Inc. found that the median 1976 household income in **Wainwright** was \$10,000.

TABLE 13

MEDI AN FAMI LY I NCOME
NORTH SLOPE BOROUGH TRADI TIONAL COMMUNIT IES
1973

<u>Traditi onal Communi ty</u>	<u>Medi an Fami ly Income</u>
Anaktuvuk Pass	\$ 3,591
Barrow	\$ 8,560
Kaktovi k	\$16,500
Nuiqsut	\$3,800
Point Hope	\$6,770
Point Lay	\$6,250
Wainwright	\$5,833
<u>BOROUGHWI DE</u>	<u>\$ 6,962</u>

Source: Dupere and Associates.

TABLE 14

PER CAPITA AND FAMI LY I NCOME
NORTH SLOPE BOROUGH TRADI TIONAL COMMUNIT IES a/
1976

<u>Communi ty</u>	<u>Percent of Popul ati on Covered</u> a/ %	<u>Per Capi ta Income</u>	<u>Medi an Fami ly Income</u> s
Anaktuvuk Pass	81	\$1,815	\$10,062
Barrow	23	\$3,508	\$22,676
Kaktovi k	54	\$2,317	\$15,289.
Nuiqsut	89	\$1,925	\$11,899
Point Hope	75	\$1,966	\$11,992
Point Lay	69	\$1,566	\$ 7,832
Wainwright	85	\$1,323	\$8,906

a/ Survey conducted in March, 1976.

Source: North Slope Borough School District.

The main reasons for increases in family incomes of the North Slope's permanent residents are believed to be related to the incorporation of the North Slope Borough in 1972 and to the formation of the regional and village corporations under the terms of the Alaska Native Claims Settlement Act. Together, the borough and the corporations have served to greatly increase the number of jobs available to Eskimos in the region, both in Barrow and in the smaller villages. The availability of jobs on the pipeline and in the Prudhoe Bay area has also been a factor.

Although income levels in the North Slope region's traditional communities have risen significantly since 1970, with the possible exception of Barrow they are still far behind statewide averages. For example, the median family income in Wainwright in 1976 was lower than the median for the state in 1969, and this does not include adjustments for inflation.

Another factor which should be considered in a review of income levels in North Slope villages is the region's extremely high cost of living. According to the Alaska Department of Administration, food costs in Barrow in December 1976 were the highest in the state, averaging 73.6 percent above those in Anchorage. (This disparity was confirmed in December 1977 by Alaska Consultants, Inc. which found a list of selected grocery items in Barrow to cost 70 percent more than the same items in Safeway in Anchorage, although prices in Kaktovik and Nuiqsut were slightly lower than in Barrow). The same survey by the Department of Administration indicated that Barrow residents paid less for housing than did people in Anchorage; but the cost of standard housing in Barrow is so

high that, unless it is subsidized, it is beyond the reach of most local residents.

General assistance payments from the Bureau of Indian Affairs and public assistance funds distributed by the Alaska Department of Health and Social Services are an important form of supplemental income for a number of families in the borough, although they are less important today than they were a few years ago (see **Table 15**). The Bureau of Indian Affairs distributed a total of \$22,700 to 58 "cases" in the region during its 1976 fiscal year, but this was down sharply from FY 1970 when the agency distributed a total of \$61,300 to 109 "cases." Payments by the Alaska Department of Health and Social Services are also down from 1970, when \$32,606 were divided among 173 recipients during a typical month, to 1976, when a total of \$19,914 was paid out in a typical month to 130 recipients (see Table 76). By far, the major source of public assistance is the Aid to Families with Dependent Children program, which paid a total of \$15,786 to 62 recipients during a typical month in 1976.

In summary, income levels in traditional communities in the North Slope region have improved **significantly** since 1970, but they remain, on the average, well below state levels. When such factors as high living costs and large family sizes in the region are taken into consideration, it is apparent that a significant portion of the population is still living in conditions of extreme poverty and that subsistence hunting and fishing are an economic necessity. By contrast, persons employed in isolated enclaves associated with the pipeline and oil and gas activities

TABLE 15
 GENERAL ASSISTANCE PAYMENTS a/
 NORTH SLOPE BOROUGH TRADITIONAL COMMUNITIES
 FY 1970, FY 1974, FY 1976

	<u>FY 1970</u>	<u>FY 1974</u>	<u>FY 1976</u>
Total Payment	\$61,300	\$189,300	\$22,700
Number of Cases	109	293	58
Average Payment:			
Annual	\$ 562	\$ 646	\$ 391
Monthly	\$ 47	\$ 54	\$ 33

a/ Payments by the Bureau of Indian Affairs.

Source: U.S. Bureau of Indian Affairs.

TABLE 16

PUBLIC ASSISTANCE PROGRAM PAYMENTS a/
 NORTH SLOPE BOROUGH TRADITIONAL COMMUNITIES
 OCTOBER, 1970 AND OCTOBER, 1976

	Old Age Assistance		Aid to the Blind		Aid to the Disabled		Aid to Families with Dependent Children		Total	
	1970	1976	1970	1976	1970	1976	1970	1976	1970	1976
Total Payment	\$11,388	\$4,694	\$185	\$-	\$2,961	\$1,434	\$18,072	\$15,786	\$32,606	\$19,914
Number of Cases	74	51	1	-	16	17	82	62	173	130
Average Payment	\$ 154	\$ 92	\$185	\$-	\$ 185	\$ 84	\$ 220	\$ 255	\$ 188	\$ 153

a/ October is considered to be a representative month for public assistance payments.

Source: Alaska Department of Health and Social Services.

have extremely high incomes. Furthermore, these incomes are not diminished by the North Slope's high living costs since the families of almost all of these people are located outside the region.

SECTOR ANALYSIS

Oil and Gas

The oil and gas industry is not new in the North Slope region. Numerous oil seeps generated interest in the region's potential as far back as the early 1900's when mining claims were first staked in the Cape Simpson area. However, the activities of private oil interests there were halted following the creation of Naval Petroleum Reserve #4 (NPR-4) by presidential order in 1923.

A major exploration program in **NPR-4** was conducted by the Navy and **later** by civilian contractors between 1944 and 1953. During the nine-year period, nine oil and/or gas fields were discovered, but because of high costs and the relatively small scale of the discoveries, only the South Barrow gas field has been developed and this only because of its proximity to Barrow. Exploration activities in NPR-4 ceased in 1953 when it was determined that the reserve's remote location and its environmental vulnerability, combined with the absence of major finds, were serious obstacles to further development of the area.

After cessation of the **NPR-4** exploration program, no more exploratory

drilling took place on the North Slope for another 10 years until private companies leased federal lands east of NPR-4 and south of the present Prudhoe Bay field. However, no commercial quantities of oil or gas were discovered during this period, and interest then shifted to **state-**selected lands along the Beaufort Sea coast.

The State **held** four competitive oil and gas lease sales on the North Slope--one each in **1964**, 1965, 1967, and 1969. Most of the **lease** acreage at **Prudhoe** Bay was acquired in the **1965** sale by Humble **Oil** (now Exxon) and the Richfield Oil Corporation (now ARCO). The discovery well for the Prudhoe Bay field was started in 1967, and the find was officially announced in July of 1968. The size of the **Prudhoe** Bay discovery (projected recoverable reserves of 9.6 billion barrels of crude oil and 26 trillion cubic feet of natural gas) dramatically increased the value of state leases, with the most recent lease sale in 1969 bringing in **about** \$900 million in revenues to the State (compared with \$1.5 million for 23 offshore tracts leased in January 1967).

Plans to construct a pipeline to carry oil from **Prudhoe** Bay to Alaska's south coast were announced in **1969**. These plans were delayed until Native land claims were settled with the passage of the Alaska Native Claims Settlement Act in 1971 and until litigation against construction of the pipeline was finally resolved with the passage of the **Trans-**Alaska Pipeline Authorization Act, which was signed into law in November, 1973. Construction of the pipeline finally got underway in April 1974 and continued for the next three years. The pipeline began opera-

tion on June 20, 1977. The first oil reached **Valdez** 38.5 days after start-up.

As of June **15**, 1977 there was a total of 5,318 persons in the **Prudhoe** Bay industrial area and at pipeline camps in the North Slope region (see Table 17). This was down significantly from the 8,856 persons counted in these areas in July 1976. Since the **summer** of 1977, however, the number of people in the area has fallen still further.

While the Prudhoe Bay area remains the focus of most **oil-** and gas-related activity on the North Slope, National Petroleum Reserve-Alaska is also the scene of renewed interest. Numerous estimates of the potential of **NPR-A** have been made the **latest** by the U.S. Federal Energy Administration (cited in an information sheet distributed by Husky Oil NPR Operations, Inc.) was a relatively conservative 5 billion barrels of oil and 14.3 trillion cubic feet of natural gas. A comprehensive evaluation of the petroleum potential of the reserve was begun by Husky Oil for the Navy in 1975 and is continuing under the Department of the Interior. Seven wells had been drilled by the end of the 1976-77 season, although none indicated commercial finds. During the first two years of the Husky contract, attention was focused in the eastern sections of the reserve; however, during the current year of operation (winter of 1977-78), drilling is taking place at widely scattered sites in the reserve.

Under its fiscal year 1978 contract, Husky Oil is drilling six exploratory wells, three to less than 12,000 feet and three deeper. Two of the

TABLE 17
 POPULATION BREAKDOWN
 ALYESKA PIPELINE CAMPS AND PRUDHOE BAY INDUSTRIAL AREA
 JUNE 15, 1977

	<u>Population</u>
<u>Prudhoe Bay Industrial Area</u>	<u>3,504</u>
BP Alaska Base Operations Center	261
BP Alaska Construction Camp No. 1	446
BP Alaska Construction Camp No. 2	442
Alaska General Construction (Service City)	105
Frontier Equipment	215
NANA Oilfield Services	165
Wien Air Alaska	46
Mukluk (Camps 1, 2 & 3)	20
Crazy Horse Camp <u>a/</u>	100
Happy Horse Camp	33
Dead Horse Camp <u>a/</u>	64
Brinkerhoff Drilling Co.	40
Nabors Drilling Co.	25
Atlantic Richfield Co. - Base Operations	292
ARCO Construction Camp No. 1	1,004
ARCO Construction Camp No. 2	77
Nabors-Kodiak Camp	
ARCO Drilling Rigs	1::
 <u>Alyeska Pipeline Camps</u>	 <u>1,814</u>
Franklin Bluffs Camp	220
Happy Valley Camp	228
Galbraith Lake Camp	213
Chandalar Camp	400
Pump Station 1	287
Pump Station 3	209
Pump Station 4	257
 <u>TOTAL POPULATION</u>	 <u>5,318</u>

a/ Estimated population - data not certain.

Source: BP Alaska, Inc.

latter are scheduled to go to more than 19,500 feet, the deepest ever drilled on the North Slope. In addition, the company is in the process of constructing two drilling pads for exploratory **wells** planned for 1979 and is engaged in drilling three natural gas **wells** to continue development of the gas supply in the **Barrow area**. Another element of Husky's current program is the gathering and processing of 3,349 kilometers (2,081 line miles) of seismic surveys in the southern foothills, **Umiat**, and Barrow areas.

Exploration activities in **NPR-A** are unlike those at Prudhoe Bay area in that they take place in winter. Servicing of camps in **NPR-A** is being handled out of Camp Lonely (a converted DEW Line station) in the eastern section of the reserve. Equipment and supplies are barged from Seattle during the summer to designated drop-off points and are hauled overland as soon as weather conditions permit. Airfields at all drill sites are ice strips except at Icy Cape where the great depth of the well demands year-round operations and, therefore, air service.

The current **NPR-A** exploration program is scheduled to continue through about 1980, by which time a total of 26 wells **should** have been drilled. Meanwhile, the Department of the Interior is evaluating the best procedures for the development, production, transportation, and distribution of petroleum resources in the reserve, and a special task force is conducting another study to determine the values and best uses of lands within and adjacent to the reserve, including subsistence, scenic, historical, recreational, fish and wildlife, wilderness, and others. These

studies are scheduled to be presented to the Secretary of the Interior in June and **April** of 1979, respectively. Congress will then study these reports and decide the future of NPR-A.

During the 1976-77 winter program, the Navy estimated that in the peak month (February) there were 55 persons stationed at Camp Lonely, 265 at various drill sites, and between 200 and 250 persons engaged in seismic work. The number of personnel based in **NPR-A** during the current season is probably at least as great as last year.

The impact of oil and gas exploration and development activity on traditional communities in the North **Slope** region has generally been indirect, although it has provided jobs for a number of **local** residents from time to time. The **Prudhoe** Bay area is remote from traditional settlements, and exploration activities in NPR-A to date have not affected established **communities** (except Barrow to a very minor degree). However, the indirect impact on these communities has been enormous. The industry provides the tax base for the North Slope Borough's planned capital improvements program, designed to improve the quality of life for its residents.

GOVERNMENT

Government was the third largest employer in the North Slope Borough in 1976 (after contract construction and mining), but it was the major employer in all traditional communities of the region. Government jobs

accounted for 56.6 percent of average annual full-time employment in Barrow in 1977 and for a higher proportion in each of the other communities studied by Alaska Consultants, Inc. (Kaktovik, **Nuiqsut**, and **Wainwright**).

Government employment in the North Slope's traditional communities falls almost entirely into the local government category except in Barrow. In the smaller villages, the only other government jobs are generally with the U.S. Postal Service (although the U.S. Fish and Wildlife Service has a person stationed in Kaktovik and **Wainwright's** central water supply and shower facility is run by the U.S. Environmental Protection Agency).

Of the 517.5 government **emp**l oyees counted in Barrow during 1977, 420 (81 percent) worked for the North Slope Borough. However, the federal government was also a significant source of employment in the **community**. Of the 84.5 federal jobs identified here, the Public Health Service was the major employer. Most of its 54 employees work at the Barrow hospital. Other federal employees in Barrow were associated with the Federal Aviation Administration, the National Weather Service, the Postal Service, and several other agencies. State government was an insignificant element in Barrow's total employment, accounting for only 13 jobs in 1977 (excluding 60 University of Alaska personnel stationed at the Naval Arctic Research Laboratory).

In areas outside the region's traditional communities, government employment is almost nonexistent unless military subcontractors at the **DEW**

Line stations and Cape **Lisburne** are counted. There is a state trooper and one Alaska Department of Transportation employee based in **Deadhorse**. In addition, the Federal Aviation Administration maintains facilities at Deadhorse and three air traffic employees who rotate out of Fairbanks.

Most government services in this area are provided by private contractors. NANA Oilfield Services, Inc., for example, provides utilities services at Deadhorse under a borough contract, while the **Alaska** Department of Transportation contracts with another private firm for airport maintenance. Most other services normally provided by government agencies are provided by companies operating in **the** area. No local government or state services are provided to oil and gas exploration activities in **NPR-A** except when the Borough **Public** Safety Department is called in for an emergency.

While federal employment will continue to be a significant element in Barrow's economy and state employment can be expected to rise, it is in the local government sector, namely the North Slope Borough government, which has the greatest potential for continued economic and social change in the region. With the **Prudhoe** Bay area as its tax base, the Borough has undertaken an ambitious capital improvements program (**CIP**) designed to improve the quality of life for residents throughout the region. Since housing conditions and most community facilities in the traditional settlements were grossly inadequate at the time the Borough was incorporated and given the high costs of construction and adminis-

tration in the North, implementing the CIP will be very expensive.

The initial emphasis of the borough capital improvements program has been to provide each community in the region with basic life, health, and safety support. As a result, projects designed to provide electric power generation, health clinics, sewage disposal, and safe water sources received first priority for funds. The next priority has generally been housing, schools, and community service centers. The Borough is currently engaged in building or planning new school facilities in all traditional communities of the region, while new housing has also been or is being built in these towns. Programs determined to be of lower priority, such as libraries and museums, will be undertaken when the range of basic facilities and services has been provided.

Including its most recent bond sale (1977) the North Slope Borough has sold a total of \$85,100,000 in general obligation bonds since its incorporation in 1972. However, the total amount of bonds authorized per Ordinance 77-10 for all purposes for the capital improvements program ending FY 1982-83 amounts to \$131,577,000 (see Table 18). The largest single sale took place in 1977 when the Borough sold \$51,100,000 in general obligation bonds. This issue included \$23,000,000 for school facilities; \$7,600,000 for housing; \$7,800,000 for roads; \$5,500,000 for light, power, and heating systems; \$5,500,000 for sanitary facilities at Deadhorse; and lesser amounts for water facilities, sewer facilities and sanitary facilities.

TABLE 18

STATUS OF CAPITAL IMPROVEMENTS PROGRAM
TO BE FUNDED BY BONDS AUTHORIZED AND TO BE AUTHORIZED ^{a/}
FY 1974 - FY 1983

(in \$000's to nearest \$1,000)

	Total Bond Program FY 74-83	Total Bonds Authorized	Bonds Sold	Contracts or Other Obligations ^{b/}
Educati on	\$47, 313	\$40, 000	\$40, 000	\$21, 797
Roads	\$ 18, 221	\$18, 111	\$11, 200	\$ 7, 126
Housi ng	\$ 37, 043	\$13, 792	\$13, 700	\$12, 958
Water Faci l i t i e s	\$ 215	\$ 186	\$ 100	\$ 26
Sewer Faci l i t i e s	\$ 560	\$ 386	\$ 375	\$ 2
Ai r p o r t s	\$ 882	\$ 667	\$ 175	\$ 58
Urban Devel opment	\$ 1, 430	\$ 1,230	\$ 1,230	\$ 1, 132
Light, Power, Heating Systems	\$ 7, 297	\$ 6, 944	\$ 5, 550	\$ 2, 265
Public Safety	\$ 1, 800	\$ 127	\$ --	\$ --
Sanitary Facilities	\$ 15,951	\$12, 770	\$12, 770	\$12, 500
Communi cations	\$ 540	\$ 540	\$ --	\$ --
Heal th Facilities	\$ 325	\$ --	\$ --	\$ --
<u>TOTAL</u>	<u>\$137, 577</u>	<u>\$94, 753</u>	<u>\$85, 100</u>	<u>\$57, 864</u>

^{a/} Bonds authorized and to be authorized as per North Slope Borough Ordinance 77-10.

^{b/} Contracts or other obligations as of May 31, 1977.

Source: North Slope Borough.

The Borough capital improvements program was substantially amended in 1977. In September 1976 the Borough restricted its construction work in the capital improvements program to 19 priority projects because of litigation over its authority to collect taxes for debt service on certain oil and gas property in excess of the \$1,500. per capita formula then in use. This shutdown adversely affected the Borough's ability to finance its long-range capital improvement program in the manner and within the time schedule which was originally projected.

An important side effect of the CIP is that it has provided new employment and income opportunities to people in the smaller villages as well as Barrow. In the villages these jobs are generally associated with the construction, maintenance, and operation of new facilities. Ideally, the Borough attempts to pace construction projects in individual villages so that jobs are available during the summer months at a fairly constant rate. However, this has not always been possible. When a temporary shutdown of the capital improvements program ended in 1977, for example, an accumulated backlog of projects in some villages resulted in more jobs being available in 1977 than could be filled locally. Some temporary laborers had to be imported from other areas to work on these projects.

The impact of the formation of the North Slope Borough on Barrow's economy has been even more dramatic than its impact on the smaller villages since a very large number of administrative jobs has been added here as well as those in the construction, maintenance, and operation of facil-

ities. More than any other single factor, the North Slope Borough has been responsible for the major improvement in the living standard of Barrow's Eskimo residents which has taken place since 1970.

The extent to which the North Slope Borough can continue to contribute to the economic well-being of people from Barrow and elsewhere in the region during the next 20 years will be affected by legal determinations of its taxing authority. However, it is assumed that the Borough will continue to be the key element in improving living standards of all people in the region.

TOURISM

Tourism is a comparatively new industry in the North Slope region. The area's remoteness from the state's major population centers, its short cool summers, high transportation costs, and limited hotel accommodations all tended to discourage tourists, but interest in the region and its resources and people has risen in recent years to the extent that tourism has become a significant element in Barrow's economy during summer months. Many tourists also visit the Prudhoe Bay area. Tourism in other areas of the region is presently insignificant.

Almost all tourists visiting the North Slope travel in organized tours marketed by Alaska Tour and Marketing Services, Inc. This company is based in Seattle but has offices in Anchorage and, during summer, in Fairbanks and Barrow. Four travel packages to the region are offered

between June 1 and September 15, with daily trips via Wien Air Alaska from both Anchorage and Fairbanks. These are a one-day excursion trip to Barrow, a one-day excursion trip to Prudhoe Bay, an overnight trip to Barrow, and a two-day/one-night trip to Barrow and Prudhoe Bay. Advertised prices for these tours, during the 1977 season, including hotel costs but not food, range from \$199 per person for the day excursion trip to Prudhoe Bay from Fairbanks (\$249 per person from Anchorage) to \$340 per person for the **two-day/one-night combination** trip to Barrow and Prudhoe Bay from Fairbanks (\$396 per person from Anchorage). Ground transportation in Anchorage and Fairbanks is provided by Westours, the agency which books the largest share of Alaska Tour and Marketing Services' tours to the North Slope. Local transportation in Barrow and Prudhoe Bay is via bus. Trained guides accompany each tour group.

In Barrow, tourists are treated to a program which features an Eskimo blanket toss, traditional Eskimo dancing, a lecture on whale hunting, and demonstrations of the skills of Eskimo craftsmen. Locally made arts and crafts items are available for purchase at Stuaq-pak and the hotel gift shop. The overnight tour to Barrow and the **Barrow/Prudhoe Bay** combination tour also include a visit to the Naval Arctic Research Laboratory.

Hotel facilities in Barrow consist of the 40-room Top of the World Hotel which is owned by the Arctic Slope Regional Corporation and managed by Sheffield Enterprises of Anchorage. The hotel has a coffee shop, dining room, and conference room and a banquet room capable of accommodating 80

people. A beauty salon and a gift shop, the latter open only during the summer months, are also located within this facility. Other restaurant facilities in town as of December 1977 included Brewer's Cafe (open only during the summer), Ken's Restaurant (located in the new Wien airport terminal), and Arctic Kitchen.

Most facilities at Prudhoe Bay are off limits to unauthorized personnel. The tour includes an orientation lecture on the history of development of the Prudhoe Bay field and construction of the trans-Alaska pipeline, plus some discussion of the wildlife and ecology of the region. Opportunities are also provided for tourists to view the Arctic Ocean and to catch glimpses of wildlife in the area.

Overnight facilities at Deadhorse are operated by NANA Oilfield Services, Inc., which has a 240-man camp near the airport. A large number of the rooms at this facility are occupied by "permanent" area residents. Overnight accommodations are available, although they are not used by tour groups. As of December 1977, daily rates were \$100 including meals.

Alaska Tour and Marketing Services, Inc.'s Seattle office was contacted by both letter and telephone in order to obtain information on the number of tourists taking the various tours to the North Slope during the past few years. The company refused to provide any of this information except to say that a total of 4,396 people, including children, visited the region under its sponsorship during the 1977 tour season. The company also indicated that the total number of tourists to the region had been increasing steadily.

Some data developed by the NANA Coronation on the number of tourists visiting the Prudhoe Bay area, however, were made available to Alaska Consultants, Inc. According to this source, the number of tourists taking the Prudhoe Bay bus tour rose rapidly for the first four years it was offered but has since leveled off. A total of 300 people took the Prudhoe Bay bus tour in 1972. This doubled to 600 persons in 1973 and doubled again in 1974 to 1,200 people. In 1975, 1,750 people took the Prudhoe Bay bus tour, but since that time the numbers have leveled off to 1,600 persons in both 1976 and 1977.

Very few tourists visit the North Slope independently of tour groups. Some people charter aircraft for hunting and fishing trips, and hiking, particularly in the lower slopes of the Brooks Range, is becoming increasingly popular. In addition, officials of the U.S. Bureau of Outdoor Recreation acknowledged the increasing recreational use of North Slope rivers but stated that, relatively speaking, the number of users is still quite small.

Given the provision of adequate facilities and services, the tourist potential of the pipeline haul road is also significant. In January of 1978 the state administration announced its policy regarding future use of this route. Although it will be closed to public use at least until construction of the gas line is completed, industrial and tour bus traffic will then be permitted.

Because of the lack of facilities along the haul road, potential tour

bus operators will have to demonstrate their ability to provide a complete range of services for their passengers before they will be issued a certificate to operate on the road. Assuming that this is economically feasible, some tourist traffic on the haul road appears likely in the near future, although as long as traffic is limited to closely confined tour groups, the negative impact on the environment should be held to a minimum. In the long run, the tourist potential of the haul road will largely depend on the extent to which services such as food, lodging, and gasoline are permitted along the route and at its Prudhoe Bay terminus. The desirability of general public use of the haul road also has to be viewed in terms of strong and frequently stated opposition to such a development from the North Slope Borough and from village people along the length of the route as well as environmental groups.

Several of the (d) (2) proposals currently being considered by the U.S. Congress involve lands within the boundaries of the North Slope Borough. As presently proposed, expansion of the Arctic National Wildlife Range and establishment of a Noatak National Arctic Range would not significantly impact the amount of tourism in the region because both are designated as wilderness areas, which precludes building any facilities for visitors. These wilderness designations are not yet law, and there is considerable interest in removing the wilderness designation from the Arctic National Wildlife Range, although this interest has been generated primarily by the area's oil and gas potential not its attraction for tourists. Nevertheless, if facilities are developed in conjunction with the proposed Gates of the Arctic National Park, additional tourists will doubtless be attracted to the region.

Two rivers in the borough, the Utukok and portions of the Colville, have been included in the Carter administration's (d) (2) proposal as part of the National Wild and Scenic River system, and a third, the Ikpikpak, has been recommended for Wild and Scenic River status by H.R. 39, the (d) (2) proposal developed for mark-up by the Congress. Any such designation would encourage some increased recreational use of them and adjacent lands, but those factors which have traditionally inhibited tourism in the region--remoteness, high costs, and a lack of amenities--should keep use rates low.

In summary, the North Slope region has some potential for increases in tourism; however, the extent to which such increases will benefit the permanent residents of this region is subject to debate. Increases in tour group operations to Barrow would have the effect of adding a few jobs in this community. However, recreational use of remote areas of the region is expected to bring few benefits to traditional villages. Furthermore, the designation of rivers as being "wild and scenic" would have the effect of encouraging increased recreational use of these river systems, a development about which the Borough has expressed concern. The Borough has also voiced objection to the designation of areas such as the Arctic National Wildlife Range as wilderness. This is not so much because it objects to a wilderness designation but because it believes that the natural resources of the entire region would best be managed as a single unit, such as a wildlife refuge, rather than as several jurisdictions.

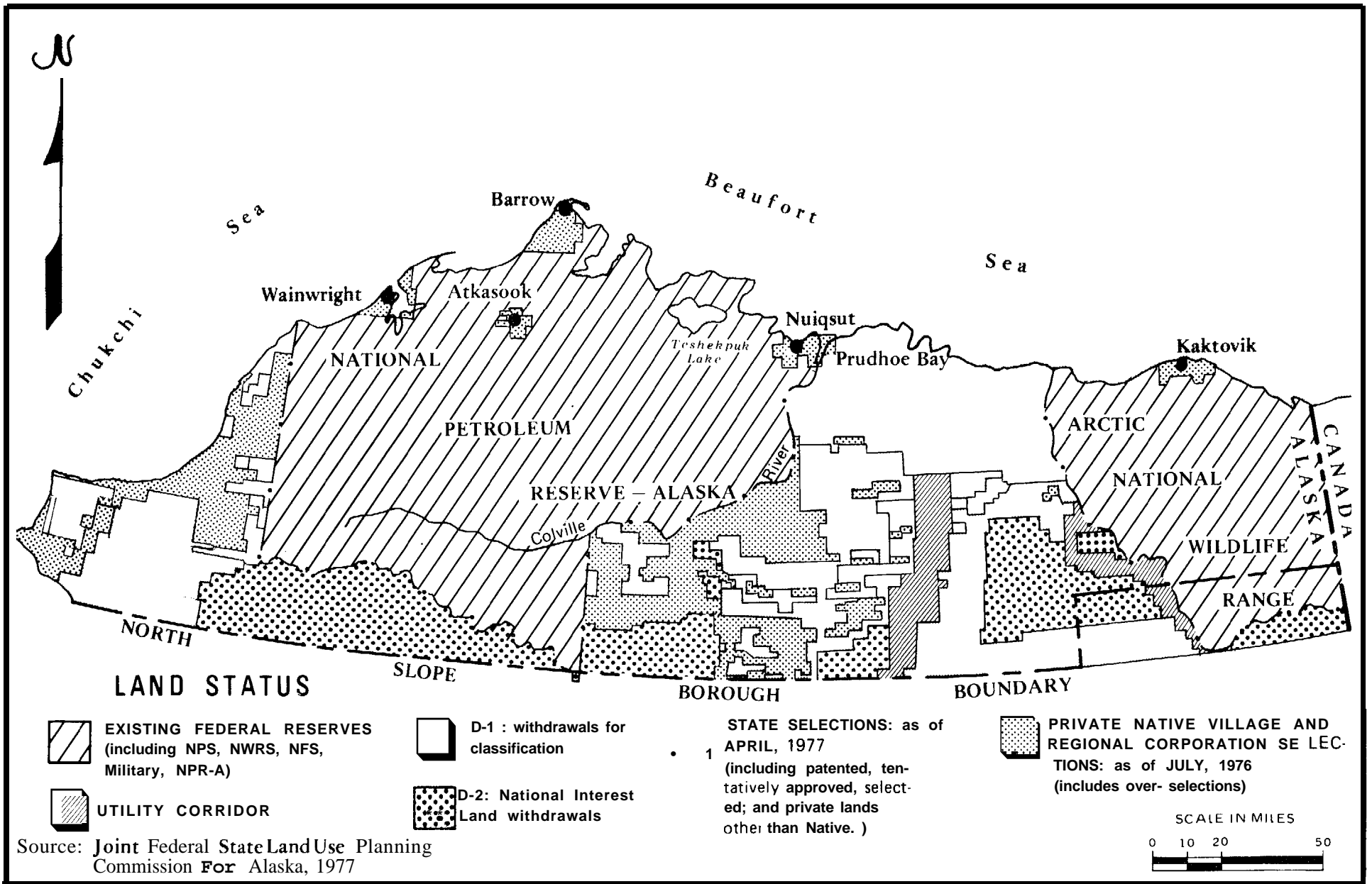
16 million hectares (40 million acres) of federal land to newly formed Native regional and village corporations. The Statehood Act directed transfer of 41.8 million hectares (104.5 million acres) of national forest, community expansion, education, and recreational lands from the federal government to the State. Since ANCSA, the State's program has largely been suspended, and much of its original entitlement remains to be selected. In turn, the organized boroughs are permitted to select 10 percent of the state lands within borough boundaries. More detailed discussion of ANCSA, the Statehood Act, and their provisions is included in the Alaska Regional Profiles: Arctic Region, published in 1975 by the Arctic Environmental Information and Data Center.

Figure 5 illustrates areas of fixed federal, state, and Native corporation ownership as well as remaining areas where other federal, state, borough, and Native corporation land applications have been made. The following briefly summarizes major land status classifications within the region and discusses issues of current importance regarding final settlement or jurisdiction.

NATIONAL PETROLEUM RESERVE-ALASKA

A 1923 executive order established the 9.2 million hectare (23 million-acre) Naval Petroleum Reserve-4. A series of Navy claims to areas included in the reserve has been contested by the State and Native corporations. The boundary of the reserve is in dispute along the entire Colville River and the coast to Icy Cape. Additionally, the Navy

FIGURE 5



ALASKA NATIVE CLAIMS SETTLEMENT ACT

Under terms of the 1971 Alaska Native Claims Settlement Act (ANCSA), 12 Native regional corporations (with provision made for a thirteenth which has since been established) and a large number of village corporations were established to manage lands and to invest cash payments transferred to Alaska Natives in the settlement of their claims. The Arctic Slope Regional Corporation (ASRC) is the regional entity for the North Slope. (The boundaries of the ASRC's region are not identical to those of the North Slope Borough, but they are similar and include the same villages.)

Under Section 12(a) of ANCSA, the Arctic Slope Regional Corporation is entitled to receive title to approximately 2.2 million hectares (5.5 million acres) of land within the North Slope region. This area includes lands selected by the regional corporation on its own account, to which it will receive both surface and subsurface rights, plus subsurface title to lands selected by villages in the region. The area in the latter category amounts to 344,990 hectares (852,480 acres).

As of January 1978 the regional corporation had received interim conveyance to almost 1.8 million hectares (4.5 million acres). Lands not yet conveyed to the corporation include "in lieu" and "dual withdrawal" lands. "In lieu" lands consist of subsurface rights to 223,870 hectares (552,960 acres) selected by the village corporations of Atkasook, Barrow, Nuiqsut, Wainwright, and Kaktovik. These communities are located either within the former NPR-4 or within the Arctic National Wildlife Range.

Since no subsurface selections are permitted in either NPR-4 or wildlife refuges under terms of ANCSA, the regional corporation has selected "regional deficiency" lands elsewhere in the region, mostly in the central and western area. "Dual withdrawal" lands are those selected by the Arctic Slope Regional Corporation but which have also been proposed for inclusion in the (d) (2) lands system. Thus, the status of the regional corporation's selections in such areas (about 303,643 hectares (750,000 acres) will not be determined until the (d) (2) lands question has been resolved.

Based on an enrollment of about 3,900 persons, the Arctic Slope Regional Corporation is entitled to a cash payment of approximately \$51 million to be paid over a 20-year period between 1971 and 1991 from the so-called Native Fund. (The fund includes congressional appropriations and mineral revenues from federal and state lands in Alaska.) In turn, half of the cash payments received by the regional corporation must be redistributed to individuals enrolled in the region and to the village corporations. As of September 1977 the ASRC had received about \$17.2 million in cash payments, half of which has been redistributed as required.

To date, the Arctic Slope Regional Corporation has invested its cash payments almost wholly in companies doing business on the North Slope. This practice keeps the money in the region and provides additional jobs for local residents. Included among the corporation's investments are Tundra Tours, Inc., which owns and operates the Top of the World Hotel

in Barrow under a management contract with Sheffield Enterprises and has also been involved in providing catering services in the Prudhoe Bay area; Eskimos Inc., which sells gasoline and provides vehicle and heavy equipment maintenance services in Barrow; Arctic Slope Alaska General Construction Company, a partnership which is presently engaged in construction activities in NPR-A and, to a lesser extent, in the Prudhoe Bay area; Arctic Technical Services, an association which includes two other corporate entities and has architectural, engineering, and a range of scientific capabilities; Eskimos Inc. Oilfield Services, which provides various oilfield services; ASRC Communications Limited, which specializes in the fields of communications and security; and a joint venture between Eskimos Inc. and SKW Contractors (an independent construction company) to build facilities such as the new ASRC office building in Barrow.

Because it has received interim conveyance to much of its lands (and with it all rights and privileges of ownership), the Arctic Slope Regional Corporation has been able to lease potential oil- and gas-bearing lands in the central and western Arctic to petroleum companies. As of December 1977 the corporation had three separate agreements with major oil concerns. Under an agreement with Standard Oil Company of California the corporation will receive \$2.5 million for exploration rights. In addition to a lease fee bonus, the corporation will also receive a percentage of any profits if SOCAL decides to drill a specific site.

In March 1977 the Arctic Slope Regional Corporation announced a 10-year

lease of 566,802 hectares (1.4 million acres) of land to Chevron and Union-AMOCO. Under terms of this agreement, the ASRC is to receive an annual rental fee and a base royalty fee of 16-2/3 percent of the value of production when and if it takes place. Under subcontract to Union-AMOCO and Chevron, Texaco has initiated an exploratory drilling program approximately 48 kilometers (30 miles) southeast of Umiat. Two exploratory wells have been drilled in this area to date. No test results had been published as of December 1977, but the area is considered by geologists to be promising.

Each of the 3,900 persons enrolled in the Arctic Slope Regional Corporation owns 100 shares of the corporation's stock (with persons enrolled in villages also owning 100 shares of village corporation stock). Like other corporation, dividends are paid to stockholders based on earnings. On December 14, 1977 the Arctic Slope Regional Corporation announced profits of \$1,389,504 for the fiscal year ending June 30, 1977 and distributed dividends totaling \$190,000 to stockholders.

The ASRC is among the wealthiest of the regional corporations, partly because some of its lands have good potential for oil and gas discoveries. Although ANCSA presently requires that 70 percent of all profits received by corporations from the development of timber resources and the subsurface estate be shared among the other corporations, mineral production at any scale would certainly benefit this region's shareholders.

Aside from the lands and investments of the Arctic Slope Regional Corpor-

ation, eligible Native villages in the region (Anaktuvuk Pass, Atkasook, Barrow, Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright) were authorized by ANCSA to select the surface estate to a total of 345,134 hectares (852,480 acres) of land (see Table 19). Village land selections are generally in the immediate vicinity of each eligible community. Selectable acreage is determined by the number of people enrolled.

The land and cash entitlements of the region's village corporations are modest when compared with those of the Arctic Slope Regional Corporation; however, they are a significant element in the economies of the region's villages. Aside from some employment opportunities in village corporation offices, most of these corporations have taken over the operation of the local stores and oil dealerships and have, therefore, assumed a dominant business role.

The impact of the regional and village corporations on the economy of the North Slope region may be even greater than indicated in the preceding pages if proposed amendments to some of the provisions of ANCSA are enacted. Of these, potentially the most significant is Section 7(i) which requires that 70 percent of the revenues received by a particular regional corporation from timber resources or subsurface estate be divided among the other regional corporations. Any downward revision of the sharing requirement would obviously be of major benefit to the Arctic Slope Regional Corporation if oil and gas is discovered in commercial quantities on its lands. The additional revenues could then be reinvested for the benefit of all of its stockholders.

TABLE 19

VILLAGE CORPORATION ENROLLMENT AND LAND ENTITLEMENTS a/
ARCTIC SLOPE REGION

Village Corporation	Enrollment	Land Entitlement	
		Section 12(a)	Section 12(b)
Anaktuvuk Pass (Nunamiut Corporation)	132	37,312 ha. (92,160 at.)	---
Atkasook (Atkasook Corporation)	71	27,983 ha. (69,120 at.)	---
Barrow (Ukpeagvik Inupiat Corporation)	2,031	65,296 ha. (161,280 at.)	19,486 ha. (48,130 at.)
Kaktovik (Kaktovik Inupiat Corporation)	112	37,312 ha. (92,160 at.)	---
Nuiqsut (Kuukpiik Corporation)	212	46,640 ha. (115,200 at.)	3,402 ha. (8,403 at.)
Point Hope (Tigara Corporation)	498	55,968 ha. (138,240 at.)	---
Point Lay (Cully Corporation)	89	27,983 ha. (69,120 at.)	7,455 ha. (18,415 at.)
Wainwright (Olgoonik Corporation)	369	46,640 ha. (115,200 at.)	18,067 ha. (44,625 at.)
<u>TOTAL</u>	3,514 b/ (852,480 at.)	<u>345,134 ha.</u> (852,480 at.)	<u>48,410 ha.</u> (119,573 at.)

a/ Enrollment current as of January 1977.

b/ Enrollment in village corporations only. Arctic Slope Regional Corporation enrollment was 3,911 as of January 1977.

Sources: U.S. Bureau of Land Management.
Federal Register, February 2, 1977.

Land Use

SETTLEMENT

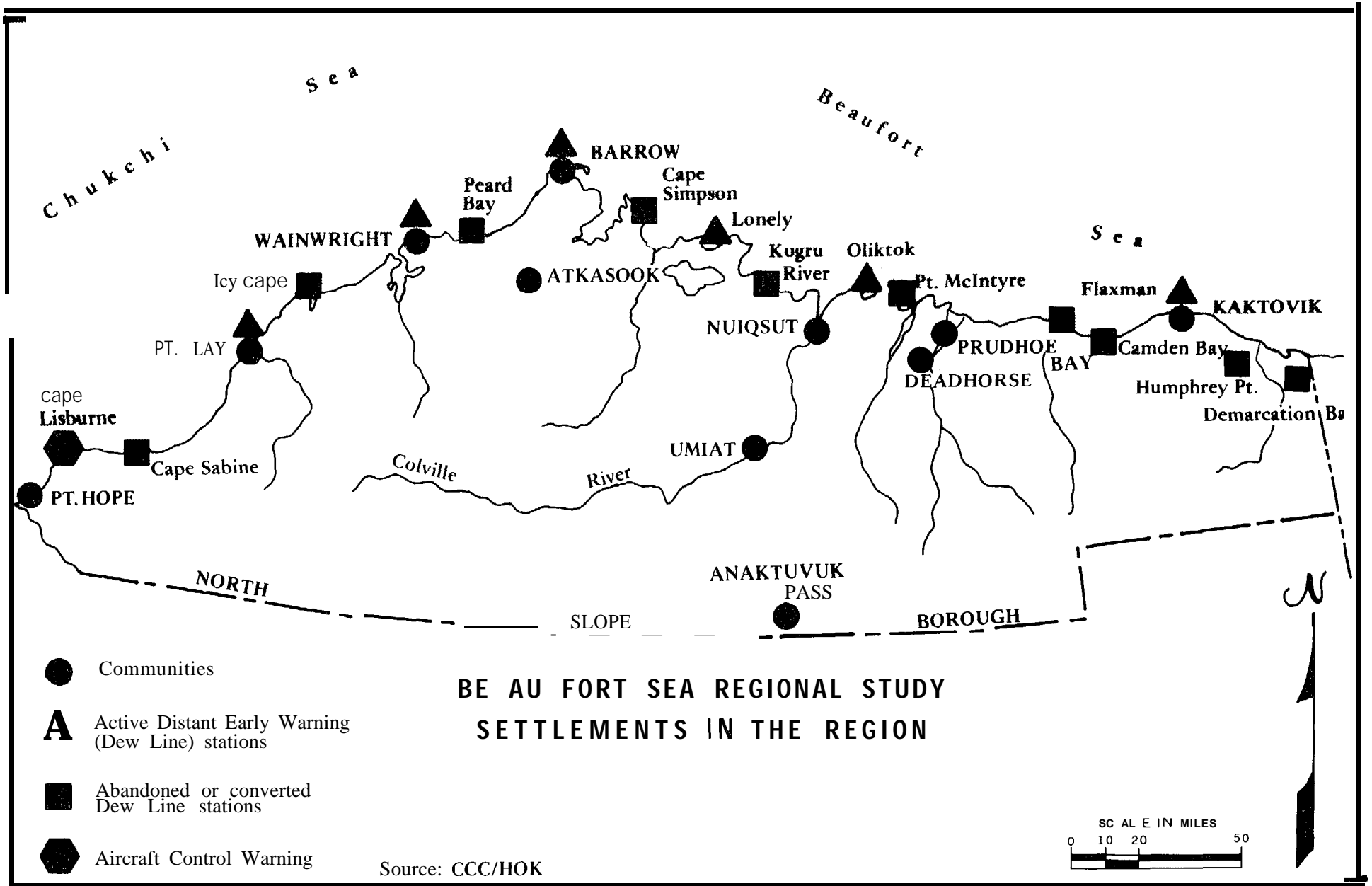
Settlement in the Beaufort Sea region includes traditional Native villages and more recent military and oil and gas development base camps. Most of these settlements are located near the coast of the **Chukchi** or Beaufort Seas (see Figure 6). Military installations include U.S. Navy research stations and U.S. Air Force Distant Early Warning (DEW) Line radar communications sites. Facilities at each of the DEW Line stations are discussed under Air Transportation.

Traditional settlement in the Arctic consisted of bands of Eskimos gathering in villages whose location and size were determined by the availability of fish and game. With the coming of the white whalers in the mid-nineteenth century, the military after World War II, missionaries, and centralized government services, there have been major changes in settlement patterns. Today, these small Eskimo encampments have been consolidated into five principal villages: Barrow, Kaktovik, **Wainwright**, Anaktuvuk Pass, and Point Hope. Three other villages--Point Lay, **Nuiqsut**, and Atkasook--are also traditional Inupiat village sites, but they are being resettled under the sponsorship of the Arctic Slope Regional Corporation pursuant to the Alaska Native Claims Settlement Act of 1971.

Community Development

Nearly all of the **people** in the North Slope Borough live in one of the

FIGURE 6



eight communities in the region or in a petroleum development base camp around **Prudhoe** Bay. Barrow is the largest of these settlements with a population that is now estimated at approximately 2,300 (North Slope Borough 1977). Of the total of 2,170 people in 1975, government employees and dependents accounted for approximately 300 persons (U. S. Department of the Navy 1977).

The following land use **summaries** for the communities in the region not treated in separate sections of this report, draws principally on information in the North Slope Borough Reconnaissance Study: An Inventory of the Borough and Its Communities (Dupere & Associates 1973).

Anaktuvuk Pass.

The townsite lies near the summit of one of three major passes that **tra-**verse the Brooks Range. The approximately 130 residents of Anaktuvuk Pass subsist by hunting caribou that migrate through the pass twice a year.

Existing land use includes approximately 50 residential units (of which 20 were vacant in 1974), a school, community hall, cemetery, church, post office, a **small** residential shelter for research personnel of the Naval Arctic Research Laboratory (NARL) in Barrow, and a nearby gravel airstrip. Land use for these facilities has been platted by the BLM.

Land use and community growth are limited by a variety of factors,

including periodic flooding of the nearby John River; the need for a new bridge across the river; the absence of a reliable, safe water supply; and needed **community** facilities for fire protection, recreation, warm storage for vehicular maintenance, and additional residential housing.

Atkasook.

Atkasook is located about 96 kilometers (60 miles) south of Barrow on the **Meade** River. The area is noted for its excellent fishing, and many Barrow residents maintain seasonal fish camps in the vicinity.

The village originally existed because of a nearby mine that supplied **coal** to Barrow. With **the** onset of the use of natural gas in Barrow, the village declined. It is now being resettled under the sponsorship of the Arctic Slope Regional Corporation.

Major capital improvements planned for Atkasook by the Borough include **community** roads and roads to the airport; water and dump sites; water supply and sewage disposal facilities; electric power distribution; 13 housing units; and educational facilities.

Point Hope.

Point Hope is located on an ancient village site on a promontory of **land** approximately 528 kilometers (330 miles) southwest of Barrow. The North Slope Borough estimated that 403 people lived in the village in 1976.

Because this location is exceptionally well suited for hunting of sea mammals, it has been occupied for an estimated 2,500 years.

The village consists of approximately 85 houses (23 of which were vacant in 1974), a school, two churches, two small hotels, a village cooperative store, airport, electrical generation plant, and several small stores within residences. Twenty of these homes, including three sod houses, were vacant in 1963. The Borough's 1976 **public** housing construction program included 30 single-family **dwellings** for Point Hope.

Conditions affecting future **land** use patterns in the **community** include coastal erosion, receipt of fee title to lands around the community under **ANCSA**, and a conflicting pattern of historical site designations and Native Allotments. Periodic flooding of the community during **Chukchi** storms is eroding the peninsula on which the village is situated **at** a rate of about 8.6 feet per year; however, a recent Corps of Engineers study stated that the village is in no **immediate** danger and that it might be **25** years before existing buildings are inundated and the present **village** site eroded away (**Dupere & Associates** 1973).

Development possibilities in the area surrounding Point Hope include potential for extraction of good quality coal and rejuvenation of the commercial reindeer herds (**Resource Planning Associates** 1976).

Point Lay.

Point Lay is a Native village of approximately 50 people, located about 480 kilometers (300 miles) southwest of Barrow on a spit of land that projects into the **Chukchi** Sea. A DEW Line site is located across the bay from the village.

The Point Lay settlement includes approximately 18 single-family dwellings, all but one owned by the regional and village corporations. Other facilities in the community include a village store, clinic, school and cafeteria, a cemetery, and an airport. There is neither electricity nor sewer and water facilities. The North Slope Borough's 1977 draft Capital Improvements Program plans for completion of a utilities system in 1981, which would make building a new school feasible.

Village relocation, a projected growth rate of 10 people per year, new housing construction, and village corporation receipt of fee title lands are all bringing about significant land use changes in Point Lay. The **community**, however, is isolated from petroleum development activities or any other influences which could spark sudden growth. Consequently, Point Lay and Atkasook **will** probably remain the smallest communities in the region.

Oil and Gas Development Base Camps

Oil and gas exploration and development require the construction of base camps to **supply** nearby operations, as at **Prudhoe** Bay, or to supply remote

operations, as in the National Petroleum Reserve-Alaska. These settlements vary in size from the facilities required to support drilling of one isolated exploratory well to a major industrial "new town" of more than five thousand temporary employees.

Because of the demands these settlements make on limited supplies of gravel (for drilling pads and airstrips) and water (for drilling operations and personal use), **even** small operations are important. The need for efficient support of 24-hour drilling operations often requires construction of a utilities, housing, and transportation infrastructure much more sophisticated than that of established, older communities.

Exploration and drilling operations can also disrupt local wildlife **habi-**tats. Seismic explorations and frequent airplane, helicopter, and **over-**tundra vehicular traffic inevitably affect caribou movement and fish and waterfowl habitats. Thus, while they create potentially **useful** infrastructure for continued oil and gas exploration or other development, exploration and drilling activities will deplete some nonrenewable resources (gravel) and scarce resources (water) and inevitably change land use and settlement patterns within the region. The following section discusses land use at the semipermanent settlement of **Prudhoe Bay/Dead-**horse and at existing and planned logistical base camps established for continued exploration of the vast National Petroleum Reserve-Alaska.

Prudhoe Bay/ Deadhorse.

Prudhoe Bay/Deadhorse is near the mouth of the Sagavanirktok River, approximately 208 kilometers (130 miles) west of the Alaska-Canada border and 176 kilometers (110 miles) southeast of Barrow. The oil development camps of British Petroleum Company (BP) and Atlantic Richfield Company (ARCO) cover an area between the Kupurak River on the west, the Sagavanirktok River on the east, and inland from Prudhoe Bay a distance of 12.8 to 16 kilometers (8 to 10 miles). Within this 259 square kilometers (100-square-mile) area are 12 multiple well-drilling pads surrounded by up to six wells each. Each pad stores supplies and provides sufficient surface facilities to serve the wells around it. The pads are connected by road to the operations, maintenance, and supply centers near the private airport at Prudhoe Bay and the state airport at Deadhorse, about 8 kilometers (5 miles) away.

Oil drilled at each of the approximately 40 wells is piped to gathering stations. Each of four stations separates the oil from gas condensate, water, and other impurities before the crude oil is shipped by the trans-Alaska pipeline to Valdez. Each gathering station occupies a site of about 2 hectares (5 acres) and can handle 225,000 barrels a day.

Ultimate development of Prudhoe Bay could require a score or more drilling pads and a total of several hundred wells. Each drilling pad will include temporary housing and dining facilities for each operating crew of approximately 40 men.

Housing at Prudhoe Bay consists of the facilities of ARCO and BP as well as those of various service companies. ARCO presently houses about 600 permanent workers, and the company projects that this number will grow to 1,000 by 1983. BP can now accommodate approximately 400 workers. The number of service company employees varies with the number, size, and duration of contracts. As new housing is needed, it is prefabricated outside Alaska and shipped by barge to Prudhoe Bay. The total transient population housed at Prudhoe Bay in 1976 was reportedly 5,531.

Each of the self-contained camps has its own personnel quarters for a module of approximately 150 workers, including office space, shops, warehouses, kitchen/dining facilities, recreation facilities, and related storage. Each camp has its own enclosed water supply/treatment and sewage systems. BP supplies electricity for its own needs and those of ARCO. Most of the service companies purchase electricity from Arctic Utilities, Inc., a subsidiary of the NANA Development Corporation.

Other land uses include two airports and a small service airport in the western field, water storage sites, gravel sites, service company support buildings (for such services as engineering and supply), a planned central utility facility for BP and ARCO, port development on Prudhoe Bay itself, and sanitary dumps.

National Petroleum Reserve-Alaska Exploration Base Camps.

The National Petroleum Reserve-Alaska covers an area of approximately 95,830 square kilometers (37,000 square miles), or nearly 50 percent of

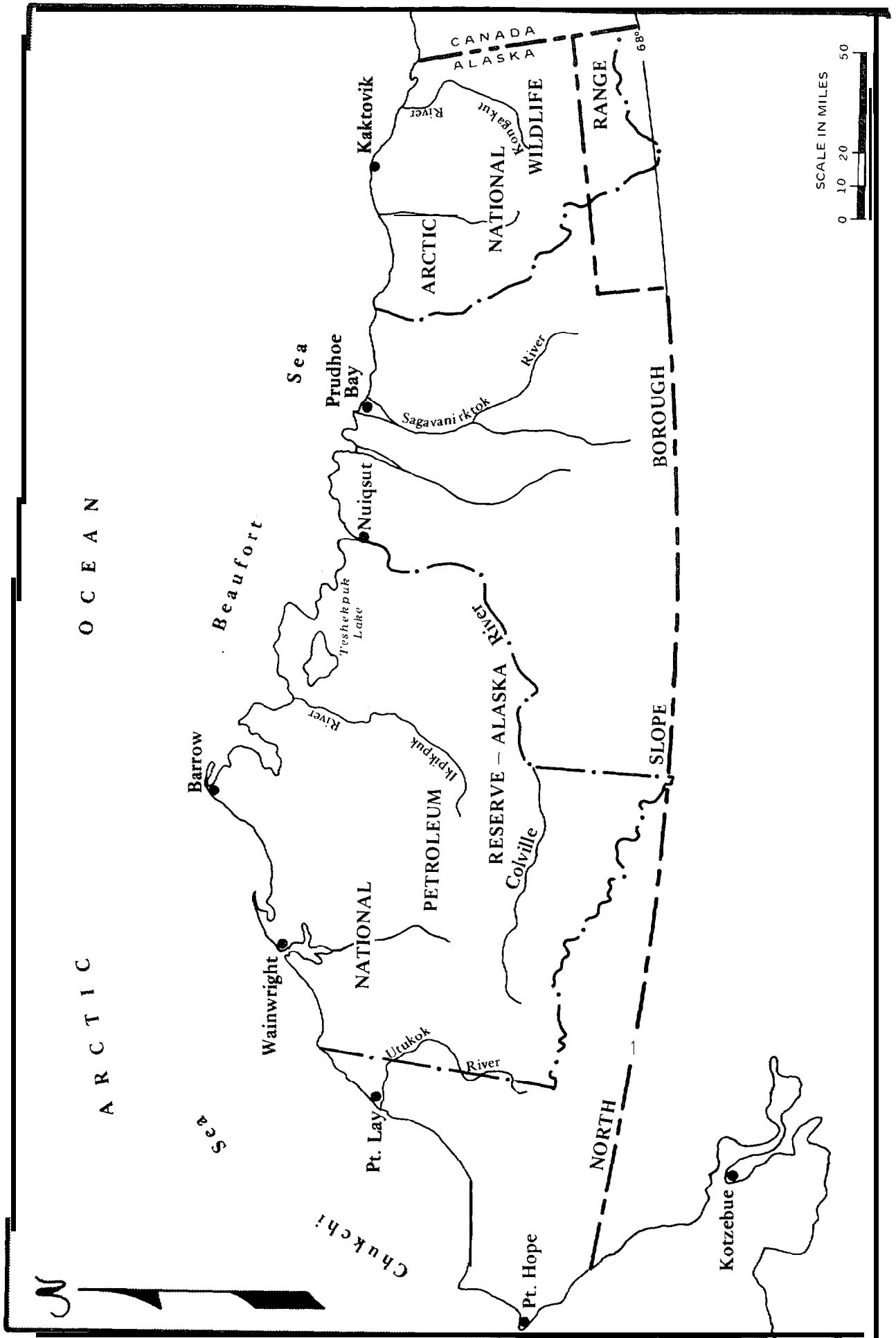
all the land in the region. It extends along the coast from Icy Cape on the west to the Colville River on the east and follows the Colville south into the Brooks Range (see Figure 7).

The NPR-A was created as Naval Petroleum Reserve-4 (NPR-4) by President Harding in 1923. Under executive order, the Secretary of the Navy was charged to "explore, protect, conserve, develop, use and operate" the reserve. The description of past and planned oil and gas exploration in NPR-A while follows is largely based upon the Draft Environmental Impact Statement, Continuing Exploration and Evaluation of Naval Petroleum Reserve No. 4 (U.S. Department of the Navy 1977).

Initial oil and gas exploration was conducted between 1944 and 1953 by a civilian contractor. Nine gas and oil fields were investigated during this period. Total recoverable reserves were estimated by the Navy at more than 80 billion barrels of oil and more than 300 billion cubic feet of natural gas. Other estimates by the Bureau of Mines for the Umiat Field alone were much higher (Department of the Navy 1977).

After 1953, the Navy continued to make geophysical surveys and drill test wells with inconclusive results. The 1973 oil embargo by Arab countries directed new attention to domestic reserves, and Congress approved additional exploration of NPR-4 to establish more reliable estimates of reserves. In 1976 Husky Oil Company began seismic and related geophysical work in Zone "A", between Dease Inlet and the Colville River near Teshekpuk Lake. The location was chosen because of its proximity to the highly productive Prudhoe Bay field to the east.

FIGURE 7



The Navy requested authorization for well exploration at 19 additional sites, but since responsibility for NPR-A was transferred to the U.S. Department of the Interior in 1977, this exploration activity will take place under its control. Large areas of NPR-A will undergo geophysical survey, and the specific locations of the 19 wells will then be chosen.

Each of the five wells drilled in the Teshekpuk Lake vicinity during the winter of 1976-77 as well as the 19 planned in the near future require specialized industrial facilities. A 1.5 meter (5-foot) thick gravel airstrip or an ice runway (to 1524 meters [5,000 feet] in some cases) is built near the drilling site and equipped with runway lights, a homer beacon, wind-measuring equipment, and other aids to safe and efficient operation. Drilling takes place on a 1.5 meter (5-foot) thick gravel drill pad which also supports housing, maintenance shops, and steel or bladder fuel tanks. Water tanks are built nearby to meet the estimated 40,000-barrel requirement for a typical 60-day drilling period. Each camp will also have its own package wastewater treatment and solid waste incineration facility. Each of four planned deep exploratory wells will require 150 to 300 days to drill.

Logistical bases along the coast of NPR-A will service these operations. The five wells drilled during 1976-77 utilized gravel borrow sites along the coast at Cape Simpson and Cape Halkett and logistical bases at the Lonely DEW Line site (POW-1) and the NARL base at Barrow. The planned exploration program will use Lonely, NARL, and possibly Umiat and the Wainwright DEW Line station. The potential also exists for utilization

of other DEW Line stations in NPR-A (Peard Bay-LIZ C, Cape Simpson-POW A, Kogru Inlet-POW B, and Icy Cape-LIZ B).

Lonely.

The Lonely DEW Line site was the base camp for exploration during the winter of 1976-77. The NARL facility at Barrow served as the trans-shipment and communications headquarters for these operations and will probably be used for exploration supply in the northwestern portion of NPR-A during the current program.

In order to provide operational and safety communications to geophysical survey camps within NPR-A, the Lonely DEW Line station's transportable earth station will connect to a loop network of eight telephone repeater stations within the reserve. The runway at Lonely was recently lengthened and widened to 1580 meters long by 46 meters wide (5,200 feet long by 150 feet wide) and lighting, navigational equipment, a small hangar, and freight handling equipment were added.

Fuel is delivered by barge and piped ashore into gasoline tanks, with a total capacity of 533,685 liters (141,000 gallons), or into JP-5 fuel tanks, with a total capacity of 6,358,800 liters (1,680,000 gallons). JP-5 fuel is used for aircraft, drill rig operation, electrical generator operation, diesel-powered equipment and heating. Two additional 4,769,100 liter (1,260,000 gallon) welded steel tanks for JP-5 fuel were scheduled for construction in the summer of 1977. This fuel is transported by aircraft or smooth-tired rolligon-type trucks to operating sites.

Housing at Lonely consists of accommodations for 20 at the DEW Line **station**, an additional 24 at the nearby Navy camp, and an expanded base camp for 50 men built recently by Husky Oil.

Umiat.

Depending on the new areas outside of Zone "A" to be explored, **Umiat** may be used as a secondary site, as it was during the early exploration of NPR-A. **Umiat** has a camp, a good airstrip, and nearby sources of gravel.

ARCHAEOLOGIC AND HISTORIC SITES

The Beaufort Sea Region contains archaeological evidence of man's prehistoric migrations into North America and occupation by Eskimo and Indian groups for at least the last 10,500 years. Prehistoric and historic material from the area have provided insights into the movements and interactions between prehistoric Eskimo groups as well as between Eskimo and interior Indian groups.

The archaeological data and literature for the Beaufort Sea Region reflect the intensity of research at certain locations and the complete absence of archaeological investigation at others. Two coastal areas have received major archaeological attention: Point Hope and Point Barrow. In the interior of the Beaufort Sea Region, two broad areas have been the focus of archaeological investigations: an area of northwest Alaska which includes NPR-A and the Utikok, **Kukpowruk**, and **Kokilik**

rivers area; and a large area of the central Brooks Range and Arctic Slope area to the north.

Of the coastal areas, Point Hope has been the focus of extensive archaeological research. Several thousand years of Eskimo **prehistory** have been identified from numerous archaeological sites, which have led to identification of the important **Ipiutak** Eskimo culture that existed on the Alaskan Arctic coast from about 200 to **300 A.D.**

The Point Barrow area has been the focus of archaeological investigations since the early 1900's. Archaeological **materials have** revealed occupation by prehistoric Eskimo groups for at **least a** thousand years. Earlier material has been recovered from the Barrow area, but these findings have not been fully reported in current archaeological literature.

The coastal area of the Beaufort Sea to the east of Point Barrow has been subjected to **only** minimal archaeological research, although there has been archaeological reconnaissance of the lower **Colville** River and its delta.

The central Brooks Range and the Arctic Slope area have received continual archaeological attention since the 1950's. This area has yielded important prehistoric materials as well as information about interior Eskimo adaptation. An extensive discussion and bibliography of the archaeological literature relevant to the areas described above can be found in Chapter 15 of the Literature Survey, Technical Report 2, of the Socioeconomic Studies Program.

Inventories of Archaeologic Sites

Inventories, maps, and other published material that attempt to provide a comprehensive picture of known archaeological resources in the **Beaufort** Sea Region have been produced by state, federal, and borough agencies and Native corporations.

The Alaska Division of Parks, Office of History and Archaeology, has published a computerized inventory of known archaeological and historic sites (Alaska's Heritage Resources 1976). The list includes data on more than four thousand sites by U.S. Geological Survey quadrangle but is perhaps only 50 percent complete, and individual entries exhibit a high degree of inaccuracy.

The Arctic Slope Regional Corporation, with the assistance of the **University of Alaska Arctic Environmental Information and Data Center (AEIDC)**, has produced maps at a scale of **1:500,000** which document Native land uses. These maps, Native Land Use and Place Name Maps of Arctic Alaska (1975) depict subsistence use areas and trails, **old** places-villages, cabins, old graves, "**siniktaknalok**" (forbidden places), ruined cabins, hunting camps, travel camp places, drying rack sites, and fish camps. The maps confirm the pattern of known archaeological sites in coastal areas, river valleys, and the central Brooks Range in the general region of Anaktuvuk Pass. Other areas are less **fully** covered because of a lack of documentation or exploration. No text accompanies these maps. The data on these maps **will** be updated through a program presently being

carried out by the North Slope Borough to identify sites and nominate them to the National Register of Historic Places.

Implications

Archaeological resources of the Beaufort Sea Region have at least two important planning implications. First, all relevant literature concluded that **only** a small portion of existing archaeological sites in the region have been identified or studied. Thus, any development activity, particularly in coastal areas or river valleys, could potentially reveal undocumented sites. This could require planning for predevelopment archaeological reconnaissance, relocation of development to alternative sites, the establishment of corridors to minimize impact on sites, or excavations or recovery of sites before actual construction.

Second, sites are important to Natives of the region as providing evidence of the **continuity of** their culture and as corroboration of present subsistence rights. Since many archaeological sites are historic hunting and fishing sites, the Borough's program to identify and nominate sites to the National Register may offer additional protection to subsistence areas. Protection provisions for sites in the register would also be a factor to be considered in any development planning.

Legislation and Administrative Programs



Federal and state laws pertaining to cultural and archaeological resources in the Beaufort Sea Region include:

Federal Antiquities Act

The Federal Antiquities Act of 1906 requires the protection of American antiquities, including historic and prehistoric sites on federal lands.

Historic Preservation Act

The Historic Preservation Act of 1966 created the National Register of Historic Places. Sites listed in the National Register are protected from encroachment by projects funded or licensed by the United States and, in most cases, are eligible for 50 percent matching grants under the National Historic Preservation Act. Grants may be used for acquisition, stabilization, and restoration.

Executive Order 11593

The Executive Order **11593** of 1971 requires federal agencies to inventory their cultural resources and submit nominations to the National Register for all qualified sites.

Alaska Native Claims Settlement Act

The Alaska Native Claims Settlement Act of 1971, Section **14(h)** (1) authorizes the Secretary of the Interior to withdraw and convey to appropriate Native Regional Corporations title to existing cemetery sites and historical places.

National Petroleum Reserve Act

The National Petroleum Reserve Act of 1976 requires that the historic value of the National Petroleum Reserve in Alaska be determined by 1979 as part of the land use planning process for the reserve.

Alaska Historic Preservation Act

The Alaska Historic Preservation Act of 1971 provides for the protection and preservation of historic and archaeological resources in Alaska.

North Slope Borough Land Use Inventories

The North Slope Borough, through its areawide historic preservation responsibilities, has documented traditional land uses in the **Wainwright** area and inland in the Utukok River watershed; the coastal region between **Teshekpuk** Lake and **Prudhoe** Bay; and the coastal region and **foothills** from **Nuiqsut** to Kaktovik and the Canadian border (Nielson 1977). This report documented traditional historic and archaeological sites, including cabins, graves, physical remains, sod houses, fishing areas, trapping areas, and whaling sites. Some of these sites **will** be **submitted** for inclusion in the National Register of Historic Places.

The Borough is using this to document the overall significance of the land and its subsistence resources to the Inupiat people in the past, at present and in the future. The assessment of sites will be used by the

Borough Commission on History and Culture as a guide for protection of sites; the Planning Commission will also use the data as an element of a future areawide land use plan.

The North Slope Borough Commission on History and Culture has adopted the completed Beaufort Sea Traditional Land Use Inventory and the Nuiqsut-Tasiqpak Traditional Land Use Inventory. It is projected that perhaps one third more sites than are currently indicated on the AEIDC maps, cited earlier, will be identified through these studies. These studies assess the value of the sites in maintaining Inupiat culture.

National Petroleum Reserve Studies

NPR-A was transferred to Department of the Interior management by the National Petroleum Reserve Act of 1976 (P.L. 94-258). Under terms of the act, historic values of the reserve are to be determined by April 1979.

In conjunction with recently completed Historic and Subsistence Site Report (Nielson 1977), Assessment of the Known Cultural Resources of the National Petroleum Reserve in Alaska (Schneider and Bowers 1977) is both a summary of secondary sources of archaeological resources of the reserve and a series of recommendations for research. Both the data summary and the research recommendations identify the disparity in archaeological data for areas outside the reserve which are relatively well researched and the "virtually unknown" interior of the reserve. The data

summary is accompanied by maps at 1:250,000 scale locating 152 known sites within NPR-A and 467 sites adjacent to reserve boundaries. This distribution is cited to document the need for archaeological reconnaissance within the reserve.

The National Park Service initiated a program of archaeological field work during the summer of 1977 to determine historic values of the reserve. Five teams were based at Umiat to do reconnaissance and site tests to determine the archaeological potential of representative environments in the reserve. Two teams worked along the Colville River by raft; the other three teams covered areas of Howard Pass, Knife Blade Ridge, and tributary creeks of the Colville River.

This survey of various physical environments covered only a small area of the reserve but will give an indication of the archaeological resources that could be potentially found in similar, unexplored areas of the reserve. A report on this field work is anticipated to be available in early 1978. It will be part of the overall area land use study, but the results are not yet published.

Proposed Projects

Archaeological resources in the Beaufort Sea Region have already been discussed in several environmental impact statements, including the Arctic National Wildlife Refuge (U.S. Department of the Interior 1974), the proposed natural gas pipeline (U.S. Department of the Interior 1976),

offshore oil and gas development (U.S. Department of the Interior 1975), and exploration of the National Petroleum Reserve (U.S. Department of the Navy 1977).

Each of these environmental impact statements refers to the relative lack of knowledge of archaeological sites in project areas. The statements also cite the high probability that many new archaeological sites will be identified through additional **field** work. The EIS on NPR-A exploration states that "with proper precautions, exploration may have a positive impact, as scientific benefits could result from the discovery of new historical or archaeological sites".

Similarly, archaeological data relevant to the **Alyeska** Pipeline project have been included in field studies and reports since 1970. John Cook, the archaeologist directing this work for the University of Alaska, has authored a series of reports that document the significant archaeological material obtained from locating and excavating sites along the pipeline route. These studies also provide a basis for estimating the cost of researching and recovering the archaeological resources affected by pipeline or other petroleum-related development. The total cost of the University of Alaska research for 1088 kilometers (680 miles) of the pipeline route was \$1.75 million.

Other Considerations

Certain coastal areas of the Beaufort Sea Region are subject to severe erosion. For example, the Point Hope peninsula has been eroding at the

rate of 2.6 meters (8.6 feet) a year on the north side and depositing 0.9 meters (2.9 feet) a year on the south side (**Dupere** and Associates **1973**). The impact of such natural processes on coastal archaeological resources has not yet been documented, but it could be severe.

SUBSISTENCE

Subsistence and Land Use

Subsistence activities were the earliest human use of the land and coastal waters in the Beaufort Sea Region, and they still comprise a vital cultural and economic **role**. Residents of coastal **communities** traditionally follow hunting and fishing patterns different from those in inland communities. Coastal Eskimos (**Tareumiut**) have traditionally occupied numerous permanent villages along the Arctic coastline and at the mouths of rivers. They mostly hunted marine mammals, fish, and **terrestrial** mammals. Of the nine communities in the region today, six are Native villages whose subsistence patterns are oriented to the sea.

The inland Eskimos (**Nunamiut**) were more nomadic. Their land use patterns have been constantly limited by the occurrence, abundance, and movement of wildlife, especially the Arctic and Porcupine Caribou Herds. The **summer** range of the Arctic Herd generally is located west of the **Colville** River; the Porcupine Herd concentrates east of the river. Temporary settlements were established along the annual northern and southern caribou migration routes crossing the Brooks Range.

Great distances, weather, dog sled transportation, and hand boats have traditionally limited the range of subsistence hunting. Today, however, hunting efficiency has increased significantly due to outboard motor-boats, snow machines, and portable communications devices such as CB radio. There are no longer any areas of the North Slope that are not hunted. Although the most intensively hunted and fished areas are within 25 to 40 miles of each coastal community, residents of Barrow and Kaktovik occasionally trap and fish in the central portion of the **Beaufort** Sea coast, between the **Colville** and Canning Rivers (Alaska Division of Policy Development and Planning 1975).

Native hunting and fishing rights are presently undergoing much discussion in Alaska. The Alaska Native Claims Settlement Act (**ANCSA**) extinguished Native aboriginal rights but stated that subsistence rights were to be protected. Some people contend that the 16 million hectares (40 million acres) to which Natives received title under **ANCSA** are not sufficient to maintain a subsistence economy. They cite two basic reasons. First, much of the land open to Native selection is far from Native villages and does not coincide with migratory patterns of game. This is especially true around Barrow where land in **NPR-A** is ineligible for selection. Second, land selected under **ANCSA** that has traditionally been used for subsistence may be used for profit-making purposes before the lands can be taxed in 1991.

A number of the alternatives for management of national interest lands under Section 17 (d) (2) of the Alaska Native Claims Settlement Act

could affect subsistence activities in the region in different ways. Consequently, there is great interest in proposals now before Congress on alternative mechanisms for management of wildlife on (d) (2) lands as well as subsistence uses permitted on public interest lands (d) (1). The Federal-State Land Use Planning Commission recently stated that subsistence rights should have priority over sport and commercial use on national interest lands except for national parks (McCabe 1977).

More than 1.2 million hectares (3 million acres) of proposed (d) (1) lands are in the Arctic. Final decisions about activities to be permitted on these lands **will** have significant consequences for future subsistence activities on the North Slope, particularly for residents of **inland** villages closer to these lands.

Conflicts

Rapid increases in state population during the last 10 years and new growth and development have created additional pressures on subsistence resources. Between 1965 and 1975 the state's population increased 65 percent, while the number of hunting and fishing licenses sold and private aircraft registered **almost** doubled. With the decreased wildlife habitat in and around urban areas, hunters and fishermen are more inclined to **fly** into remote areas.

Although recreational hunting and fishing in the Arctic is now low (ADF&G estimates that less than 4 percent of the total caribou harvest is by recreational hunters), it will probably increase. Potential OCS

oil and gas development, possible public use of the **trans-Alaska** pipeline **haul** road, development of tourist facilities in Arctic communities, and more frequent and reliable air service will all contribute to increased recreational hunting and fishing. With limitations on land areas and seasons open to hunting, severe competition between subsistence and recreational uses could result. Also, as there is money to be made outfitting recreational hunting and fishing parties, conflicts in villages between cultural and economic values are expected.

Declines in the Arctic Caribou Herd raised questions about the Navy's oil exploration in the petroleum reserve. Residents of Barrow believe that construction and use of ice roads for seismic exploration have affected caribou migration patterns and caused the herd to decline. Dead fish found on the banks of streams and lakes in the vicinity of oil exploration have been attributed by some residents to seismic detonation close to bodies of water.

Construction, operation, and maintenance activities associated with outer continental shelf exploration and development might mean moving people and supplies into important subsistence areas. This intrusion could adversely affect animal movements, denning sites, and population size. Frequently used roads, airports, and the construction and maintenance of pipelines can also create disturbance or barriers to movement of terrestrial **mammals**.

The North Slope Borough is actively pursuing formal working relationships

with the Inupiat of the Canadian Arctic for purposes of game and land management and joint policy development for OCS activities in the Beaufort Sea. Since migratory fish, fowl, and caribou do not respect international borders, the Borough contends that policies must be developed which allow for maintenance of subsistence values along with oil and gas development policies for the entire Arctic.

Land Status

Land tenure in the Arctic is divided between areas of fixed ownership and areas in a state of flux. Most of the land in the Arctic is owned by the federal government. Of the approximately 20 million hectares (50 million acres) in the region, one half is in the NPR-A and the Arctic National Wildlife Range. The State owns approximately 1.4 million hectares (3.5 million acres) between the Colville and Canning Rivers, centered on oil development in the vicinity of Prudhoe Bay. An additional 1.4 million hectares (3.5 million acres) of land are owned by nine Native village corporations comprised of the communities of Barrow, Kaktovik, Nuiqsut, Wainwright, Atkasook, Point Lay, Point Hope, and Anaktuvuk Pass and the regional corporation. Approximately 0.6 million hectares (1.4 million acres) in the region are part of the State's trans-Alaska pipeline utility corridor.

As a result of the Alaska Native Claims Settlement Act in 1971 and the Statehood Act in 1959, classification of remaining land in the Arctic has not been finally determined. ANCSA called for disbursement of

claimed jurisdiction to a 3.2 kilometer (2-mile) buffer zone around the reserve and ownership of coastal tidelands in Smith Bay, Harrison Bay, Peard Bay, and Kasegaluk Lagoon in 1974 (Skjadel 1974). Although the State received title to tidelands 4.8 kilometers (3 miles) from the high-watermark of the coastline under the Submerged Lands Act of 1953, the Navy redefined the **NPR-4 boundary** from the highest high-water mark to the mean high-water mark, thereby assimilating shallow, potentially oil-rich submerged tidelands from the State. To date, the State has made no formal response to the Navy's action.

On June 1, 1977, Congress placed the reserve under control of the Department of Interior and renamed it National Petroleum Reserve-Alaska. Presently, it is not clear how jurisdictional transfer from the Navy to DOI will affect resolution of these boundary disputes.

ARCTIC NATIONAL WILDLIFE RANGE

The Arctic National Wildlife Range extends from the Canning River at Camden Bay to the Canadian border and south across the Brooks Range, approximately 240 kilometers (150 miles) from the Beaufort Sea. An estimated 3.6 million hectares (8.9 million acres), or two thirds of its entire area, is included within the borough boundaries.

As part of the federal national interest parkland selections under **provisions** of Section 17(d) (2) of **ANCSA**, the Department of Interior in October 1974 proposed an expansion to include an additional 1.5 million

hectares (3.7 million acres) south and west of the range. Along with portions of the proposed Gates of the Arctic National Park in the central Brooks Range, these (d) (2) lands in the borough comprise approximately 1.1 million hectares (2.8 million acres). A final decision on (d) (2) recommendations by Congress is expected no later than December 17, 1978.

STATE LANDS

The State has 1,364,680 hectares (3,411,700 acres) of patented land in the region and an additional 0.4 million hectares (1 million acres) pending or tentatively approved along the eastern bank of the Colville River and in the vicinity of Point Lay, Point Hope, and other Native villages. Additional selections are expected with boundary resolution of (d) (1) and (d) (2) withdrawals.

NORTH SLOPE BOROUGH

When the legislature authorized the creation of organized borough in 1963, it permitted each borough to select 10 percent of the State's general grant lands conferred under the Statehood Act. The North Slope Borough has applied for nearly all of its 10 percent allotment of state patented land, or 13,330 hectares (33,324 acres). The State, however, has rejected these applications, maintaining that the lands are unavailable for selection because of prior state commitments in the form of oil and gas and other leases and permits. Because there is no

precedent for this state action, the issue is in litigation, and a lower court decision is on appeal.

Whatever additional lands the State selects, once boundaries of the (d) (1) and (d) (2) lands are formally fixed, the Borough will be entitled to an additional 10 percent of the State's lands. Under the Statehood Act, the State is required to complete its land selection procedure by 1984, but the Borough has no time limit on selection of its entitlement.

NATIVE REGIONAL AND VILLAGE CORPORATIONS

The Arctic Slope Regional Corporation recently became the first Native regional corporation in the state to receive interim conveyance of nearly all the land it is entitled to under ANCSA. On June 3, 1977 the ASRC received its last conveyance from the Bureau of Land Management, bringing its total of surface and subsurface lands to 1.16 million hectares (2.9 million acres), with an additional 88,630 hectares (221,575 acres) near Anaktuvuk Pass pending. Although the lands will not be fully conveyed until they are surveyed, the corporation now has all the privileges and rights of ownership.

REGIONAL CORPORATION CONVEYANCES

Lands yet to be conveyed under ANCSA to the corporation include "in lieu" and "dual withdrawal" lands. The in lieu lands consists of subsurface

rights that normally would have been requested in conjunction with village-selected surface lands at Barrow, **Wainwright**, **Nuiqsut**, and **Kaktovik** but were unavailable because of prior subsurface rights of the **NPR-A** and the Arctic National Wildlife Range. Dual withdrawal lands include areas selected by the ASRC but which are also identified for inclusion in the proposed (d) (2) lands.

VILLAGE CORPORATION CONVEYANCES

Villages in the region have obtained interim conveyance for lands totaling more than 280,000 hectares (700,000 acres). **Wainwright** was the second **community** in the state to receive its full conveyance of 42,125 hectares (105,312 acres). Barrow received most of its remaining allotment 80,493 hectares (201,232 acres) at the same time. Table 20 shows the status of village selections.

NATIVE ALLOTMENTS

The Alaska Native Allotment Act of May 17, 1906 authorized the Secretary of the Interior to grant up to 64 hectares (160 acres) of land to Native Alaskans. Although the act was terminated by the passage of **ANCSA** in 1971, applications filed before that date are **still** being processed and honored. About 250 parcels, totaling **15,000** hectares (37,500 acres) were applied for in the Arctic Region (**Seikregg et al.** 1975), most of them along the coastal zone from Harrison Bay to Kaktovik, from Harrison Bay west to Cape **Lisburne**, and along inland rivers.

TABLE 20

BEAUFORT SEA REGION LAND STATUS

CURRENT NATIVE VILLAGE CONVEYANCES UNDER THE ANCSA (SECT. 12a)

	<u>Acreage Conveyed or Pending</u>
Atkasook (Atkasook Corporation)	69,120
Barrow (Ukpeagvik Inupiat Corporation)	201,232
Kaktovik (Kaktovik Inupiat Corporation)	65,000 (selected)
Point Hope (Tigara Corporation)	127,912 (selected)
Point Lay (Cully Corporation)	85,300
Wainwright (Olgoonik Corporation)	110,472
Nuiqsut (Kuukpik Corporation)	115,200
Anaktuvuk Pass (Nunamiut Corporation)	90,000

Source: Anchorage Times, June 4, 1977

University of Alaska, Arctic Environmental Information and Data Center. 1975. Alaska Regional Profiles: Arctic Region.

LAND STATUS ISSUES

The Alaska Native Claims Settlement Act set the stage for the complex land status and ownership issue in the region. The following discussion relates to the distribution of conveyed lands as well as to the uses to which they may be put.

National Interest Lands

Congress is presently considering legislation to set up a system for the national interest lands designated by Section 17(d) (2) of ANCSA. **Important** components of the legislation are the amount of this land that will become part of national systems of parks, wildlife refuges, forests, and **wild** and scenic rivers; the **schedule** for absorbing the designated lands into these systems; and the **recreational**, resources extraction, and **transportation** uses allowed in each.

H.R. 39, sponsored by Congressman Morris **Udall**, would include 46 million hectares (115 million acres) in various national systems. Portions of this land area within the boundaries of the North Slope Borough are **proposed** as additions to the Arctic National Wildlife Range, portions of the Gates of the Arctic National Park in the central Brooks Range, and portions of the Noatak National Preserve.

Key alternative proposals to the **Udall bill** include those of Governor Jay Hammond and the Federal-State Land Use Planning Commission. The

Governor's proposal would set aside 10 million hectares (25 million acres) until the year 2000, allowing for potential resource development during the interim. The proposal of the FSLUPC would include 17.6 million hectares (44 million acres) in the four national systems, and an additional 18.7 million hectares (46.7 million acres) in a fifth system designated as Alaska national lands, to be jointly managed by the U.S. Fish and Wildlife Service, Park Service, Forest Service, and Bureau of Land Management.

Differences among all land status alternatives in the Beaufort Sea Petroleum Development Region are presently unclear but relate to alternative delineations of land areas to be included in the Brooks Range portion of the system. The proposal of the FSLUPC would add the following Arctic rivers to the wild and scenic rivers system: the Utukok (which empties into the Chukchi Sea near Icy Cape); the Ikpikpuk (which empties into the Beaufort Sea at Smith Bay); and the Canning (which empties into the Beaufort Sea at Camden Bay).

The legislation finally enacted on (d) (2) lands will determine such land uses as the kind and amount of mineral extraction allowed, the locations of transportation and pipeline corridors, and the potential conflicts between subsistence activities and increased recreational opportunities.

Native Corporation Management

Recent conveyances to the Arctic Slope Regional Corporation and village corporations **have** created conditions for the planning, management, and potential development of resources on these lands. For example, the ASRC undertook exploratory drilling programs approximately 30 miles southeast of **Umiat** and at the **Tulugak** location. These and other lands selected by the ASRC will be managed by the corporation at least until 1991, when shareholders have the option of leasing or selling their shares of stock in the corporation.

Future oil and gas development activities on regional or village corporation lands could require special agreements relating to surface and **sub-**surface rights. For example, the village of **Nuiqsut** has received a selection of approximately 13 square kilometers (5 square miles) within the boundaries of the State's nearshore oil lease area. Under an agreement between the ASRC, the village corporation, and the State Division of Lands, **Nuiqsut** will retain surface rights and the State will retain the subsurface rights to these five sections (State Division of Policy Development and Planning, April 1975)

Easements Across Native Lands

Future activities of the regional and village corporations depend on resolution of litigation against the Bureau of Land Management by the ASRC. Six regional corporations are challenging the right of the

Department of the Interior to grant easements across all conveyances made under **ANCSA**, including Native Lands. These rights were promulgated by the Secretary of the Interior in two administrative orders dated February 5, 1976 and March 5, **1976**, which qualified rights of access preserved under Section 17(d) (2) of ANCSA.

The administrative orders are significant to the regional and village **corporations** because they establish broad discretionary power of use and access across Native Lands and because resolution of litigation over these rights and specific requested easements could delay land **conveyances** to Native corporations.

The February-administrative order concerned reservation of local **public** easements across all lands conveyed under **ANCSA**. The easements are meant to reserve lands for transportation, utilities, and communications corridors and facilities and for recreational use by the public. **Transportation** easements could be established for such facilities as roads and trails, railroad spurs, docks, navigational aids for **watercraft** or aircraft, and aircraft landing sites.

The easements would be precisely located wherever possible, "except where they would result in substantial delay in the issuance of conveyances." Guidelines for reservation of easements include assessment of **public** use along with special consideration of the "effect of a proposed easement on Native Lifestyle and subsistence needs." Additional guidelines require review of recommendations of the Federal-State Land Use Planning

Commission, other federal agencies, the State, Native corporations, and the general public.

The **FSLUPC** has stated that its position is that no surface easement corridors should be established across (d) (2) or other lands at this time because locations of resource development in the future are unknown and **intercommunity** transportation needs cannot be projected with certainty. It believes that multimodal transportation corridors should be planned in the context of a statewide land use planning process.

Two additional provisions of **ANCSA** have particular significance to subsistence fishing activities. The February order established a continuous linear easement of 7.5 meters (25 feet) wide along the entire coastline of Alaska. This easement would be used for the beaching of **watercraft** and aircraft, **travel** along the shore, recreation, and other similar uses such as camp sites. A second provision calls for reservation of a 7.5 meter (25-foot) wide easement **along** the banks of rivers and streams that have highly significant present recreational use.

The March administrative order reserved additional public easements across Native land for interregional or interstate transportation of natural resources that are the property of the United States or that are intended for delivery to the United States. The easements include the right to construct any necessary facilities during periods of planning, locating, constructing, operating, maintaining, and terminating

transportation systems. Pipelines carrying federally owned oil and gas from National Petroleum Reserve-Alaska to the **trans-Alaska** pipeline corridor, for example, could cross Native Lands at **Nuiqsut** or regional corporation-selected lands near **Umiat**. Although the easements are not meant to benefit private resource owners, the inclusion in the order of easements for transport of resources bound for the United States appears to apply to nearly all resource development.

Additionally, this order provides for crossing of all lands conveyed under **ANCSA** rather than delineating specific rights-of-way. Although consent by the owner of the land is required before designation of a right-of-way, the United States may exercise right of eminent domain if such consent is not given.

The Alaska Public Easement Defense Fund, representing sportsmen and recreational interest has filed a suit seeking broader interpretation of **ANCSA** to allow for greater public access onto Native lands. This suit seeks ends that directly oppose the suit filed by the regional corporations to restrict the number and uses of transportation corridors.

Community Facilities and Services

BOROUGH POWERS AND PROGRAMS

For purposes of local government administration, the State of Alaska is divided into organized and unorganized boroughs. Organized boroughs are

classified as being first, second, or third class. Incorporated as a first-class borough in 1972, the North Slope Borough adopted a home-rule charter in April 1974 that essentially allows it to assume all powers not expressly forbidden by state law. A mayor, elected for a three-year term, provides administrative and policy direction to the borough government, and a seven-member elected school board assumes management control of the North Slope Borough **School** District.

As a first-class borough, the North Slope Borough has mandatory areawide powers of assessment and collection of taxes, education, and planning and zoning. According to state statute, boroughs may acquire additional areawide powers either by transfer from incorporated cities within their boundaries or as a **result of** an areawide election. A borough also has the power to establish "service areas" within its boundaries for the purpose of providing special services to a given area which are not provided on an areawide basis.

Aside from its three mandatory areawide powers, the North Slope Borough assumed the following powers from incorporated communities in the region as the result of an election held April 30, 1974:

- sewer and sewage treatment facilities
- watercourse and flood control facilities
- **health** services and hospital facilities
- telephone systems
- light, power, and heat
- water

- transportation systems, including airport and aviation systems and streets and sidewalks
- libraries
- garbage and solid waste collection and disposal services and facilities
- housing, urban renewal, rehabilitation, and development
- preservation, maintenance, and protection of historic sites, buildings, and monuments

The areawide police power was transferred to the Borough as the result of an election held July 1, 1976.

On November 20, 1973 the Borough assumed by ordinance all municipal powers granted by Alaska statutes in the area outside incorporated cities. This allows unincorporated communities, such as Point Lay and Atkasook, as well as the **Prudhoe** Bay industrial area to receive **all** available local government services. In addition, the Borough created a service area at **Deadhorse** in 1975 to provide solid waste, sewer, and water services.

To provide the range of local government services, organized boroughs and first-class or home-rule cities may, under Alaska law, assess and collect taxes on real and personal property at a rate up to 30 **mills**. In addition, they may levy sales taxes of up to three percent, although this limitation does not apply to **local** governments with home **rule** charters.

Although the North Slope Borough theoretically has the power to levy real and personal property taxes of up to **30 mills**, in reality its taxation ability falls far short of this because of the limitations on local government taxation of certain oil and gas industry property as defined in Title 43.56, Section 29.53.045 of the Alaska Statutes, which is quoted in part:

- (a) A municipality may levy and collect taxes on taxable property taxable under AS 43.56 only by using one of the methods set out in **(b)** or (c) of this section.

- (b) A municipality may levy and collect a tax on the **full** and true value of taxable property taxable under AS 43.56 as valued by the Department of Revenue at a rate not to exceed that which produces an amount of revenue from the total municipal property tax equivalent to \$1,500 a year for each person residing within its boundaries.

- (c) A municipality may levy and collect a tax on the full and true value of that portion of taxable property taxable under AS 43.56 **as** assessed by the Department of Revenue which value, when combined with the value of property otherwise taxable by the **municipality**, does not exceed the product of 225 percent of the average per capita assessed full and true value of property in the State multiplied by the number of residents of the taxing municipality.

Title 29.53.055 of the Alaska Statutes states that there is no limitation on taxes levied or pledged to pay or secure the payment of the principal and interest on bonds. However, this assertion is currently being **challenged** in the state supreme court. It is the contention of the North Slope Borough that the statutory limitations on local government taxation imposed by Section 29.53.045 do not apply to debt service but only to operating revenues. Should the ruling go against the Borough, its ability to collect the revenues necessary to carry out its capital improvements program would be very much more limited since oil and gas property accounts for by far the largest share of the value of taxable property in the Borough. (The State assessed value of property held by the Borough's 10 largest taxpayers in 1977 amounted to \$3,273,320,800. **All** 10 were oil and gas or related companies.)

Even if the Borough wins its case, the legislatively enforced link between local taxation ability and population causes some problems, mainly because the population of the region has recently varied so much from year to year. During peak periods of pipeline construction, there were more than 12,500 borough residents. By July of 1977, however, this figure had fallen to about 9,000 and since then, it has fallen still further. Sporadic population increases can again be expected with construction of the gas line and the forthcoming Beaufort Sea offshore oil and gas lease sale (providing that personnel are located within the 3-mile limit). However, the "highs" and "lows" that accompany these activities are not desirable as a determinant of revenues needed to provide essential, permanent borough services.

Because the taxing formula contained in Section 29.53.045(c) of the Alaska Statutes is less sensitive to local fluctuations in population and also because it contains a built-in inflation factor (assuming that the average Statewide per capita value of civilian property will increase each year), the Borough plans to switch to this formula for the upcoming fiscal year. Through the current fiscal year, however, it has used the \$1,500 per capita formula.

With the above limitations in mind, the Borough mill rate in 1977 was set at 7.52 mills, including a tax at the rate of 2.12 mills which is subject to debt service litigation (see Table 21). In addition, the Borough presently levies a three percent consumer sales tax on all sales made within the borough. Because some cities within the Borough also levy sales taxes, local residents pay a combined rate of up to six percent in communities such as Barrow and **Wainwright**. All local sales taxes are collected by the Borough and remitted back to individual cities, as applicable.

Other sources of borough revenue are the state and federal governments, primarily for health and education services. The Borough also collects revenue from miscellaneous sources, including earnings from interest, the teacher lunch and housing program, and athletic gate admission charges.

Although the North Slope Borough has assumed areawide powers for a wide variety of municipal services, it does not in fact provide all of them

TABLE 21

GENERAL REVENUES BY SOURCE a/
 NORTH SLOPE BOROUGH
 FY 1973 - FY 1978
 (in \$000's to nearest \$1 ,000)

<u>Fiscal</u> <u>Year</u>	<u>General</u> <u>b/</u> <u>Property</u> <u>Taxes</u>	<u>Sales</u> <u>c/</u> <u>Taxes</u>	<u>State</u>	<u>Federal</u>	<u>Mi scel laneous</u> <u>Revenues</u>	<u>Total</u>
1973	\$ 418	\$ 37	\$ 69	\$ 27	\$ --	\$ 551
1974	\$ 3,548	\$1,040	\$1,376	\$ 31	\$ 168	\$6,163
1975	\$5,501	\$1,181	\$2,295	\$1,767	\$ 975	\$11,719
1976	\$6,884	\$ --	\$5,342	\$1,270	\$2,138	\$16,634
1977	\$18,220	<u>d/</u> \$ --	\$5,302	\$1,883	\$ 892	\$26,297
1978	\$26,556	<u>e/</u> \$ 240	\$6,839	\$2,091	\$2,034	\$37,760

- a/ General revenues means all cash receipts except for enterprise funds.
b/ Property taxes includes penalties, interest and charges.
c/ Sales taxes includes penalties and interest.
d/ Includes a tax at the rate of 2.62 mills (\$4,631,000) which is the subject of litigation.
e/ Includes a tax at the rate of 2.12 mills (\$7,634,000) which is the subject of litigation.

Source: North Slope Borough.

at the present time. Its services and its capital improvements program have been designed to first provide each village within its boundaries with basic life, health, and safety support. Thus, projects to provide electrical generation, health facilities, sewage disposal and safe water systems, and year-round airstrips have initially received the highest priority. (Airstrips are included as a basic support facility because aviation is the primary and often the only mode of transportation available to North **Slope** villages.)

Housing, schools, and community service centers generally have second priority and the Borough is presently engaged in constructing new school facilities in most communities of the region. In addition, new housing units have been or are being built in all **of** the Borough's traditional **communities**. Programs to supply amenities deemed to be of lower priority, such as libraries and museums, **will** be undertaken when the range of basic facilities and services has been provided.

Several services for which the Borough has assumed areawide responsibility, such as hospital facilities and telephone service, are already provided by other agencies. Hospital services in the region are presently furnished by the U.S. Public Health Service. Telephone services are privately owned and operated. In Barrow, the local system is run by General Telephone, **while** all other traditional communities in the borough are served by RCA **Alascom's** bush communications system.

INTERREGIONAL AND INTERCOMMUNITY TIES

The North Slope Borough covers a 228,648 square kilometer (88,281-square mile) area across the extreme north of Alaska. It extends from near Point Hope on the **Chukchi** Sea approximately 1,040 kilometers (650 miles) east to the Canadian border, and from Point Barrow in the north to 68 degrees latitude in the Brooks Range, a distance of about 360 kilometers (225 miles). The Borough's estimated 9,643 residents in July 1977 lived primarily in the Prudhoe Bay area (which, including pipeline camps, accounted for 55.5 percent of the Borough's 1977 population) or in eight widely separated traditional Eskimo **communities--Anaktuvuk** Pass, Atkasook, Barrow, Kaktovik, **Nuiqsut**, Point Hope, Point Lay, and **Wainwright**.

There is no **intraregional** transportation system connecting all of the various North Slope communities. The pipeline haul road, which runs from the Yukon River north to **Prudhoe** Bay, is the only highway in the region. However, access to it is presently limited to traffic related to oil and gas development activity or to maintenance and operation of the **trans-Alaska** pipeline. With the exception of the **Prudhoe Bay/Deadhorse** area, no North Slope **community** is closer than 144 kilometers (90 miles) to this highway route.

In the absence of an interconnecting overland transportation system, transportation among the various North Slope communities is limited to air travel. As of December 1977 Kaktovik, Prudhoe Bay/Deadhorse, **Nuiqsut**, Barrow, and **Wainwright** were all connected (although not necessarily

directly) by scheduled air service. Point Hope and **Anaktuvuk** Pass, on the other hand, had scheduled air service only to communities outside the region. Point Hope is connected to Kotzebue and **Anaktuvuk** Pass to Fairbanks. The newly resettled villages of Atkasook and Point Lay had no scheduled air service in December 1977 and were dependent on private charter operators based in Barrow. Charter operators at Barrow, **Deadhorse**, **Kaktovik**, **Bettles** (for **Anaktuvuk** Pass), and Kotzebue (for Point Hope) provide **links** between communities not connected by scheduled air service.

Air transportation to Fairbanks and points south from most communities in the North Slope Borough is through either Barrow or **Deadhorse**, both of which have daily scheduled service to Fairbanks and Anchorage. Point Hope residents travel to Fairbanks and Anchorage via Kotzebue, while Anaktuvuk Pass has direct service to Fairbanks.

Although **all** passenger traffic and most freight to and **from** North Slope villages is by air, the coastal communities of the region are accessible by barge and shallowdraft vessels during the short ice-free **summer** season. Point Hope, **Wainwright**, and Barrow are supplied annually from Seattle by the Bureau of Indian Affairs ship North Star **III**. These same communities also receive their annual fuel supplies from Seattle but by barge. In addition, the Prudhoe Bay area, the **DEW** Line stations, and **NPR-A** exploration activities are **all** supported by barge service.

Except as they all relate to Barrow, there are few relationships between

individual North Slope traditional settlements. As the North Slope Borough seat and as the headquarters of the Arctic Slope Regional Corporation, however, Barrow clearly has relationships with all communities in the region. In addition, over the past 50 years there has been a significant amount of **outmigration** from most traditional villages to Barrow so that most villages have personal and family ties with Barrow as well as governmental and corporate links with that **community**. Atkasook, **Nuiqsut**, and Point Lay have particularly strong ties since they were very recently resettled, largely by Barrow residents.

Another link connecting most traditional villages in the region to Barrow is the Public Health Service hospital in that **community**. Except for Point Hope and Anaktuvuk Pass residents, people from other villages travel to Barrow when they require medical services beyond the capability of local health aides. (Kaktovik residents **are** sometimes evacuated to **Inuvik** in Canada's Northwest Territories.) In turn, patients requiring surgery or specialized medical care that is not available in Barrow are flown outside the region to Fairbanks or Anchorage. Point Hope residents are flown to the **Public** Health Service hospital in Kotzebue or, if they require additional services, they are transferred to Fairbanks or Anchorage. Anaktuvuk Pass patients have direct access to Fairbanks.

Both the North Slope Borough and the Arctic Slope Regional Corporation have strong ties with communities outside the North Slope region, as do military subcontractors and organizations such as the Naval Arctic Research Laboratory. The Arctic Slope Regional Corporation has an

Anchorage office, and the Borough has offices both in Anchorage and Washington D.C. Both use specialized consultant services, most of which are located in Anchorage, and **legal firms** based in Anchorage and outside the state.

The ties between Barrow and the **Prudhoe Bay/Deadhorse** area are quite different from those between Barrow and **the** region's traditional settlements. Prudhoe Bay, **Deadhorse**, and other camps in this area exist **solely** to support oil and gas development and production. The North Slope Borough has established a service area at Deadhorse to provide **solid** waste, sewer, and water services and has built a local tax assessment office. However, the operators in this area do not depend on the Borough for other government services at the present time. Furthermore, although some permanent borough residents do work here, for the most part people from elsewhere in the region have little contact with the **Prudhoe Bay/Deadhorse** area. None of the companies maintains an office in Barrow, nor are there any hiring halls in the region.

There is, however, one very important **link** between the **Prudhoe Bay/Deadhorse** area and the remainder of the North Slope region; it is on this area that the Borough's tax base essentially rests. The property taxes paid by companies operating in this area form the financing basis of the Borough's capital improvement program. Thus, the recent improvements in the quality of **life** in the region's traditional villages are directly related to oil and gas developments in the **Prudhoe Bay/Deadhorse** area.

Other linkages between the **Prudhoe Bay/Deadhorse** area and villages in the North Slope region are limited to law enforcement and transportation connections. A state trooper has been stationed at Deadhorse since April 1975, and he or a trooper from Fairbanks travel to borough villages when required. In addition, Kaktovik, **Nuiqsut**, and Barrow all receive scheduled air service to and from Deadhorse airport, and supplementary charter services are also available.

Except for the provision of borough solid waste, sewer, and water services at Deadhorse, the companies operating in this area provide their own services and their employees generally travel from Deadhorse directly outside the region to Fairbanks, Anchorage, or points beyond. The transportation requirements of this area are also generally independent of other **communities** in the borough. Supplies are brought in from Anchorage and Fairbanks via the pipeline haul road, by air charter from Fairbanks, or in the **summer** by barge from Seattle. Management and executive personnel are based in offices in Fairbanks, Anchorage, and outside the state.

The DEW Line stations and the Cape **Lisburne AC & W** site have few ties to the region's traditional **communities**. These facilities were established in the region to perform specific military-related functions and are self-contained units which do not depend on established communities for services. However, **there is some** contact with neighboring villages (Point Lay, **Wainwright**, Barrow, and Kaktovik). The greatest amount of contact occurs at Kaktovik where the airstrip at the Barter Island

station is also used for general aviation and where local residents have more opportunities for employment on base. The town of Point Lay is being moved closer to the DEW Line station in that area and now uses the station's airport facilities.

The DEW Line system is administered by the air force's Aerospace Defense Command which is based in Colorado Springs. Operation of the system is handled by a private contractor (FELEC Services, Inc.) and most personnel are hired out of state. The stations in the North Slope region are supplied weekly by an air force charter while fuel and bulk supplies are transported during the summer months by barge from Seattle. Cape Lisburne is also operated by a civilian contractor (RCA) and is supplied independently of the region's traditional communities.

The only other major group presently operating in areas of the borough outside the established communities is Husky Oil, which is undertaking oil and gas exploration work in NPR-A for the U.S. Department of the Interior. The firm does have a very small office in Barrow, but its operations in the region are generally directed out of Anchorage.

Servicing of oil and gas exploration activity in NPR-A is being undertaken out of Camp Lonely in the eastern section of the reserve, although Husky Oil has also obtained permission to use up to 3,785,000 liters (1 million gallons) of the NARL camp's total fuel storage capacity of 9,462,500 liters (2.5 million gallons) near Barrow. During the summer of 1977, barges from Seattle dropped off supplies at Peard Bay, Husky

Point, and Icy Cape which were then hauled overland during the winter months to planned drill sites. Air services are contracted out of Fairbanks. Except for its use of the NARL facilities, the entire operation has very little relationship to the remainder of the North Slope Borough.

COMMUNITY POWERS AND PROGRAMS

Fire Protection

Fire protection is one of the two municipal powers retained by individual communities within the North Slope Borough; however, fire protection in the outlying villages is virtually nonexistent. Besides Barrow, two other villages, Point Hope and Kaktovik, had organized fire departments as of December 1977, and only Barrow has any fire-fighting equipment beyond a few portable fire extinguishers. Access to water for fire fighting, particularly in winter, is a problem in most villages as they generally lack central water supplies, and most available water sources are frozen at that time of year.

Barrow has a well-organized, 22-man volunteer fire department. The department is housed in a station built in 1975 and has a pumper truck, a tracked vehicle with a tank, and a fully equipped rescue unit. The community has an Insurance Services class rating of 8 for residential buildings and 9 for commercial structures. This poor rating reflects, among other things, the lack of a community water system, and it translates into very high fire insurance rates. All other traditional villages

in the region have a rating of 10, the worst possible. (For a more detailed description of the facilities and services of the Barrow fire department, see the Barrow chapter of this report.)

Most North Slope traditional villages are extremely vulnerable to major damage from fires. The combination of old, deteriorated wooden structures located close together in a region where high winds are extremely common is dangerous since once a fire took hold, a number of buildings could be lost. Moreover, the lack of fire-fighting equipment in all villages except Barrow severely limits local control capability in case of a major fire.

By contrast, fire-fighting equipment and facilities at the region's oil and gas-related camps and at remote military installations are highly sophisticated. Each major company maintains its own fire protection apparatus at whatever level the value of the properties justifies.

Alyeska Pipeline Service Company is responsible for safety and fire protection at the trans-Alaska pipeline plant and three pump stations within borough boundaries. According to a company spokesman, these facilities are outfitted with a range of equipment specifically designed to combat fires resulting from oil and gas combustion. Each pump station has two built-in fixed fire protection systems--a halon system and a combination water/foam system--and a portable twin-engine unit equipped with 204 kilograms (450 pounds) of dry chemical and 747 liters (200 gallons) of premixed light water. These are usually mounted on pickup truck beds

but, when required, can be picked up by helicopter for use at another location. In addition, a number of hand portable and wheeled extinguishers are also available.

At each station there is at least one fire truck with a 4,731 liter (1,250-gallon) water tank, 226 kilograms (500 pounds) of dry chemical, 473 liters (125 gallons) of A3F foam, and a 1,135 liter (300-gallon)-per-minute pump. Pump station #1, which is in the Prudhoe Bay complex, has two such fire trucks, one of which is available under a mutual aid agreement to supplement BP (Sohio) and Atlantic Richfield's fire-fighting capabilities.

A full-time safety and fire protection specialist is responsible for the maintenance and operation of fire protection equipment at each of the three **pump** stations in the North Slope Borough. This person is also charged with the responsibility for organizing and training the station's fire brigade. According to Alyeska safety officials, existing equipment can adequately protect the pump stations, but the amount of assistance that they could provide in the event of a fire at another location would be very limited without leaving themselves vulnerable.

Responsibility for management of the Prudhoe Bay field is divided between BP (Sohio) and Atlantic Richfield Company (ARCO). Each has its own fire protection personnel and equipment designed to meet the needs of its particular operation. Although these may differ in specifics, both companies have systems which meet National Fire Protection Association

guidelines for the types of fires most likely to **occur** in this environment. Only the BP (**Sohio**) system is described in detail here.

BP (**Sohio**)'s fire station is located close to its base operations center. The company's safety engineer and three safety technicians, who are responsible for maintaining both fixed and mobile fire protection equipment, are housed here. A 20-man fire brigade, assigned to each seven-hour shift and equipped with electronic pagers, is spread throughout the complex and can be called immediately in the event of a major fire. The entire brigade receives weekly training, and all brigade members are trained annually at special fire-fighting courses given at Texas A & M University. Mobile equipment stationed at the firehouse includes a fire truck equipped with a 2,839 liters (750 gallons) -per-minute pumper, a 7,570 liter (2,000 gallon) water tank, 1,514 liters (400 gallons) of 3F foam, and 680 kilograms (1,500 pounds) of dry chemical. A water truck has a 7,570 liter (2,000 gallon) capacity and a 1,892 liters (500-gallons) -per-minute pneumatic pumper.

In addition to mobile equipment, each of the company's major facilities has a built-in fire protection system. The central power station has four 3,628 kilogram (4 ton) carbon dioxide systems for its turbines, several halon systems, and a 75,700 liter (20,000 gallon) water tank with pumps powered by elevation and air pressure for each pair of turbines.

The three gas gathering centers are similarly equipped. Each has a 1.6 million-liter (433,000-gallon) circulating system with two 5,677-liters

(1,500-gallons) -per-minute pumps, one electric and one diesel. System outlets are located in each module within the gathering centers. Each gathering center also has standard foam application systems and is equipped with water curtains between modules. Fire detection systems vary, depending upon the particular activity involved and the type of fire danger associated with it.

The company's three housing complexes have elaborate fire detection systems. In addition, doors close automatically to contain fires within specific areas, and there is halon protection throughout. Water for fire fighting comes from two sources --the 113,550-liter (30,000-gallon) swimming pool and the buildings' potable water source, which has a 113,550-liter (30,000-gallon) reserve at all times. An additional 302,800-liter (80,000-gallon) water tank equipped with two 1,892-liters (500-gallons) -per-minute pumps is now under construction at the fire station.

Air force DEW Line stations on the North Slope are typically outfitted with portable fire extinguishers, hoses, "escape" doors, and a number of fire alarm boxes. A fire officer is responsible for organizing, training, and directing the station fire brigade, and each station has a water tank truck and a pumper.

According to Air Force sources, fire protection at the Cape Lisburne AC & W site is the responsibility of a full-time civilian fire chief and a 13-man auxiliary fire brigade. Fire-fighting equipment at the facility includes a pumper with a 1,892-liter (500-gallon) tank.

Recreation

Recreation is one of the powers retained by individual communities in the North Slope Borough. At the present time, however, recreational facilities and organized recreation activities are limited almost entirely to school gymnasiums (where these exist) or to small community centers. In addition, National Guard armories are available for public use in several towns, and local churches sometimes offer limited recreation programs to their members.

Despite the general lack of adequate facilities, people in the region are interested in improved recreation opportunities. Most towns have recreation committees appointed by their city councils. These committees generally raise funds from the proceeds of bingo games and use them to sponsor special communitywide events. However, Barrow is the only community in the borough with a salaried recreation director.

While the responsibility for providing recreation facilities remains with individual communities in the North Slope Borough, the borough government is in the process of upgrading the range of local facilities as part of its program of constructing community service centers in all villages of the region. Generally, these facilities will take the form of gymnasiums/multipurpose rooms which will be included as part of new school complexes. (More detailed descriptions of these facilities are found in later chapters of this report dealing with individual communities.)

Compared to the limited recreation facilities available in most of the North Slope's traditional communities, the facilities available to people living in camps outside these communities are relatively lavish. For example, BP (**Sohio**)'s base camp is equipped with a full gymnasium--including basketball and handball courts, a swimming pool and saunas, an indoor track, and a **fully** equipped exercise room. In addition, the camp has a theater for movies and, occasionally, live entertainment brought in from outside the region. **Employees** also have access to a wide range of hobby-oriented and academic classes taught by fellow employees when a particular skill is locally available or by imported specialists when it is not.

Atlantic Richfield's **Prudhoe** Bay base camp has a range of recreation facilities similar to that offered by BP (**Sohio**). This camp has an indoor basketball court, which can be converted for volleyball and badminton, with an elevated indoor track over it. The camp also has a fully equipped exercise room, saunas, pool tables, and other table games. A 135-seat theater is included in the complex and is used for both **movies** and live entertainment. Recreation activities are organized by a **full-time** recreation director.

Each of **Alyeska's** three pump stations in the North Slope Borough has a large recreation area, half of which is devoted to **table** games such as table tennis and pool, and the other half used as a theater for daily movie shows. Each station also has a sauna, a fully equipped exercise room, and a commissary where employees can purchase personal items plus books, newspapers, and magazines.

According to the air force, recreation facilities at Cape Lisburne are typical of those offered at AC & W sites and consist of a hobby shop, a gymnasium, table tennis and pool tables, a bowling alley, and a bar. Facilities provided at the various DEW Line stations are similar to those at Cape Lisburne. The main station on the system, BAR-Main on Barter Island near Kaktovik, has an exercise room, a lounge, a bar, and a recreation room equipped with table games which can be converted for use as a movie theater.

The Alaska Division of Parks and Recreation sponsors a variety of programs aimed at developing recreation facilities throughout the State, but the North Slope Borough has derived little benefit from them. There are no existing state parks within the borough boundaries, nor are any planned in the near future. Funds from the State trails and footpaths program have virtually all been expended on bike paths in urban areas such as Anchorage and Juneau for the past few years. In addition, the Alaska Division of Parks and Recreation distributes funds for historic preservation, but as of December 1977 it had not expended any within the North Slope Borough.

Another program administered by the Alaska Division of Parks and Recreation is the Bureau of Outdoor Recreation Land and Water Conservation program which provides grants to local communities for recreation projects. However, during the 10 or so years that this program has been available, Barrow is the only rural community that has received funds. A grant of \$20,000 in 1977 was used to construct an outdoor playground.

Recognizing a need to channel more recreation funds into **small** villages around the state, the Division of Parks and Recreation is in the process of undertaking a statewide assessment of **small community** recreational facilities and needs. Based on a study of 14 villages, including **Wainwright** and **Barrow**, the division hopes to develop a broader understanding of the types of additional recreation facilities which **small** Alaska towns require.

While recreation facilities within the borough's traditional settlements are limited, the region as a whole has a high potential for outdoor recreation. During the past several years, the federal government has conducted extensive research on the recreation resources of the region in connection with its proposed classification of (d) (2) lands and the Congressionally mandated National Petroleum Reserve-Alaska study. The Alaskan Arctic Gas Pipeline Company also conducted a recreation use study of the Arctic National Wildlife Range in connection with its proposed natural gas pipeline route through that area.

As part of the **NPR-A** study, a task force headed by the Bureau of Outdoor Recreation and including **other** agencies such as the National Park Service and the North Slope Borough, is charged with developing the wilderness scenery and recreational potential element of the overall **NPR-A** land use plan. As part of this effort, the group is also studying local recreation needs and the region's potential for tourism. During the summer of 1977, Bureau of Outdoor Recreation personnel floated four rivers in **NPR-A--the Awuna, the Nigu-Etivluk system, the Colville and the Utukok.**

The Idpikpuk River and the Kuk-Ketik system will be studied during the **summer** of **1978**. In addition, the Bureau of Outdoor Recreation plans to assess the kayaking and wildlife viewing potential of the Arctic coast between Icy Cape and **Wainwright**.

Two rivers in NPR-A, the Utukok and portions of the **Colville**, have been included in the administration's (d) (2) proposal as part of the National Wild and Scenic River system. H.R. 39, the (d) (2) proposal developed for mark-up by the Congress, **also** recommends the inclusion of the **Ikpikpuk** River in this system.

LAW ENFORCEMENT

The North Slope Borough assumed areawide police powers on July 1, 1976. Prior to that time, police protection was provided by individual **communi-**ties, often with only volunteer officers, and state troopers based in Barrow, Fairbanks, and Deadhorse. The only state trooper now stationed in the borough is at Deadhorse.

The borough **public** safety department is headquartered in the main borough building at Barrow, however, the staff operates either out of the **old fire hall** across from **the** post office or in the **field**. As of January 1978, the police force numbered 16 **commissioned** officers, 13 of whom were trained. Thirteen of these officers were stationed in Barrow and one each at **Wainwright** and Anaktuvuk Pass and one rotating among other North Slope villages as needed. The Borough plans to hire four

more officers by July 1978 so that resident police protection can be provided to all communities in the region.

Barrow and Point Hope are the only communities in the borough with police stations or detention facilities. Barrow's jail, however, is actually only a holding facility since no one can be **held** there longer than 24 hours, and juveniles cannot be held there at all. Persons requiring longer detainment are transported to Fairbanks after processing by the local magistrate.

The Borough's 1974-1980 capital improvements program has scheduled construction of modest public safety buildings in each village plus a regional headquarters building in Barrow. The first of these facilities is scheduled to be built at **Wainwright** in **1978**.

According to the Borough's public safety **director**, crimes in this area are almost always related to alcohol abuse. Public safety department statistics indicate that at least 95 percent of **all** persons arrested are intoxicated to some extent and that a high proportion of deaths from snowmobile and auto accidents or fires are related to excessive alcohol consumption. Department statistics also indicated a strong relationship between unnatural deaths and legally available liquor in the **community** in 1977, noting that seven alcohol-related deaths occurred in Barrow during the first seven weeks after the city-owned liquor store reopened. All told, a **total** of 17 alcohol-related deaths of people between the ages of two months and 22 years was recorded in Barrow in 1977, whereas none

had occurred in 1976 when the town was officially dry. It **should** be emphasized, however, that not all of these deaths were crime related.

Aside from excessive alcohol consumption and events leading from it, the Borough public safety director noted that serious crime is not a major law enforcement problem in the Borough. Because alcohol abuse stands out as the leading cause of anti-social behavior in the region's traditional **communities**, however, dealing with this problem has been a major focus of the public safety department's attention. In 1977, the department instituted a policy in Barrow of detaining severely intoxicated persons from four to eight hours and then releasing them. According to the public safety department, this program has reduced arrests by 40 **to** 50 percent. This program **is** presently restricted to Barrow as other villages in the region except for Point Hope lack detention facilities.

Although it has assumed areawide police powers, the North Slope Borough in fact provides **little** protection outside the region's traditional communities. The State provides police protection services along the length of the **trans-Alaska** pipeline and has a state trooper stationed at Deadhorse for this purpose. The Borough public safety department has responded several times to emergency **calls** associated with ongoing **exploration** activities in NPR-A. However, no need for stationing borough police personnel in areas outside the traditional communities is presently foreseen.

HEALTH AND SOCIAL SERVICES

Health and social services in the North Slope Borough's traditional communities are provided by three agencies representing three levels of government. These are the U.S. Public Health Service, which operates a hospital in Barrow and provides itinerant medical and dental care to the smaller villages of the region; the Alaska Department of Health and Social Services, which runs the Barrow Health Center with public health nurses who are based in Barrow but who also travel to other communities in the region; and the North Slope Borough Health Department, which operates health clinics in villages outside Barrow and which is in the process of setting up its own health program to supplement those of the U.S. Public Health Service.

Health services in areas outside the region's traditional communities are generally lacking; however, BP (Sohio) and ARCO do maintain facilities in the Prudhoe Bay area.

Public Health Service

The Public Health Service operates a 14-bed general hospital in Barrow for all people (including whites) in traditional communities of the region except for residents of Anaktuvuk Pass (served by the Tanana Service Unit) and Point Hope (served by the Kotzebue Service Unit). The hospital is staffed by three doctors, a dentist, and a complement of nursing and other support personnel. In addition to these inpatient

services, a health clinic provides outpatient diagnosis and treatment. (Staffing of this facility is described in more detail in the section of this report dealing with health and social services facilities in Barrow.)

Besides resident medical personnel, specialists from the Alaska Native Medical Center in Anchorage or private physicians under contract are periodically brought to Barrow to hold special clinics. In FY 1976, for example, clinics were held in the fields of pediatrics, medicine, gynecology, orthopedics, surgery, ear-nose-throat, radiology, ophthalmology, and urology.

Public Health Service medical teams make several visits each year to villages within the Service Unit. These visits involve coordination with Borough health aides in the various communities. Public Health Service personnel also coordinate their activities with those of the state public health nurses.

During FY 1976, the Barrow hospital had an average daily patient load of 3.9 persons, down from an average of 8.5 patients per day recorded in FY 1968. All told, a total of 1,520 inpatient days was logged at the hospital during FY 1976, with the average length of stay per patient being 3.9 days. According to Public Health Service statistics, the leading causes of hospitalization in FY 1976 were influenza and pneumonia, accidents and injuries, deliveries, chronic otitis media, alcohol misuse, upper respiratory problems, infected skin and abrasions, functional psychoses, active pulmonary tuberculosis, and inflammatory diseases of

the central nervous system (see Table 22). Although not always a primary cause of hospitalization, the Public Health Service notes that a large number of patients have underlying social, mental, or alcohol problems that compound or complicate their cases. Because of this, a social worker makes weekday morning ward rounds.

According to the U.S. Public Health Service, the primary effort of the Barrow Service Unit hospital is to provide health care services to ambulatory patients. General clinic is held every weekday afternoon, while mornings are reserved for both inpatient care and specialty clinics for outpatients. The latter include physical examinations, prenatal and postnatal checkups, well-child care, and women's clinic. Emergency treatment is available at any time.

During FY 1976, the Barrow hospital received a total of 23,393 outpatient visits, a 14 percent increase over the number of visits in FY 1975 and an extraordinarily large number in relation to the region's population. More than half of the visits in FY 1976 (12,273) were first visits, with the remainder classified as continued treatment. Public Health Service statistics indicate that the leading causes of outpatient visits were upper respiratory problems; accidents and injuries; acute otitis media; alcoholism (both acute and chronic); influenza and pneumonia; strep throat; diseases of the teeth and gums; schizophrenia and other psychoses; eczema, urticaria and skin allergies; and laboratory tests (see Table 23).

TABLE 22
LEADING CAUSES OF HOSPITALIZATION a_
BARROW SERVICE UNIT
FY 1974 - FY 1976

Health Condition	Number of Inpatient Days		
	FY 1974	FY 1975	FY 1976
Influenza & Pneumonia	174	197	250
Accidents & Injuries	141	264	244
Deliveries	153	161	141
Chronic Otitis Media	1	60	86
Alcohol Misuse	49	86	67
Upper Respiratory Problems	51	42	57
Infected Skin & Abrasions	117	90	36
Functional Psychoses	--	16	32
Active Pulmonary Tuberculosis	--	--	30
Inflammatory Diseases of Central Nervous System	21	13	27
<u>Ten Leading Causes of Hospitalization</u>	697	929	970
<u>TOTAL INPATIENT DAYS</u>	<u>1,267</u>	<u>1,708</u>	<u>1,520</u>

a/ The Barrow Service Unit excludes the communities of Point Hope and Anaktuvuk Pass.

Source: U. S. Public Health Service.

TABLE 23
LEADING CAUSES OF OUTPATIENT VISITS a/
BARROW SERVICE UNIT
FY 1974 - FY 1976

<u>Health Condition</u>	<u>Number of Diagnoses</u>		
	FY 1974	FY 1975	FY 1976
Upper Respiratory Problems	2,403	2,302	2,850
Accidents & Injuries	1,903	2,576	2,215
Acute Otitis Media	721	879	956
Alcoholism, Acute/Chronic	413	451	597
Influenza & Pneumonia	155	460	449
Strep Throat	149	417	441
Diseases of Teeth & Gums	146	268	435
Schizophrenia & Other Psychoses	226	379	414
Eczema, Urticaria, Skin Allergies	287	322	388
Tests Only	384	391	374
<u>Ten Leading Causes of Visits</u>	<u>6,847</u>	<u>8,445</u>	<u>9,119</u>
<u>TOTAL DIAGNOSES</u>	<u>17,122</u>	<u>20,462</u>	<u>23,393</u>

a/ Outpatient visits at Barrow Service Unit hospital only.

Source: U.S. Public Health Service.

Dental care is an important part of the outpatient care provided by the Public Health Service in Barrow. While the emphasis of this program is directed toward children between the ages of five and 15, services are also theoretically available to adults. However, an enormous disparity exists between services rendered and those needed to provide optimal dental care. According to the Public Health Service, of a total of 789,660 service minutes required for optimal care in FY 1976, only 32,174 were provided that year by Indian Health Service dentists (or 4.1 percent of the total required). As a result, services are generally provided to patients with the most urgent needs, and much of the population receives no dental care at all.

The population of the Barrow Service Unit has one of the highest rates of decayed, missing and filled teeth in Alaska. Many teeth are removed with no chance of prosthetic replacement and for the three to five year old who is already suffering from rampant decay, lack of space maintenance from symptomatic extractions will lead only to future orthodontic extractions.

The scope of dental services provided in outlying villages is even more restrictive, being almost solely comprised of emergency treatments in various types. No periodontal, prosthetic, space maintenance, or orthodontic services are provided in field locations.

(U.S. Public Health Service, May 1977)

Because of the inadequate level of dental service (even with supplemental

contract care provided in Wainwright and Kaktovik by private dentists), the North Slope Borough had planned to take over the dental program and hire two dentists for its new health facility. While it may still do so in the future, the Borough in the meantime is hiring a second dentist for the PHS hospital. His/her salary will be paid by the National Health Service Corps, and the Borough will reimburse travel costs for the dentist and an assistant for periodic visits to the villages of the region.

In the FY 1978 review of health and health-related problems, the Public Health Service noted that top priority should be given to the development of an adequate water source, water and sewer distribution systems, and an improved system for solid waste disposal in Barrow. In the Public Health Service's opinion, these improvements would probably result in a dramatic decline in the incidence of skin infections, neonatal diarrhea, gastroenteritis, and most common communicable diseases and possibly, also, to a decline in mental illness and alcoholism.

Venereal disease is another recognized health problem in the North Slope region. Alaska has the highest rate of venereal disease in the United States, and the rate in the Barrow Service Unit, according to Public Health Service officials, is among the highest if ~~not~~ the highest in the state. The national incidence of gonorrhea in 1974 was estimated at 100 cases per 100,000 people; in Barrow during the same year gonorrhea incidence was estimated at between 865 and 1,190 cases per 100,000 people. It is the opinion of health officials that the incidence of gonorrhea in the North Slope is still increasing, although they have no substantiating data.

Alaska Department of Health and Social Services

The Alaska Department of Health and Social Services operates the Barrow Health Center with a normal staff of two state public health nurses and a borough **community** health aide. The Health Center is located in the old area of the Barrow hospital, and the nursing staff make frequent visits to the region's villages as well as serving the public health needs of Barrow.

The Health Center staff is responsible for monitoring a range of public health problems. The major focus of their activities in the North Slope region is described in the section of this report dealing with health and social services facilities in Barrow.

North Slope Borough

The North Slope Borough operates a system of health clinics staffed by health aides in all villages within the region. Each village has a clinic staffed by one primary aide and an alternate (except for Point Hope and **Wainwright** which have two primary aides and an alternate). However, none of the clinics are adequate. The clinics in Kaktovik, **Nuiqsut**, Point Hope and **Wainwright** are in structures originally designed for other uses, those in Anaktuvuk Pass and Atkasook are located in **school** buildings and the clinic in Point Lay is in the health aide's home. Because of the inadequacy of existing facilities, the Borough **plans** to replace all clinics in the region in the near future except for Point Hope where the city government has obtained an Economic

Development Administration (EDA) grant of \$250,000 to build its own facility. All of these clinics will be leased by the U.S. Public Health Service under its Village Built Clinic program.

Aside from its system of clinics, the North Slope Borough is **also involved** in supplementing the health care services provided by the U.S. Public Health Service. The old post office building in Barrow has been acquired by the Borough and will be remodeled to house health administration and **social** services offices plus space for a senior citizens' center. The types of services which it hopes to provide at this location are described in the section of this report dealing with health and social services facilities in Barrow. Services to be provided immediately and those which will be provided in the longer term are subject to some change. For example, the Borough had hoped to take over the Public Health Service dental program in the very near future. In the short term, however, it will instead be contributing to the addition of a second dentist at the Public Health Service hospital.

Aside from improved dental care, areas identified by the Borough as in need of substantial upgrading include mental health, alcoholic detoxification and rehabilitation, and optometric care. The Borough was interviewing applicants for psychologist and paraprofessional assistant positions in January 1978; an alcoholic detoxification and rehabilitation program is being established at the hospital; and by April 1978, the Borough hopes **to** hire someone with optometric training to operate an eye aid clinic at the new borough health facility.

Other

Outside of the traditional **communities**, health facilities and services in the North **Clope** region are very limited. According to the Air Force, Cape **Lisburne** probably has a local medic but any cases requiring more than first aid care are evacuated out of the region. The DEW Line stations also have no more than first aid capabilities.

Both BP (**Sohio**) and Atlantic Richfield Company maintain health-related facilities in the Prudhoe Bay area to handle the needs of their employees. Services are not provided to the region's traditional communities unless these people are employed at **Prudhoe** Bay. Atlantic Richfield has a well equipped clinic located at its main base camp. This facility is staffed full **time** by a physician and two physicians' assistants, all of whom are furnished under contract by a clinic in Fairbanks. BP (**Sohio**) has two medical facilities, one at its base camp and one at its construction camp #2, which are staffed by a licensed physician's assistant or nurse practitioner. A direct telephone line connects these facilities to a doctor in Anchorage. Patients requiring more than primary care are evacuated out of the region.

EDUCATION

The North Slope Borough automatically inherited the mandatory areawide borough power of education upon its incorporation in 1972. At that time, both the U.S. Bureau of Indian Affairs and the State operated schools

within the region. The **Wainwright**, Kaktovik, and Barrow schools were run by the Bureau of Indian Affairs and those in Point Hope and Anaktuvuk Pass were part of the State system. The borough school district took over the Point Hope and Anaktuvuk Pass schools from the State in 1974, **while** the Bureau of Indian Affairs turned over the Barrow, **Wainwright**, and Kaktovik schools in 1975. New schools were built by the Borough in the resettled villages of Point Lay in 1975 and in Atkasook in 1977. The original **Nuiqsut** school was transported to the community by the Arctic Slope Regional Corporation in 1974.

At the time the borough school district took over responsibility for education on the North Slope, there was no high school program offered in any school in the region except for ninth grade classes in Barrow. Students wishing to continue their education into high school were therefore forced to leave the region to attend Bureau of Indian Affairs schools at Mt. Edgecumbe (**Sitka**), Chemawa (Oregon), or elsewhere, or they could attend high schools in communities such as Anchorage and Fairbanks and board with families in those towns. **While** well-intentioned, this forced **outmigration** from the North Slope abruptly thrust students into a foreign environment dominated by Western culture and mores and, at the same time, cut them off from their parents at a critical period of their development. The dropout rate is believed to have been very high. Those who did "survive" the experience often found it difficult to return to their villages.

The lack of high school facilities in the North Slope region undoubtedly

contributed to the extremely low educational attainment levels of residents of the Barrow Census Division at the time of the **1970** census. Only slightly more **than** a quarter (27.6 percent) of the census division's population aged 25 or older had more than an elementary school education in 1970, and the median number of school years completed was only 7.3 for males and 6.3 for females. This compares very unfavorably with the average for the state as a whole, where more than 80 percent of the population aged 25 or older had completed elementary school, and the median number of school years completed was 12.4 at that time.

The North Slope Borough School District initiated a **boroughwide** high school program **in 1975**. Some students already enrolled in other high school programs elected **to** complete their schooling outside the region. However, high school enrollment in the borough has increased significantly. In the 1975-76 school years, the first year of the high school program, there were 171 secondary students enrolled in borough schools. During the 1976-77 school year there was a final enrollment of 201 high school students, an increase of 17.5 percent. Some further increases in secondary student enrollment are expected as the school district enlarges its school program and makes scheduled improvements to its education facilities.

The physical facilities which the **school** district inherited from the State and the Bureau of Indian Affairs were, for the most part, in poor physical condition. Furthermore, since these facilities had been designed to **accommodate** only elementary students, they were inadequate in

both design and space to also accommodate the needs of a high school program. Facilities such as vocational technology classrooms or equipment and gymnasiums, for example, were not provided.

The **provision** of adequate educational facilities throughout the region is seen as a very high priority item in the North Slope Borough's ongoing capital improvements program. As originally conceived, educational facilities were to be an integral part of a **community** educational and service center, a complex that would house educational and community needs such as water, sewer, and electrical services. This concept has been revised as a result of the capital improvements program shutdown in 1976 and to comply with schedules imposed by the availability of state and federal funding. As revised, the initial phase of the education facility construction program consists of providing basic space to supplement existing requirements. Then, as additional requirements are assessed and identified, the facilities will be expanded and integrated into the **community** center complex. (Specific projects in Barrow, Kakto-**vik**, **Nuiqsut**, and **Wainwright** are discussed in greater detail in later sections of this report.)

Aside from elementary and high school programs offered in the region's traditional **communities**, Barrow also has an institution for higher education. Inupiat University is largely supported by Borough funds but had **only** 6 employees as of December **1977**. However, this institution is again expanding its curriculum which is designed to serve the specialized educational needs of the region's Inupiat Eskimo population.

There are no educational facilities located outside the traditional communities of the North Slope Borough for the very simple reason that none of the nontraditional settlements has any children. Persons stationed at military, pipeline and **oil-** and gas-related facilities are all there specifically to perform a given job. Thus, any families which these people might have are located outside the region or, in the case of North Slope permanent residents, in one of the borough's traditional **communities.**

UTILITIES

Basic utilities service in the Arctic is extremely limited. With the exception of base camps at Prudhoe Bay, specialized military installations, and a few public facilities in larger communities, piped water supply and water borne sewage disposal systems are not presently in use. Electrical generation and distribution systems are found in most communities but are often unreliable. Gas distribution systems, where they exist, are poorly designed and maintained. Most **fuel** for heating is costly, and fuel storage facilities are typically inadequate. Solid waste and sewage containers are disposed of at community dumps too infrequently, creating unsanitary conditions detrimental to community health.

Despite the inadequacy of existing systems, basic utility services are critically important to human comfort and safety in the Arctic. The North Slope Borough has given highest priority to their development (1977 Capital Improvements Program Revisions). Electrical generation and distribution are scheduled to proceed first, followed by safe water and sewage systems.

The following **summary** of utilities in the Arctic Region is primarily based on surveys undertaken for the North Slope Borough by **Dupere & Associates** (Reconnaissance Study: An Inventory of the Borough and Its Communities, October, 1973 and Manpower Development and Community Survey Reports, July 1974). Although nearly four years have passed since completion of the first study, much of the information remains valid.

While housing, commercial development, and **community** facilities have continued to be built in North Slope communities, utility systems have typically not been expanded to serve them. In the past, the Public Health Service Aid Program for sanitary facilities (Sanitary Facilities for American Indians Program, P.L. 86-121) was tied to new housing construction in Alaska communities. However, in order to expedite the recent construction of needed housing, PHS requested that funds for new housing be separated from funds for development of sanitary facilities.

Water, Sewer, and Solid Waste Disposal

More than 90 percent of the households surveyed in the region in the 1970 Census lacked some or all basic plumbing facilities. The majority of the region's residents obtain water by hauling water or ice from nearby lakes. **Dupere & Associates** (1974) found that only 10 percent of the housing units surveyed in Barrow and Kaktovik had piped water systems. Moreover, where piped water systems exist, water still has to be hauled to the dwelling's storage tanks. Seventy percent of the new housing units surveyed lacked a bathtub or shower, and even fewer units had installed sinks.

The same study indicated that the only **flush** toilets in the region are self-contained and like honey buckets, require periodic emptying. Human waste is collected in plastic bags or 50-gallon barrels and hauled to **community** dumps. Dump sites in some communities are left uncovered, **while** Barrow and **Prudhoe Bay/Deadhorse** wastes are incinerated.

Since so many residents provide for their own water needs, consumption cannot be monitored, and consumption estimates vary dramatically. The Public Health Service estimates a present per capita consumption at Barrow of as high as 35 **gallons** per day, while Johnson and Dryer (in press) assessed it to be about 10. Figures for other communities are even lower. In contrast, per capita water use at **DEW** Line stations averages 47 gallons per day and at the Naval Arctic Research Laboratory (NARL) in Barrow, 125 gallons per day (ITT Arctic Services, Inc.). Thus, the amount of water currently consumed provides **little** reliable data for design of newer systems.

Electric Power and Heat

Power generation and distribution systems in the region range from those which are Borough-owned and privately operated, such as at Barrow, to communities with **small** generators serving very few homes, such as Anaktuvuk Pass. Eighty-five percent of the housing units surveyed by **Dupere** and Associates in 1974 had electricity. Larger facilities include the gas turbine-powered generators recently installed at Barrow with a 2,710-kilowatt capacity and 1,600-kilowatt generators for backup; the

NARL facility at Barrow with a 3,000-kilowatt system of four 750-kilowatt gas turbine generators; and the central power station was built for British Petroleum in Prudhoe Bay, which has a capacity of 134,000 kilowatts. A major gas turbine generator plant is now under construction in California for shipment to Prudhoe Bay.

Most communities use oil as heating fuel. Barrow uses natural gas. A reliable, inexpensive source of heating fuel and permanent storage facilities are high priorities for communities in the Beaufort Sea Region. The North Slope Borough recently negotiated a lower consumer rate for gas from the South Barrow Field to serve Barrow. The rate was lowered from 50¢ per thousand cubic feet (MCF) to 32.4¢ MCF.

The Borough is also attempting to convince national energy policy planners to adopt an Arctic Community Energy Policy so that other arctic communities can utilize low-cost gas from nearby fields. These efforts are based on a provision of the Naval Petroleum Reserve Act of 1976 that prohibits the Secretary of the Navy from including amortization of federal investment in the rate base for Barrow.

Utilities Service Plans

The North Slope Borough has been instrumental in developing plans to improve utilities systems in the region. The proposed improvements are based on borough inventory conducted by Dupere & Associates in 1974 that

projected capital improvement requirements from FY 1974 to FY 1980. The Borough updates this program each year, incorporating the projects identified in the inventory together with any newly identified projects.

The Borough's annual capital improvement program (**CIP**) contains demand estimates, a brief description of each project, the costs identified by the **Dupere** & Associates study, possible funding sources, and any potential funding difficulties. Cost estimates do not reflect inflation since 1974. The **Dupere** & Associates study as well as the annual revisions presents broad objectives rather than a definitive action plan. Although a priority ranking from 1 to 3 is assigned for each project, there is no assurance that any specific project will be undertaken in a given year. Demand estimates are based on the projections of individual agencies, such as the **Public** Health Service, which provide services to borough residents. The assumptions underlying these estimates often are not stated.

Providing "life-health-safety" facilities, containing a reliable water supply, power source, and health care unit for each community is a priority of the North Slope Borough Planning Department. Similar facilities, or variations containing public showers, laundry, and sewage and **solid** waste treatment, will probably be built in all North Slope communities in the future.

Wainwright has such a facility, which contains water and water treatment, storage, sewage treatment and solid waste disposal (incinerator), and

laundry. Other systems (e.g., Kaktovik) are in the design phase. In order to utilize waste heat from electrical generators for **water** and sewage treatment, space will be provided for the generation equipment.

The draft CIP includes plans for concurrent development of water and sewage systems in each community. Costs **will** be jointly shared by the U.S. Public Health Service (which **will** fund service **to** the community **at** large), and the Borough (which **will** fund service to **public** facilities within the **community**). The first phase will include a developed water source with a central watering point and safe water treatment; a central laundry/showers/toilet facility; and a sewage disposal system. The sewage disposal system will typically consist of an outfall into a sewage **lagoon** or vehicular collection and disposal. Phase two will consist of distribution service **to** public facilities and individual homes as **re-**quired by residents. The Borough has allotted 1977-78 funds for development of a Utility Management System to establish maintenance and operational procedures with the PHS.

The schedule for village water improvements in the Beaufort Sea Region are as follows:

- Barrow - PHS study of three-block-long **utilidor** due **fall** 1977
(future linkages due 1980)
- **Nuiqsut** and Point Hope - 1979 (presently in design phases)
- Atkasook - 1980
- Point Lay - **1981**
- **Wainwright** - Not needed (EPA Central Utility Facility complete)

- **Anaktuvuk** Pass - No participation by PHS. Borough responsible for completion of initial phase "as soon as possible."
- **Deadhorse**, due for completion summer 1978 - Borough-funded project underway.

The **Prudhoe** Bay project is unique among **community** projects funded by the Borough. The Borough is in the process of developing a central utilities facility at **Prudhoe** Bay containing water supply, sewage, and solid waste disposal facilities. A solid waste incinerator is presently complete but not in operation. When the entire complex is constructed, it will provide contract services to oil companies in Service Area 10 of **Prudhoe** Bay. NANA Environmental Systems has been contracted to design, construct and operate the complex.

Plans for water supply include a three-year **program** for dredging of a gravel site near the Sagavani rktok River to create a reservoir for water supply. The 600,000-cubic yards of gravel will be used for development in the area, including potential improvements requiring 300,000 cubic yards of gravel at the state airport at Deadhorse, approximately one to two **miles** south of the supply site. Permit applications were filed with the U.S. Army Corps of Engineers in January 1977.

The project is delayed by oil company litigation against the Borough. The companies have contested the Borough's rights to **levy** special assessments in Service Area 10 to cover its general **obligation** bonds totaling **\$2.5 million** in construction costs for the complex. The State funded the balance of the approximately \$14.5 million facility.

COMMUNICATIONS

Communications facilities are operated by state and federal government agencies for civil aviation and national defense installations and by private companies such as RCA and Wien Air Alaska. Until recently, radio and radio-telephone were the primary communications systems serving individual communities such as Kaktovik, as well as construction camps at Prudhoe Bay and Deadhorse. However, the construction of telecommunications satellite earth stations at Barrow and Wainwright and the planned construction of others at North Slope communities will bring long-distance telephone service to some otherwise isolated locations. Citizens' band (CB) radios are commonly used for intravillage communications.

Telecommunications Satellite System

Within a few years of assuming responsibility for the Alaska Communication System from the Air Force in 1971, RCA Alascom has introduced satellite technology throughout the state. As part of its agreement with the State to construct 100 satellite earth stations throughout Alaska, RCA inaugurated satellite telephone service in the Arctic early in 1977. Satellite earth stations were put into service at Anaktuvuk Pass and at Barrow.

The capabilities of the 10 meter (33-foot) diameter earth station at Barrow suggest the range of telecommunications services that can be brought to other isolated areas of Alaska. Prior to the installation of

the earth station, Barrow had seven long-distance circuits. It now has 20 long-distance channels for public use, and more can be added to meet future needs. In addition to public uses, the earth station also carries private line circuits for the Public Broadcasting System, the Alaska Native Health Service, and teletype and telex customers.

The following is a list of selected communities where RCA Alascom plans telephone system improvements:

	Present Toll Circuits	1981 Planned Toll Circuits
Barrow	20	32
Wainwright	1	1
Nuiqsut	2	2
Kaktovik	0	0

Source: Paul F. Reitmeyer, Manager, Industrial Marketing, RCA Alascom.

DEW Line Stations

Alaska's military Distant Early Warning System (DEW Line) was established by the Air Force in the 1950's to provide intermediate radar detection of foreign aircraft. Seventeen stations were built along the Arctic coast from Cape Lisburne to the Canadian border at approximately 50-mile intervals. More sophisticated detection systems have eliminated the need for most of these stations. Only the stations at Cape Lisburne, Point Lay, Wainwright, Barrow, Pitt Point, Oliktok, and Barter Island (Kaktovik)

are still open. The others have either been abandoned or converted to **other** uses, such as logistical bases for petroleum exploration in NPR-A, or wildlife research.

The most potentially useful facilities at these deactivated DEW Line stations are airstrips and fuel storage facilities. The original gravel runways were between 458 meter and 1067 ~~meter~~ **(1,500** and 3,500 feet) long. Some have been widened, lengthened, and outfitted with navigational aids and lighting. The facilities also included three small buildings housing radar equipment, vehicles, and staff quarters.

Operational **DEW** Line facilities are **still** for the exclusive use of the Air Force, and permission to land must be granted in advance by the DEW system office in Colorado Springs, Colorado. Villages normally use the airports for special cargo deliveries or emergencies; however, the Borough has established a joint use agreement with the Air Force which allows commercial use of the Barter Island airstrip for Kaktovik residents.

Communications for Oil and Gas Exploration

The deactivated DEW Line station at Lonely, on the east side of Smith Bay, has become a base camp for continuing exploration of **NPR-A**. Plans for modern communications include the RCA transportable earth station at the **POW-1** site about 0.8 kilometers (one-half mile) to the east. Communication links are also planned between the earth station and seven small telephone repeater station points in **NPR-A** (U.S. Department of the

Navy, 1977). Included in **the** closed loop system is a repeater station at the deactivated Cape Simpson **DEW** Line site. As backup to the system there is a long-haul VHF/UHF radio hookup to the Deadhorse and Barrow stations that is tied into their respective telephone systems.

TRANSPORTATION

Transportation in the Arctic is characterized by great distances and significant seasonal and weather limitations. Long-distance transport of passengers and freight **to** and within the Arctic is **mostly by** plane or boat. With the exception of rudimentary road systems in each community, there is only one interregional road in the Arctic, the **trans-Alaska** oil pipeline **haul** road. **All** passenger traffic into and out of the region is by air. Both scheduled commercial flights and nonscheduled charter aircraft serve communities in the region. Additionally, all cargo transportation requirements in winter are met by aircraft.

Marine transportation has significant seasonal limitations but is the cheapest mode for moving freights. Goods can only be brought in during the few months a year when leads open in the shorefast ice. For every ton of freight shipped into the state by air, six enters by water (Parker **et al.** 1972). Most heavy cargo and **fuel** is transported to **arc-**tic communities by ship and barge.

Significant difficulties with the construction of roads and railroads on the North Slope has forced the reliance on air and marine transportation.

Although the terrain is flat and presents no topographic limitations to vehicular movements, the wet surface conditions in summer and the extremely low temperatures in winter make overland transportation problematic. The **trans-Alaska** pipeline haul road follows an alignment along a river and avoids most of the wet tundra coastal plain. Although the haul road eventually may be open for public use, the **Prudhoe** Bay terminus is still at least 112 kilometers (70 miles) from the nearest community, **Nuiqsut**.

The development of roads has been further limited by the **lack** of road construction materials. At least 1.0 to 1.5 meters (three to five feet) of gravel must be placed over the surface of the tundra in order to prevent disturbance of permafrost. Removal or damage of the tundra mat causes the permafrost to **melt**, and resulting erosion damages the tundra and often buckles the road with frost heaves, making it impassable. Figure 8 indicates the current **intra-** and interregional scheduled air and marine transportation routes and the alignment of the **trans-Alaska** pipeline haul road.

Limitations of the Study

Baseline assessment of transportation facilities on the North Slope is difficult. Information is often unreliable and out of date, and on-site checks are costly. State regulatory agencies and the Borough differ on what facilities exist at airports and DEW Line stations and on the costs of moving people and goods. Apparently, there is no systematic procedure

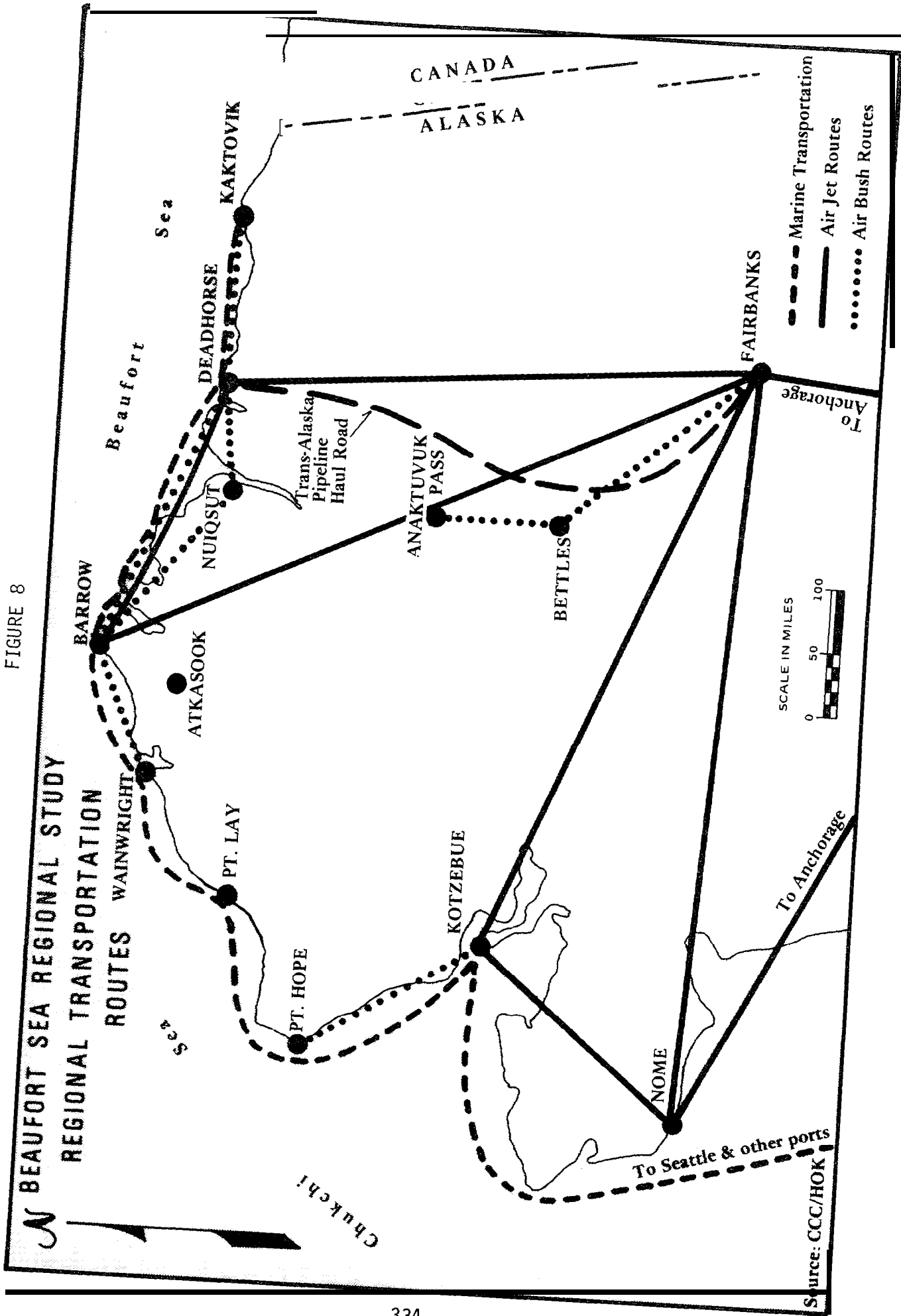


FIGURE 8

for compiling and reporting Arctic transportation data. Attempts were made to corroborate data by cross comparison of source material and discussions with agency representatives, but even the owners and operators of some airports are unaware of the size and length of their airstrips and related support facilities. Information in this inventory may be assumed to be reasonably accurate for larger, more accessible communities, such as Barrow, and less reliable for isolated or abandoned settlements, such as DEW Line stations.

The following sections summarize the existing air and marine transportation in the region. Principal routes and facilities are discussed together with problems or other issues associated with improvement of transportation services to North Slope communities. Also included is a discussion of highway transportation issues associated with public use of the trans-Alaska pipeline haul road.

Air Transportation

Because the North Slope has no public highway system and its marine transportation is limited to the short ice-free summer season, the region depends on air transportation. Regularly scheduled air service via Wien Air Alaska serves Barrow, Deadhorse, Kaktovik, and Anaktuvuk Pass from Fairbanks, and Point Hope from Kotzebue. Air taxi operators provide intraregional service between communities. The Air Force provides contract charter flights to three DEW Line sites as well as Kaktovik (Barter Island DEW Line), Barrow (NARL), Wainwright, and Point Lay, with public use on a space available basis.

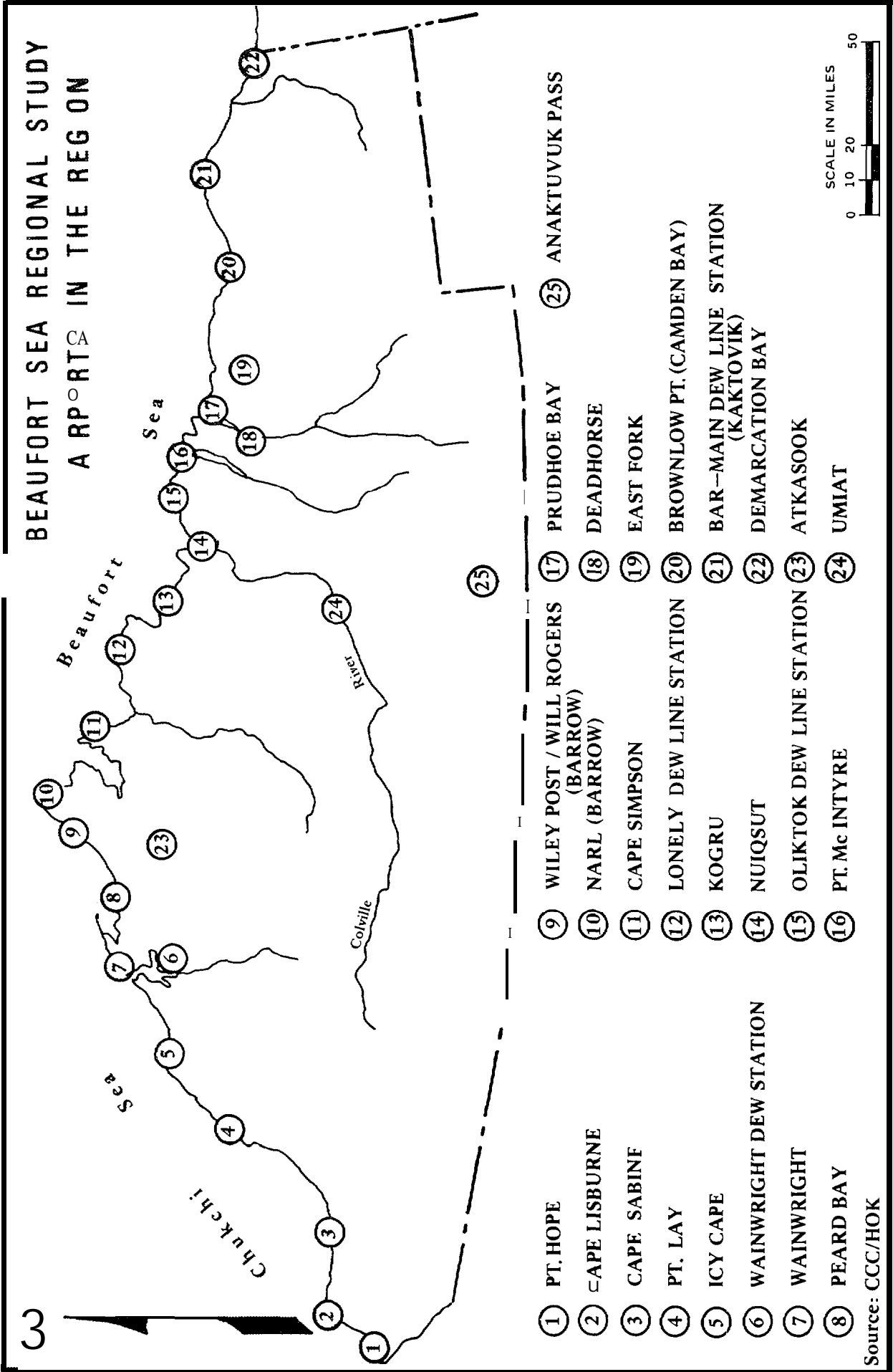
An inventory of airport facilities was prepared for the North Slope Borough in 1975 (Airport Facilities Study, H.V. Lounsbury & Associates). Facilities were grouped into two categories--those operated and maintained by the federal government and restricted to military use and state and private airports serving the public. A number of active and inactive public and private airstrips were not included in the inventory.

The airports operated by the U.S. Air Force and Navy are generally well-maintained and better able to handle large aircraft under adverse weather conditions than are public use airports at most villages. Airport facilities located at active and deactivated DEW Line stations along the Arctic coast were constructed in the 1950's. Of the 17 original sites seven are in active military use, four are being used for research, two are logistical bases for exploration of petroleum reserves, and the remainder are abandoned (see Figure 9).

Since North Slope communities are so dependent on air service for transportation of people and goods movement, reliable low-cost service is essential. Air transportation issues basically focus on the cost, coverage, and frequency of air service as well as industry's need for improved airport facilities in the region.

Oil and gas exploration and development require large planes and frequent air service. Air transportation facilities typically require upgrading to handle heavier aircraft and increased air traffic demands of petroleum development.

FIGURE 9



The current oil and gas exploration program in NPR-A is an example of the immense air transportation service requirements of a drilling program.

In the 1976-77 winter season, the alternatives to deliver fuel and cargo by marine barge or Hercules aircraft to supply bases were evaluated.

If the transport of fuel had been accomplished by aircraft alone, it would have required approximately 100 flights just for the fuel 1,892,500 to 2,271,000 liters (500,000 to 600,000 gallons) to drill one medium-depth well 3,000 to 3,600 meters (10,000 to 12,000 feet).

Although airlifting of fuel to bases is more costly than barge transport, aircraft are occasionally used to provide direct service from Fairbanks to the well sites. Both the State Division of Aviation and the North Slope Borough may have a role in responding to industry requirements for improved air transportation in the region. So far, the Division of Aviation has taken a reactive stance to private sector decisions rather than attempting to anticipate them. The Division of Aviation's primary role in responding to OCS activities would probably be to lease undeveloped state land surrounding an airport to private industry. Industry could then expand existing apron and service areas, construct enclosed hangars, and bring in needed utilities. The Division would encourage the use of private land for any new warehousing facilities. The Division of Aviation would continue to maintain existing facilities at current levels. In some instances (e.g. Deadhorse and Yakataga), industry has constructed new airstrips and upgraded navigational equipment.

The Borough has no official obligation to meet **industry** transportation needs. In **1975** the Borough funded two studies to inventory airport and other facilities **at** abandoned DEW Line stations and to identify procedures **by** which the Borough could acquire the sites from the General Services Administration (Hewitt V. Lounsbury & Associates 1975a, **1975b**). This may mean that if OCS oil and gas development base camps were required at locations along the Arctic coast, the Borough might be willing to obtain certain abandoned **DEW** stations for lease to oil companies. The City of Barrow has already set aside land south of the State-owned airport for industrial development.

Marine Transportation

Arctic communities have always been oriented toward the sea. **Tareumiut** Eskimos depended almost entirely on the sea for subsistence, primarily from marine mammals. The rise of commercial whaling in the region in the mid-nineteenth century also brought western trade goods which encouraged migration from inland **Nunamiut** settlements to communities such as Barrow. Trading for commercial goods gradually began to replace the ancient trading patterns between coastal and inland Eskimos (U. S. Department of the Navy 1977).

Since the heyday of commercial whaling, Barrow has continued to be the major Arctic port. World War II liberty ships were commonly used for several decades after the war, but now, with the sole exception of the liberty ship North Star III, (operated by the Bureau of Indian Affairs

to serve northwest and Arctic Alaska), oceangoing barges deliver most freight.

Cargo from oceangoing ships and barges is offloaded at sea onto shallow- and medium-draft vessels and lightered to shore. Seattle and several California ports are the main embarkation points. Barges transport most heavy and bulky cargo associated with petroleum-related activities in the region including fuel and fuel tanks, construction equipment, drilling mud, pipe, casing, prefabricated housing, and modular development camps. Smaller craft are occasionally used to shuttle cargo to areas with no port facilities.

Barges have served oil exploration needs in NPR-A for the last 20 years (U.S. Department of the Navy 1975). The NARL base at Barrow provides fuel storage for the reserve 9,027,225 liters (2,385,000-gallon) capacity. JP-5 airplane fuel and gasoline are transferred from offshore fuel barges in flexible, 6-inch lines..

In 1968, 5,714 short tons (s.t.) of cargo were shipped to the North Slope most of it to Barrow (Parker 1972). With the beginning of oil development at Prudhoe Bay, that figure rose dramatically to 91,089 s.t. in 1969 and 175,000 s.t. in 1970. Only a small portion of this freight normally comes from intrastate ports; apparently in 1969 only 4,000 tons were transhipped to Prudhoe Bay from Anchorage (Parker 1972).

The physiography of Prudhoe Bay requires lightening of freight with

smaller barges for 9.6 kilometers (6 miles) to reach the port. **facilities.** A gravel causeway and four barges serve as the unloading dock. Adjacent to the dock is a 10 hectare (25-acre) gravel pad storage area. Three heavy cranes are stationed at the dock for unloading cargo. A road **con-**nects the port to the principal camp **facilities** and airport (about 6.4 kilometers (4 miles) south) and to the **Dead**horse airport (about 14.4 kilometers (9 miles) south). A second dock 1524 meters long and 15 meters wide (5,000 feet long and 50 feet wide) was **built** at Prudhoe Bay during the winter of 1975-76.

In addition to cargo ship service to coastal communities, the government contracts for barges to serve the DEW Line stations, the NARL Facility at Barrow, NPR-A **oil** exploration, and Prudhoe Bay oil development requirements. Most ports of embarkation are in Washington State or California, with Seattle being the primary port for Alaska.

Water transport is the most economical but it has several drawbacks. Air transport has the advantage of speed and the ability to serve immediate needs. Additionally, the large quantities of material shipped by barge require costly storage. Barges are more prone to accidents, and insurance rates for barges in Alaska are among the highest in the **world.**

Even with these limitations, however, barge transport is essential to oil development operations in the Arctic. During the initial North Slope exploration boom in 1968-69, air transport was favored over water because of weather constraints and speed, but companies shifted to water-

borne modes in the **summer** of 1969. The '90,000 tons of freight shipped during that summer, including buildings, drilling cement and mud, **and** fuel oil, were stockpiled at **Prudhoe** Bay. The following winter air freight requirements dropped drastically.

A combination of modes, by water to Anchorage, or by water and truck to Fairbanks, and then transfer to air freight or airmail for delivery in the Beaufort Region, may be competitive with barge rates for lighter and less bulky materials when the high cost of lightening (estimated at 26 percent of ocean freight rates), storage and inventory expenses at **destinations**, and the time factor are considered.

NPR-A Oil Exploration.

Plans are that continuing oil exploration in **NPR-A** will use ports at Barrow and the DEW Line stations at Lonely and **Wainwright**. The NARL base at Barrow was the primary base for the 1944-53 exploration program, and it will be used to **supply** exploration of the northwestern portion of **NPR-A** during the current program. The Lonely station, approximately 128 kilometers (80 **miles**) southeast of Barrow, is an important offloading site for airplane fuel and gasoline serving exploratory activities in the eastern portion of **NPR-A**. The LIZ-3 DEW Line site on **Wainwright** Inlet could also be used since it is **ice** free for a **longer** period each **summer** than either Barrow or Lonely. Supplies shipped to any of these locations will be transported overland by all-terrain vehicles in winter, a maximum of approximately 80 kilometers (50 miles), or airlifted to ice airstrips at **inland** camps.

Port Development.

For many years there has been interest in developing deepwater ports at communities along the Arctic coast. Recent exploration and development of oil and gas reserves on the North Slope has increased that interest. However, there are a number of problems inherent in port development in this region, including:

- Short ice-free summer season and resulting inactive period during the iced-in winter season;
- Shallow coastal waters, requiring **lightering** of cargo from deeper waters to shore;
- Absence of port facilities;
- Lack of good offloading areas and safe anchorages; and
- Potential adverse environmental impacts of port and causeway construction on fish and marine mammals.

A **deepwater** harbor at Barrow or other locations along the coast does not seem feasible because all protected anchorages have poorly defined entrances and are so shallow that extensive, continuous dredging would be required. Parker (1972) stated that even with dredging and creation of a causeway-breakwater lightening of cargo via medium-draft (6 meter (20 foot) boats might still be necessary.

Land Transportation

The only **interregional** highway in the Arctic is the trans-Alaska pipeline haul road, originally built by the pipeline owners parallel to the oil pipeline for its construction and maintenance. The road is narrow, winding, and unpaved with **many** steep grades and dangerous curves. At one time during pipeline construction, truckers dubbed the road the "Kamikaze Strip".

The agreement under which the haul road was built required the State of Alaska to obtain the necessary construction permits from the federal government and **Alyeska** Pipeline Service Company to build the road to secondary highway standards. Upon completion of the pipeline, the road was to be turned over to the State.

Many people assumed that when the State secured more than \$27 million in federal funds for project construction and the route was placed on the Federal Aid Highway System that the haul road would be opened as soon as possible to the public. However, the current state administration has questioned the **wisdom of** immediate unrestricted public use of the road as **well** as long-term **public** subsidy of a facility used for the benefit of private operators (Alaska Consultants, Inc. **1976**). Consequently, the governor's office has completed a study to determine appropriate use of the haul road.

In a statewide radio address on January 18, 1978, Governor Jay **Hammond**

reported his findings and recommendations on the use of the haul road.

Findings included:

First: The road opens up vast new areas of the state to vehicular traffic. Second: **It** invades lands which **all** agree are extremely susceptible to long-term **environmental** damage. For example, one "highway" built across the arctic some few years ago left permanent **scars** that **will** last for decades. Third: The people of the North Slope Borough, who will be impacted most by the road and through whose lands it runs, have made clear their desire for limited industrial use. Fourth: The start-up costs of road maintenance are enormous. It's estimated \$13 million **will** be required just to build or buy facilities, purchase equipment and begin maintenance. Fifth: Subsequent annual maintenance costs also are enormous. About \$6 million will be needed for the nine month period after the state takes over the road for a summer-use-only program. By 1980 it would cost about \$10.5 million for year-round maintenance. These figures are put into perspective when one realizes that the total highway budget for all roads in Alaska annually is \$40 million, yet the **total** general fund revenue from the highway fuel tax is only about \$20 million annually. The rest, of course, comes from "**one-time-only**" oil dollars. (Hammond 1978)

The program proposed by the Governor contained the following elements:

- Upgrading of the road itself and associated recreational facilities from Fairbanks to the north shore of the Yukon River;

- Establishment of the haul road north of the Yukon River as an industrial road during and in support of the construction of a gas pipeline; in addition, it **would** support **Prudhoe** Bay needs, oil pipeline maintenance and operational needs, North Slope mineral explorations, and necessary governmental **activities**;
- e Provision of limited public access to the North Slope through means of a privately-owned, subsidized, and operated mass transportation system, such as tour bus concessions;
- A summer use only restriction, to minimize maintenance costs;
- Reconsideration of greater public use, following the decline of heavy industrial use.

IV. CITY OF BARROW

Population

PAST TRENDS

Patterns of settlement along the Arctic coast were historically based on subsistence harvesting of sea mammals. Small bands of coastal Eskimos hunted, fished, and traded with nomadic inland Eskimos who hunted the caribou. The traditional village of **Utkiagvik**, at the site of present-day Barrow, resulted from a consolidation of several settlements scattered along the coast and served as a central point for these activities.

The arrival of **commercial** whalers in the 1850's started an irreversible change in traditional Eskimo patterns. The coastal Eskimos clustered at Point Barrow and gradually began trading with **the** whalers rather than with the inland Eskimos. The **latter** group was then forced to move to **the** coast to obtain necessary supplies. Throughout the **commercial** whaling period, the village at Point Barrow furnished many men for whaling expeditions in exchange for trade goods.

Following the decline of whaling in 1915, Point Barrow Eskimos, who had come to depend on trade with whites, turned to trapping as their primary economic activity. When the depression hit in 1929 and the demand for fur declined, villagers were forced to return to a subsistence economy. These changes in trading patterns and economic vicissitudes are reflected

in Barrow's population (see Table 24). Forty houses and 250 people were observed at Point Barrow in 1852-53, the 1890 census indicated 150 people living in the area, and the 1910 census counted 446 people. Between 1910 and 1920, Barrow's population declined by 28 percent (446 to 322), a period which coincided with the decline of the whaling industry.

Over the past century, various federal government activities in the Barrow area have contributed to the development of the village as a regional center. In 1881 the U.S. government established a polar station 0.8 kilometers (1/2 mile) northeast of Barrow for magnetic and meteorological research. About the turn of the century, a herd of reindeer was introduced, under federal sponsorship, to help the economy and replace some of the depleted game resources. The herd peaked at about 35,000 animals in 1935, but overgrazing, disease, predators, and poor management soon reduced the herd to a fraction of its original size, and they have now completely disappeared from the region. Substantial employment resulted from exploration activities in Naval Petroleum Reserve No. 4 (NPR-4) between 1944 and 1953 and from construction of the **Naval** Arctic Research Laboratory (NARL) in 1947 and the **POW-Main** DEW Line station in the 1950's. In his account of the U.S. Geological Survey's exploration program in **NPR-4** John C. Reed (1958) noted, ". . . about 80 Eskimos were employed by Arcon and attendant activities such as the Arctic Research Laboratory. Natives were paid the same wages as the Whites for similar work so that substantial cash was known in Barrow village."

The effect of these activities on Barrow's growth is reflected in

TABLE 24

POPULATION TRENDS
BARROW, ALASKA
1890 - 1977

<u>Year</u>	<u>Popul ati on</u>	<u>Percent Change</u> -
1890	152	
1910	446	193.4
1920	322	- 27.8
1929 a_/	330	2.5
1939 a_/	363	10.0
1950	951	162.0
1960	1,314	38.2
1970	2,104	60.1
1977	2,700 <u>b/</u>	28.3

a/ Census taken as of October 1, 1929 and October 1, 1939.

b/ Alaska Consultants' estimate of Barrow's population assumes a ratio of approximately 3 persons per job. The official North Slope Borough estimate of 2,220 appears too low.

Sources: U.S. Census.
Alaska Consultants, Inc.

contemporary census figures. Between 1929 and 1939, the village's population grew from 330 to 363, an increase of 10 percent. During the **following** decade of **NPR-4** and NARL activity, the growth rate was 162 percent. From 1950 to 1960, which includes the period of **DEW** Line station construction, Barrow's population increased an additional 38 percent.

Significant population growth has continued since 1960. Between 1960 and 1970, the range of government services was expanded considerably, which attracted residents of other villages in the region to Barrow. Barrow's population rose from 1,314 to 2,104. The discovery and development of the **Prudhoe** Bay oil field, the passage of the **Alaska** Native **Claims** Settlement Act in 1971, and the incorporation of the North Slope Borough in 1972 have been the major factors in Barrow's recent growth. The Arctic Slope **Regional** Corporation (**ASRC**) and the Borough have opened up new employment opportunities for **local** residents and may have checked the rate of **outmigration** from the region. In addition, the job opportunities afforded by the ASRC and the Borough have contributed to a small influx of non-Natives into Barrow since 1970.

Barrow's 1977 population was estimated by Alaska Consultants, Inc. to **be** 2,700 persons. The official borough estimate in July **1977 was** 2,220. Despite an **outmigration** of Eskimos from Barrow to resettle the traditional villages of **Nuiqsut**, Point Lay, and Atkasook, the borough estimate is **felt** to be unrealistically low in view of the amount of immigration from some of the other villages and from outside the region which has recently taken **place**. Alaska Consultants, Inc. counted a total of 915 full-time

jobs in Barrow in 1977. Using a typical ratio of three persons for every job, a population figure of about 2,700 persons in this community was thus derived.

Concomitant with Barrow's growth over the past century, many small North Slope settlements completely disappeared or significantly decreased in population. In 1939 Point Lay had a population of 117, but no population was recorded for this location in the 1960 or 1970 censuses. This community has recently been reestablished, however, and had a population of 54 in July 1977 according to borough estimates. Atkasook and Nuiqsut have also both been recently reestablished as viable communities.

The Alaska State Housing Authority (1970) related the growth of Barrow directly to rates of **outmigration** from traditional communities. The reestablishment of Point Lay, Atkasook, and Nuiqsut represents the first significant population movement from Barrow back to the villages in many years, although immigration of Eskimos into Barrow since 1970 has probably exceeded this planned **outmigration**. In July 1977 the Borough estimated a combined population of 297 for the three resettled villages.

POPULATION COMPOSITION

Barrow's population is 90 percent Eskimo, according to the 1970 census. The city has the distinction of being the largest Eskimo community in the state. The 10 percent non-Eskimo sector of 207 people is nearly all whites (191), most of whom were attached to one of the various federal agencies.

Barrow's 1970 population statistics reveal many **age** and **sex** characteristics peculiar to Alaska (see Table 25 and Figure 10). For example, **males** outnumbered females by a 52 to 48 percent margin, just slightly less than the 1970 state ratio of 54 percent **males to** 46 percent females. In the United States as a whole, however, females outnumbered males 51 to 49 percent. The population is young. This is usual in predominantly Native areas of Alaska, which characteristically have high birth rates. The median age of **males** in 1970 was 17.8 and that of females, 16.5. The median age of the Barrow Native population was even lower, 17.2 for males and 16.0 for females. In the Barrow Census Division in 1970, for example, the **male** median age was 19.6 and that of females was 16.4. All of these figures are lower than average for the state or nation. In 1970 the median age of **males** in the state was 23.3 and in the nation, 27.0. The median age in the state for females was 22.9 and in the nation, 29.6.

GROWTH PROSPECTS

Barrow is the only traditional community in the region that has **experienced** substantial emigration. Federal activities in the region center around Barrow, and this established the community as the dominant **population** hub. The **immigration** of researchers, service agency employees, and their families was more than matched by that of Eskimos from other North Slope villages who were attracted by the new services and employment opportunities (see Table 26).

Further growth for Barrow probably most depends on activities of the

TABLE 25

COMPOSITION OF POPULATION BY RACE AND SEX
BARROW, ALASKA, 1970

<u>Race</u>	<u>Sex</u>		<u>Total</u>	<u>Percent of Total</u> %
	<u>Male</u>	<u>Female</u>		
White	109	82	191	9.1
Negro	3	1	4	.2
Indian	4	4	8	.4
Aleut	1	0	1	a/
Eskimo	975	921	1,896	90.1
Other	3	1	4	.2
<u>TOTAL</u>	<u>1,095</u>	<u>1,009</u>	<u>2,104</u>	<u>100.0</u>

a/ Less than .1 percent.

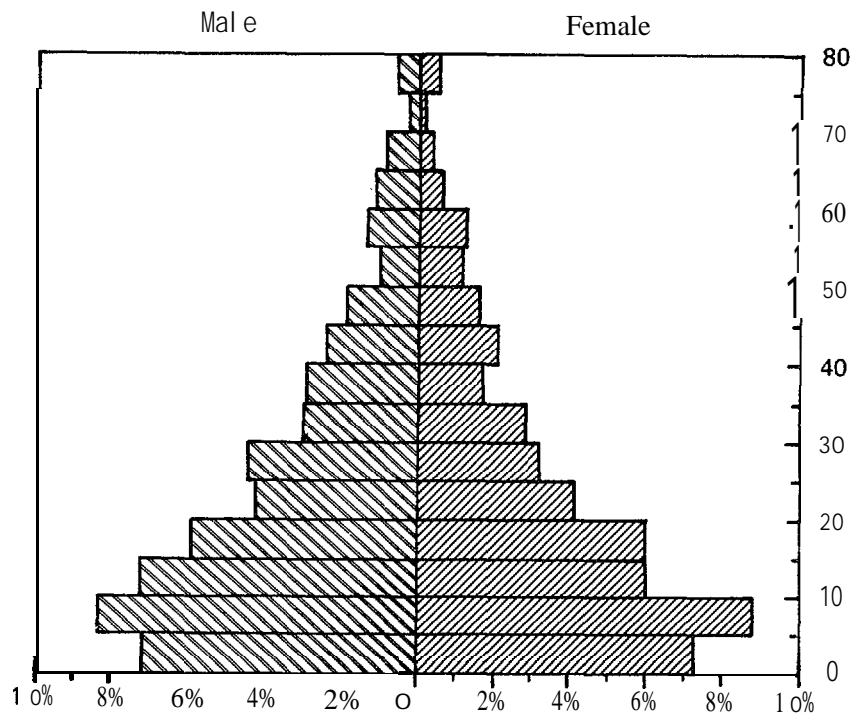
Source: U. S. Census.

TABLE 26

HOUSEHOLD DENSITIES
BARROW, ALASKA
1970

<u>Persons Per</u> <u>Household</u>	<u>Total Housing</u> <u>Units</u>	<u>Percent Total</u> <u>Population</u>	<u>Percent Total</u> <u>Housing Units</u>
1 person	34	1.6	9.1
2 persons	39	3.7	10.5
3 persons	38	5.4	10.2
4 persons	50	9.5	13.4
5 persons	37	8.8	9.9
6 persons	35	10.0	9.4
7 persons	33	11.0	8.8
8 persons or more	107	50.0	28.7
<u>TOTAL</u>	<u>373</u>	<u>100.0</u>	<u>100.0</u>

Source: U. S. Census.



BARROW

COMPOSITION OF POPULATION

1970

Arctic Slope Regional Corporation and the North Slope Borough. The success of the regional corporation's investment and development programs will largely determine the number and kind of new job opportunities it can offer in the future. The corporation has already invested heavily in the **community** and appears likely to continue to do so.

The impact of the North Slope Borough on future employment and population in Barrow should continue to be very significant. However, the extent of this impact **will** be largely determined by the tax revenues which it receives. Oil and gas property accounts for virtually all of the **Borough's** assessed **valuation**. Since local taxation for operating revenues (i. e., excluding debt service) of such property is presently restricted by state law **to** either a \$1,500 per capita formula or to a formula which limits a local government's tax **base to** 225 percent of the average per capita value of civilian property in the state multiplied by a local government's total civilian population, the taxing ability of the North Slope Borough is to a large extent determined by factors outside its **control**. A lawsuit to determine if debt service is also subject to these limitations on **local** government **taxation** is presently before the Alaska Supreme Court. If the decision goes **against** the North Slope Borough, its ability to carry out its capital improvements program would be severely limited.

Despite these uncertainties and the restraints imposed on the Borough's ability to tax oil and gas property within its borders, the North Slope Borough is expected to continue to be the major factor **in** Barrow's future

growth. The rate of that growth, however, will undoubtedly be influenced by decisions regarding the Borough's taxation capabilities.

Economy

COMPOSITION OF EMPLOYMENT

A count of employment in Barrow was undertaken by Alaska Consultants, Inc. in December 1977 because there were no meaningful current employment statistics available for the community. Jobs were counted both in the community itself and at nearby government facilities such as the Naval Arctic Research Laboratory (NARL) and the POW-Main DEW Line station. However, jobs held by Barrow residents in areas outside the immediate Barrow area, such as Prudhoe Bay and **NPR-A**, were not included.

When converted to average annual full-time employment, a total of 915 jobs were counted in Barrow in 1977 (see Table 27). Close to 57 percent of these jobs were in government occupations, most of them with the North Slope Borough.

Of 420 average annual full-time jobs in local government, 404.5 were with the Borough (213.5 in the general government category and 191 with the Borough School District). Federal and state governments accounted for 84.5 and 13.0 jobs, respectively.

The next largest employment sector after government was in transportation,

TABLE 27
 AVERAGE ANNUAL FULL-TIME EMPLOYMENT
 BARROW, ALASKA
 1977

<u>Industry Classification</u>	<u>Number</u>	<u>Percent of Total</u> %
Mining	1.5	.2
Contract Construction	17.0	1.9
Manufacturing	0	---
Transportation, Communications and Public Utilities	173.75	19.0
Trade	56.5	6.2
Finance, Insurance and Real Estate	48.0	5.2
Service	100.75	11.0
Miscellaneous	0	---
Government	517.5	56.6
Federal	(84.5)	(9.2)
State	(13.0)	(1.4)
Local	(420.0)	(45.9)
<u>TOTAL</u>	<u>915.0</u>	<u>100.0</u>

Source: Alaska Consultants, Inc.

communications, and public utilities, which accounted for roughly 174 jobs, or 19 percent of the total annual average full-time employment in the community. The largest single employer in this group was ITT (based at NARL) with 73 jobs, followed by Barrow Utilities with 20 jobs.

Approximately 100 jobs were counted in the service sector. The largest employer was the University of Alaska with 60 employees, all of whom are associated with NARL, followed by the Top of the World Hotel with 22 jobs. Eskimos, Inc., a vehicle repair and maintenance concern, accounted for 14 jobs in services (plus two in trade). Both the hotel and Eskimos, Inc., are subsidiaries of the Arctic Slope Regional Corporation. The service sector also includes three churches, a cleaners, and a beauty salon.

Trade accounted for 56.5 jobs, or six percent of all the jobs in Barrow. Of the 12 employers in this category, the largest employer was Stuaqpak (Barrow's main general store), followed by Brewer's Store No. 1 and Cash and Carry. Finance, insurance, and real estate accounted for 48 jobs in 1977, nearly all of them with the Arctic Slope Regional Corporation. Finally, 18.5 jobs were in mining and contract construction, about two percent of the total. Husky Oil was the sole employer in the mining sector with only 1.5 jobs, while jobs in the construction sector were all based in the community and were split among SKW (10), Blackstock (3), and Skyline Construction (4). Figures for these construction firms can be misleading since annual average full-time employment statistics do not show the much higher number of jobs during the short construction season.

UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT

Reliable figures on unemployment and **seasonality** of employment are difficult to develop for North Slope communities. Information is generally poor and incomplete, making accurate historical comparisons impossible. Population and employment data gathering methods used before 1975 **included** Barrow as part of a large area extending between Beechey Point and Cape **Lisburne** and as far south as the Brooks Range. Both the census division and the labor area also included **Wainwright**, Point Lay, Anaktuvuk **Pass**, **Nuiqsut**, and Cape **Lisburne** plus seismic or exploration crews operating in NPR-4. Barrow accounted for nearly 80 percent of the census division's population in 1970 but conclusions about the employment situation in Barrow from these data can **only** be considered indicative. In 1975 the Alaska Department of Labor began collecting employment statistics on a boroughwide basis, making recent data incompatible with that for previous years.

Alaska Department of Labor data for 1970 indicated that unemployment in the Barrow labor area averaged 11 percent in 1970, ranging from a high of 18.8 percent in June to a low of 6.1 percent in January. Unemployment in 1970 averaged nine percent Statewide, somewhat lower than in the Barrow labor area. Lowest unemployment statewide occurred in September (6.5 percent) and the highest in February (11.6 percent), a seasonal high-low employment pattern quite different **from** that exhibited by the Barrow area. In 1972 the Barrow labor area's unemployment rate rose to 11.8 percent, ranging from a high of 18.5 percent in February to a low

of 7.3 percent in October, a more typical **Alaska** pattern. The statewide unemployment rate also increased, from nine to 10.5 percent. As was the case with the Barrow area in 1972, the highest state unemployment rate occurred in February (14.7 percent) and the lowest rate was in August (**eight** percent).

Between **1972** and 1975, unemployment in the Barrow **labor** area decreased significantly, and seasonal variations became much less extreme. Average unemployment in 1975 was six percent, somewhat **lower** than the state average for that year of 8.4 percent. Statewide seasonal unemployment ranged from a high of **11.2** percent in January of 1975 to a low of six percent in September. In the Barrow labor area the peak unemployment month was July (9.5 percent), and the **low was** March (4.1 percent).

RECENT TRENDS AND CHANGES

Between 1970 and **1975**, nonagricultural wage and salary employment in the Barrow labor area rose from 977 to 1,997, more than a 100 percent increase (see Table 28), a rate of growth well above that experienced statewide. In the Barrow **labor** area, three sectors showed substantial change between 1970 and 1975. Mining **fell** from 28.6 percent of total nonagricultural wage and **salary** employment in 1970 to **13.1** percent in 1975, although the number of jobs in this sector declined only **slightly**. Virtually none of the jobs in this sector was held in Barrow or even by Barrow residents. The service sector, although it increased in absolute numbers from 1970 to **1975**, actually declined as a percentage of **total**

TABLE 28

EMPLOYMENT COMPOSITION
BARROW LABOR AREA
1970 AND 1975

<u>Employment Sector</u>	1970		1975	
	Number	% of Total	Number	% of Total
Mining	280	28.7	261	13.1
Contract Construction	173	17.7	380	19.0
Manufacturing	a/		a/	
Transportation, Communications & Public Utilities	86	8.8	185	9.3
Trade	a/		129	6.4
Finance, Insurance & Real Estate	a/		56	2.8
Service	142	14.5	196	9.8
Miscellaneous	0	---	a/	
Government	165	16.9	790	39.6
Federal	(128)	(13.1)	(265)	(13.3)
State and Local	(37)	(3.8)	(525)	(26.3)
<u>TOTAL</u>	977	<u>100.0</u>	<u>1,997</u>	<u>100.0</u>

a/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Department of Labor.

nonagricultural wage and salary employment during the five-year period. Employment in the government sector changed the most.

Federal, state and local government employment in the Barrow labor area in **1970** represented 165 jobs, or 16.9 percent of total nonagricultural wage and salary employment. By 1975 this sector accounted for 790 jobs, or 39.5 percent of the total, an increase of 379 percent. Most of this growth occurred in state and local government, where employment rose from 37 jobs in 1970 to 525 in 1975, **almost** all of which can be directly traced to the establishment of the North **Slope** Borough. Reliable historical employment data are not available specifically for Barrow, but a **December** 1977 employment count by Alaska Consultants, Inc. found 517.5 jobs, or 56.6 percent of average annual full-time employment in the community, to be in the government sector. About 78 percent of all these government jobs in Barrow were held by North Slope Borough employees.

OCCUPATIONAL SKILLS

Comprehensive information on the skills of the work force in the region and for individual **communities** is generally lacking. The **Employment** Security Division of the Alaska Department of Labor conducted a comprehensive manpower and skill survey of the Barrow-Wainwright area in 1969, but this information is now very much out of date.

The Barrow Manpower Center maintains a list of skills of persons who register there when looking for a job. Since there are no union hiring

halls anywhere in the borough, registrants at the center are generally local Barrow people or residents of other North Slope communities. The skills of these people may or may not represent those of the region's permanent residents, but they probably typify those of people actively seeking work.

During FY 1977 a total of 497 people registered at the Barrow Manpower Center (see Table 29). Of this group, 357 were males, and 381 were listed as American Indians (certainly almost all Eskimos). The largest single group (almost 31 percent) claimed no specific skills, while 29 percent listed skills in structural work, mainly in construction-related occupations. Other numerically important occupational categories were clerical and sales (13.5 percent), services (10.7 percent), and miscellaneous (9.5 percent). Most persons in the last group had skills in heavy equipment operation or in packaging and materials handling. Another 4.4 percent claimed professional/technical/managerial occupational skills. The remaining four occupational categories accounted for a combined total of only 11 registrants. No conclusions can be reached from available data as to the number of people with skills in oil- and gas-related occupations.

The distribution of skills among registrants at the Barrow Manpower Center understates the proportion of permanent residents of the North Slope region who have skills in the professional/technical/managerial area. A large proportion of the jobs in Barrow require these types of skills, although many are not filled locally. Nevertheless, new employees with

TABLE 29
 OCCUPATIONAL SKILLS
 BARROW MANPOWER CENTER REGISTRANTS
 FY 1977

<u>Occupation Category</u>	<u>Number</u>	<u>Percent of Total</u> %
Professional /technical /managerial	22	4.4
Clerical and sales	67	13.5
Services	53	10.7
Farming, fishery, forestry	2	.4
Processing	4	.8
Machine trades	4	.8
Bench work	1	.2
Structural work	144	29.0
Miscellaneous	47	9.5
Unskilled	153	30.8
<u>TOTAL</u>	<u>497</u>	<u>100.0</u>

Source: Alaska Department of Labor.

professional /technical /managerial skills soon become permanent community residents.

INCOME LEVELS

Historically, family income levels in Barrow have been **well** below statewide averages, but they have risen sharply in recent years. Recent **sur-**veys indicate that average and median Barrow household incomes now **com-**pare favorably with those **of** other communities around the state, at least in absolute terms.

The 1970 census reported that the median family income in 1969 for the Barrow Census Division (Barrow constituted about 80 percent of the Barrow Census Division's population) was \$8,575. This was **well below** the statewide median income at that time of \$12,443. **In** 1969, 120 Barrow families (or 27.7 percent) had incomes below defined poverty levels (see **Table** 30). A 1974 survey by **Dupere** and Associates (see **Table** 31) of **171** Barrow households showed a median 1973 family income for the community of \$8,560, slightly lower than the 1970 census figure. This discrepancy could be attributed to different sampling techniques or to the fact that a higher proportion of the households in the latter survey were Native. **In** 1974, 26.3 percent of the households surveyed were found to have incomes below the officially defined poverty level.

A North Slope Borough School District survey in March 1976 showed a sharp rise in family income in Barrow between 1973 and 1975. Based on a sample

TABLE 30
 FAMILY INCOME DISTRIBUTION
 BARROW CENSUS DIVISION, ALASKA
 1969

<u>Family Income</u>	<u>Number of Families</u>	<u>Percent of Total</u>
Under \$1,000	23	5.3
\$ 1,000-\$1,999	30	6.9
\$2,000-\$2,999	28	6.5
\$3,000-\$3,999	57	13.2
\$4,000-\$4,999	6	1.4
\$5,000-\$5,999	25	5.8
\$6,000-\$6,999	5	1.2
\$7,000-\$7,999	31	7.2
\$8,000-\$8,999	20	4.6
\$9,000-\$9,999	28	6.5
\$10,000-\$11,999	59	13.6
\$12,000-\$14,999	54	12.5
\$15,000-\$24,999	41	9.5
\$25,000-\$49,999	26	6.0
\$50,000 or more	0	---
<u>TOTAL</u>	433	<u>100.0</u>

Source: U. S. Census.

TABLE 31
 FAMILY INCOME DISTRIBUTION
 BARROW, ALASKA
 1973

<u>Family Income</u>	<u>Number of Families</u>	<u>Percent of Total</u>
Under \$1,000	7	4.1
\$ 1,000-\$4,999	38	22.2
\$ 5,000-\$10,999	33	19.3
\$11,000-\$15,999	21	12.3
\$16,000-\$20,999	14	8.2
\$21,000-\$24,999	10	5.8
\$25,000 or more	13	7.6
No response	35	20.5
<u>TOTAL</u>	171	<u>100.0</u>

Source: Dupere and Associates.

of 23 percent of Barrow households, this survey found the community's median family income in 1975 to be \$22,676.

A second survey in 1976, conducted by the Alaska Department of Administration, found the average Barrow household income to be \$27,507, significantly higher than the school district survey figure. It should be pointed out, however, that state data were based on a sample of only 10 households, and all but one of the people interviewed were employed in skilled occupations. This same survey found an average household income of \$34,316 in Fairbanks, significantly higher than the Barrow figure, while the average household income for Anchorage was found to be \$25,053, slightly lower than that of Barrow.

Barrow residents are clearly enjoying increasingly higher incomes. However, the purchasing power of the Barrow dollar is significantly less than in other communities in the state. The 1976 Alaska Department of Administration survey of food and housing costs in selected communities around the state, for example, found that Barrow food prices averaged 73.6 percent above those in Anchorage. In fact, food costs in Barrow were shown to be much higher than any of the other 28 communities surveyed. Similarly, a check of 13 market basket items by Alaska Consultants, Inc. in December 1977 found that Barrow grocery prices averaged about 70 percent above those in Anchorage. Although average family income in Barrow was found by the Department of Administration to be nine percent above that of Anchorage, Barrow residents clearly have a much lower buying power. The high and rising cost of living in Barrow most severely impacts those who are unemployed or living on fixed incomes.

Federal public assistance programs provide an income supplement for some Barrow households (see Table 32). During FY 1976 the Bureau of Indian Affairs distributed a total of \$12,000 in general assistance payments to 40 Barrow residents, an average of \$25 **per month per** recipient--a sharp drop from 1973 when approximately \$155,000 were distributed to **191** recipients for an average monthly payment of \$68.

State public assistance payments by the Alaska Department of Health and Social Services also help to supplement income for some families (see Table 33). During a typical month in 1976, 28 Barrow residents received Old Age Assistance payments, eight people qualified for Aid to the Disabled, and 37 were eligible for Aid to Families with Dependent Children funds. Monthly Old Age Assistance payments averaged \$89, Aid to the Disabled monthly payments averaged \$62, and monthly Aid to Families with Dependent Children payments averaged \$258.

Land Use

OVERALL PATTERNS

The community of Barrow is comprised of the city **itself** and various federal government facilities grouped around the **Naval** Arctic Research Laboratory north of the city. Principal land uses in the city consist of two residential areas: **Browerville** to the north of Isatkoak Lagoon and the older part of the city to the south of the lagoon (see Figure 11). The lower or westward portion of the lagoon is used as a sewage outfall for

TABLE 32

GENERAL ASSISTANCE PAYMENTS a/
 BARROW, ALASKA
 FY 1973 - FY 1976

	<u>FY 1973</u>	<u>FY 1974</u>	<u>FY 1975</u>	<u>FY 1976</u>
Total Payment	\$154,900	\$83,600	\$26,300	\$12,000
Number of Cases	191	148	67	40
Average Payment:				
Annual	\$ 811	\$ 565	\$ 393	\$ 300
Monthly	\$ 68	\$ 47	\$ 33	25

a/ Payments made by the Bureau of Indian Affairs.

Source: U.S. Bureau of Indian Affairs.

TABLE 33

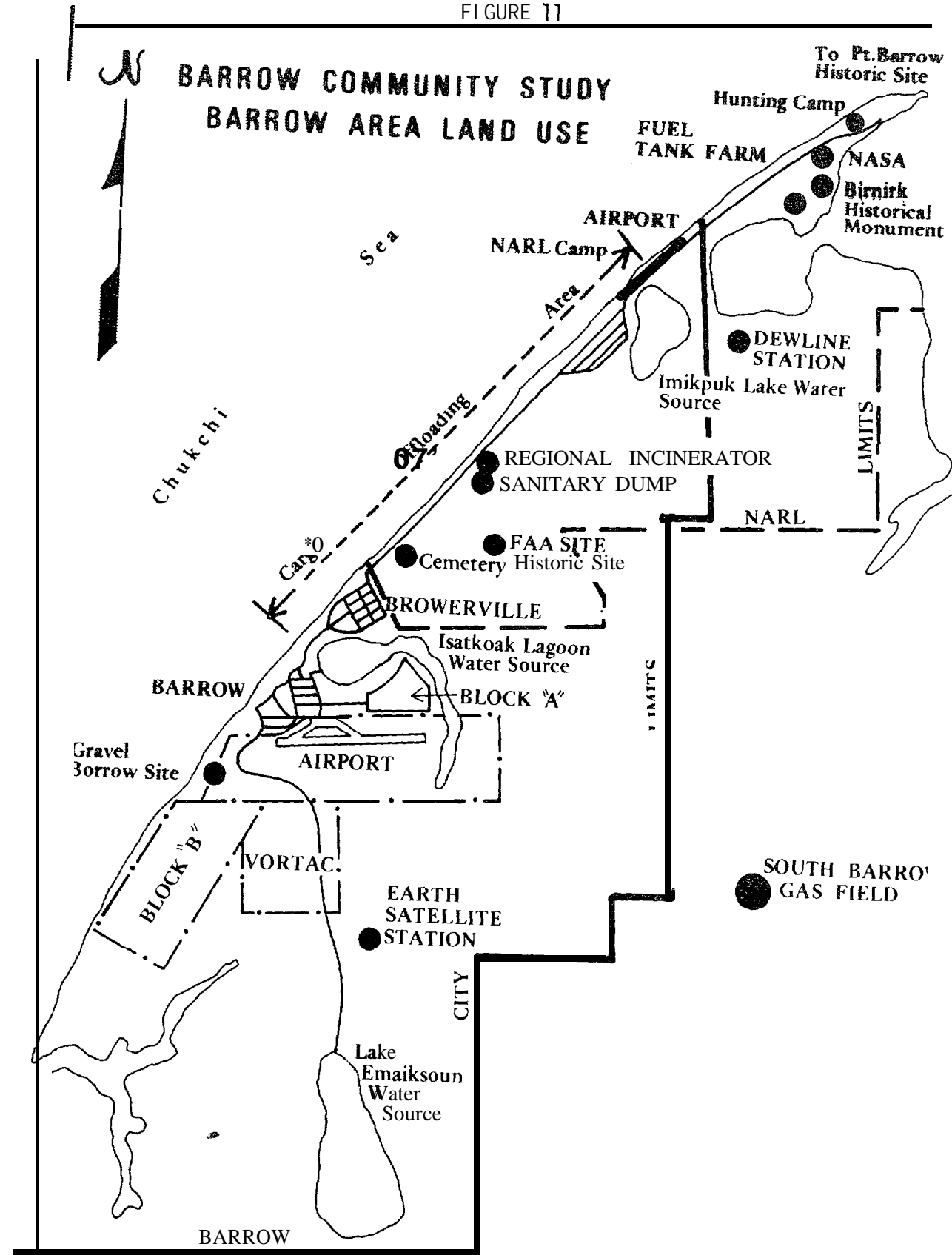
PUBLIC ASSISTANCE PROGRAM PAYMENTS a/
 BARROW, ALASKA
 OCTOBER, 1976

	<u>Old Age Assistance</u>	<u>Aid to the Disabled</u>	<u>Aid to Families with Dependent Children</u>	<u>Total</u>
Total Payment	\$2,488	\$ 492	\$9,541	\$12,521
Number of Cases	28	8	37	73
Average Payment	\$ 89	\$ 62	\$ 258	\$ 172

a/ October is considered to be a representative month for public assistance payments.

Source: Alaska Department of Health and Social Services.

FIGURE 11



Source: Barrow Regional Master Plan 1973

the school, located adjacent to the lagoon in the older part of the city. A dam was recently built across the upper portion of the lagoon by the Public Health Service (PHS) to contain the city's principal water source.

The older part of Barrow contains most of the governmental and commercial facilities in the city. The federal government operates the PHS hospital, the Weather Service, the new post office, and the Federal Aviation Administration (FAA) at the state-owned airport. North Slope Borough facilities include the new administration building, the city's electrical generators and electrical distribution system, Inupiat University, and a movie theater. Commercial land use in this part of town includes the new Arctic Slope Regional Corporation-owned supermarket/department store and the Top of the World Hotel, Schontz's general merchandise store, a gas station, and smaller commercial entities which operate out of individual homes. Block "A" and Block "B" are designated as residential and industrial expansion areas of the city, respectively.

South of the airport are the FAA airport navigational aids site (VORTAC), the RCA Atlascom earth satellite communications station, and the community's second water source, Lake Emaiksoun.

The following federal government activities are located around NARL: the Air Force POW-Main DEW Line station, the NASA weather rocket launch facility, the Coast Guard communications station, the FAA antennae complex, and of course, the research laboratory itself. The NARL facility, sponsored by the Office of Naval Research (ONR) as a support station for

applied scientific research throughout the Arctic, houses its activities in approximately 175 small buildings.





HOUSING

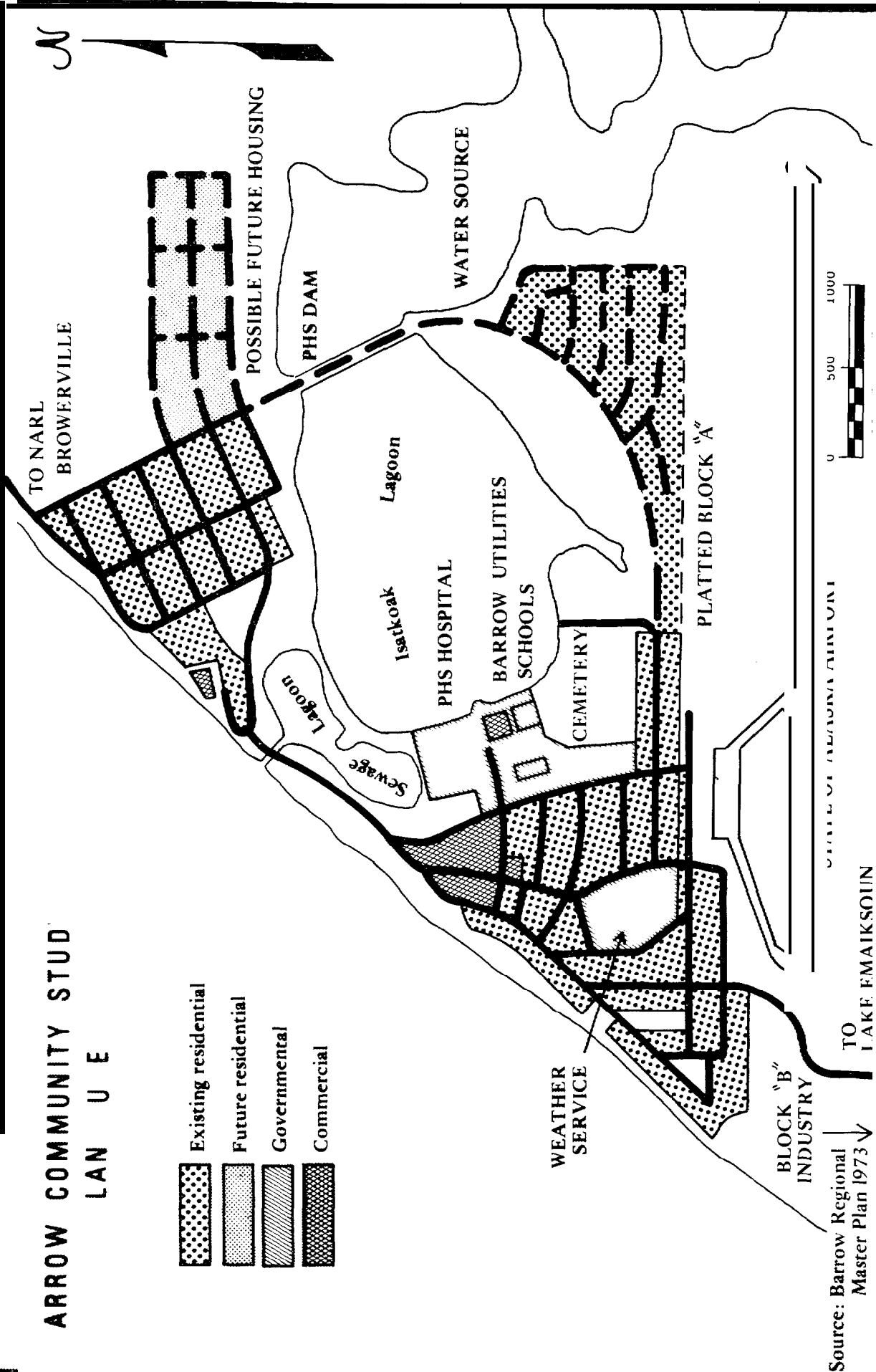
Residential land use in Barrow consists of the older housing area south of Isatkoak Lagoon, the relatively newer housing of Browerville, north of the Lagoon, and camp housing at NARL. Within the 80 hectares (200 acres) of developed land in Barrow including Browerville, residential land use comprises approximately 34 hectares (85 acres), or 42 percent of the land area (see Figure 12).

No comprehensive housing surveys have been undertaken in Barrow since 1974, but according to the borough planning director, there are approximately 500 dwelling units in Barrow. Units constructed since 1973 consist of single-family, multifamily, and teacher housing. This new housing includes 54 single-family units and 49 multifamily units laid out in buildings of 28 units, 12 units (fourplex) and nine units. The fourplexes are teachers housing, and eight more units are planned. The only nongovernment multifamily structures of more than two units in the borough are at Barrow.

Most new housing has been constructed in the Browerville area. Of the 58 units occupied by federal and state personnel (Urban and Rural Systems Associates 1974), most are located here. The lots and houses are larger and more costly than those in the southern part of Barrow. Lots are

ARROW COMMUNITY STUDY LAND USE

-  Existing residential
-  Future residential
-  Governmental
-  Commercial



Source: Barrow Regional Master Plan 1973

FIGURE 10

generally 15 meters wide by 37.5 meters long (50 feet wide by 125 feet long) (John Graham & Company 1973). Most of the newer housing was designed and built in the lower 48 and shipped by barge to Barrow. Consequently, floor plans reflect standard arrangements of bedrooms (usually two) and living, dining, and kitchen areas more typical in other parts of the country. Because of the high purchase price and heating costs of these homes, some remain unoccupied.

Housing Conditions

The continuing need for new housing in Barrow arises not only from deterioration and overcrowding of existing housing, but from population growth as well. The community's ability to respond to demands for new and better housing will be a critical factor in determining basic growth patterns. The number of housing units in deteriorated or dilapidated condition has been variously estimated by several agencies and consultants. John Graham and Company (1973) reported that 250 dwelling units (60 percent of all housing) were in need of major repair and that at least 30 houses should be replaced immediately. Extrapolating from a 1969 Alaska State Housing Authority (ASHA) study, the Graham report speculated that as many as 80 units could be dilapidated and in need of replacement. By contrast, the Borough's 1974 to 1980 Capital Improvements Program (CIP) proposed replacing the approximately 20 percent of the nonfederal housing (60 units) that does not meet minimum standards. Housing conditions in Barrow are among the poorest in the region.

A Dupere and Associates study (1974) describes severe housing deterioration, inadequate insulation, and high costs for heating, maintenance, and renovation. These conditions resulted in a high vacancy rate (16 percent) at a time when much of the population lived in severely overcrowded homes.

According to the Dupere study, most dwellings are small, averaging 66.7 square meters (725 square feet), single story, and of wood frame construction. Larger houses built since 1974 would skew this average, but the figure still describes typical older housing in most of the village. Although average house size in the borough is even smaller, 58 square meters (630 square feet), the occupancy rate of Barrow housing was 5.64 persons per dwelling unit, the highest in the borough. In 1974 the most frequent complaint of Barrow residents about their housing was overcrowding.

Most homes are built on gravel pads or pilings driven into the permafrost. Inadequate foundations have caused differential settling in some cases. Roof framing is usually sheathed with wood planks and covered with galvanized corrugated metal to provide a slip surface for snow. Typically, single-family units are built on small lots with little space between dwellings or between dwellings and the street, constituting an obvious fire hazard. Dupere reported that Barrow homes were the most poorly insulated in the borough. Twenty-five percent had either no insulation in the ceiling or none in the walls, and 38 percent had none in the floors.

Utilities service to older housing is almost nonexistent. No housing has piped-in water, and 79 percent of the units in 1974 had no shower or bathtub and even fewer had installed sinks. Although some units have flush toilets, all sewage is collected and disposed of in "honey buckets" for periodic pickup by tank trucks.

Housing Programs

Programs to replace existing substandard housing are of continuing high priority to the North Slope Borough. Technical assistance has been provided to help families in Barrow with loan applications and other negotiations with the Farmers Home Administration, the Alaska Housing Finance Corporation (an agency of the Alaska State Housing Authority), and private housing contractors. Approximately 20 new FHA- and AHFC-financed housing units were prefabricated by CAPP Homes and shipped to Barrow by barge in 1973. An additional 15 homes were rehabilitated or substantially replaced under the FHA home improvement loan program. The Borough has also built housing in Browerville with funds from general obligation bonds. Thirty-four of the planned 36 single-family units, 12 of the 20 planned fourplex housing units, and nine housing units for the elderly have been built under this program. This effort is part of a five-year program of housing construction throughout the borough.

The Borough's 1977 Capital Improvements Program draft called for the construction of two additional single-family units, two more fourplex

teacher housing units, a 29-unit apartment, and another fourplex. In the longer run, the 1974/75 CIP estimated that 150 units would be needed to accommodate the projected growth of the community but deferred 35 percent (53 units) until after FY 1979/80.

An additional housing assistance program of the Arctic Slope Region Corporation has resulted in a grant of \$4.32 million from the U.S. Department of Housing and Urban Development. This money will be used to purchase 72 existing apartments for Native housing in Barrow.

There is a reciprocal and often confusing relationship between housing programs and those for the provision of sewer and water facilities. In 1973, for example, the construction of federally assisted new housing in Barrow was contingent upon a State Department of Environmental Conservation-approved water supply and sanitation system. In order to obtain federal funding for these utilities, the Borough requested that the Indian Health Service (IHS, a Public Health Service agency) implement a 1972 water and sewer master plan.

IHS responded that 100 homes would have to be constructed or improved before the water and sewer system could be justified. The Borough was caught between conflicting requirements of two governmental agencies. The City resolved the situation by implementing an interim water supply, sewage, and solid waste hauling service. The FHA and the Alaska Housing Finance Corporation then financed the new housing, which lends impetus to completion of the IHS long-range plan.

According to the borough planning director, the number of new or replaced housing units constructed since 1973 has increased the total housing in Barrow by approximately 20 percent. Virtually all of this housing was constructed in the existing residential areas of Barrow and Browerville, and little land remains for new residential development. 0.8 to 1.6 hectares (two to four acres) are available in Browerville, and a few isolated lots are available in the city.

Under the moderate growth assumptions in the 1973 John Graham & Company study, a projected 1990 population of 5,000 will create additional demands for housing in the city that cannot be met without substantial redevelopment at higher densities. The Borough has not updated or revised this population projection, and presently sees no reason to doubt growth assumptions and projections in the report. The Public Health Service's Preliminary Design Analysis for Water Supply and Distribution (1974) is based on a growth factor of 198 percent--from 2,200 persons and 370 homes to 4,350 persons and 750 homes. No timetable was established for reaching this design capacity, but the schedule probably will not keep pace with new housing construction.

The two basic options for increasing residential land in Barrow are in Block "A" east of Barrow and in the NARL tract east of Browerville. Block "A" contains approximately 150 platted lots (Hewitt V. Lounsbury & Associates 1976). The size of this expansion area is limited by the airport along its southern boundary and by Isatkoak Lagoon along its north and east boundaries. Expansion into the NARL tract east of Browerville would require an agreement with the Office of Naval Petroleum and

Oil Shale Reserves, which administers the tract. The Borough is presently seeking to lease land along the east side of Ahkovak Road.

The John Graham and Company master plan for Barrow assumes that 750 dwelling units is about maximum for the single-family dwelling holding capacity of the city, including expansion into Block "A" (138 lots) and into the area east of **Browerville** (170 lots). It should be noted that this figure assumed an even higher occupancy rate (6 persons per dwelling unit) than existed in 1973 (5.64 persons per dwelling unit). Severe overcrowding is apparently to be alleviated by construction of larger houses, but this solution may be beyond the financial reach of many of Barrow's residents.

Another area which might be used for future residential expansion is the 3.2 hectare (8 acre) site in the center of Barrow now occupied by the U.S. Weather Service. The Barrow master plan recommends that the Weather Service relocate its operations to Block "B" south of the airport, which is presently designated by the Borough for industrial development.

All current plans for expansion into these areas assume that the single-family dwelling will continue to be the dominant form of housing. The 1973 Barrow master plan, for example, assumes that demands for privacy would inhibit public acceptance of apartment living. Dupere & Associates (1974) reported that 86 percent of the housing units were owner occupied; and that fully half of the people renting units were dissatisfied with their housing. Another response indicated that higher housing densities would not be found objectionable.

This apparent change in attitude is reflected in recent housing constructed in Barrow. The form of housing that will accommodate projected growth is evolutionary. Construction of multifamily units in the past four years is generally keeping pace with single-family construction. It is not known if the new apartments are occupied primarily by new residents, former (dissatisfied) renters of existing housing, or former residents of other overcrowded housing.

New patterns of land use may emerge in Barrow if the shift toward higher-density housing continues. Limited available land for construction, the high costs of providing utilities service to new areas, and increased construction and maintenance costs may have an effect on provision of other services as well. Educational, recreational, and commercial facilities may have to be built to serve more highly concentrated development than was envisioned in the 1973 master plan.

Land Status

The city of Barrow occupies a land area of approximately 60 square kilometers (23 square miles) along the north coast tip of Point Barrow. With the exception of the state territorial waters to the west, the federal government owns most of the land around the city. The massive National Petroleum Reserve-Alaska (NPR-A) abuts the community to the south and the east and the Naval Arctic Research Laboratory tract (U.S. Naval Tract No. 1) lies to the north. The surface rights to approximately 80,000 hectares (200,000 acres) of NPR-A around the city are held by the Barrow

Native village corporation (see Figure 13).

This corporation, Ukpeagvik Inupiat, has received entitlements totalling 80,492 hectares (201,232 acres). They extend over three townships south of Barrow and approximately four townships to the east. The selection also includes Point Barrow and the barrier islands of Etison Lagoon.

Since all of the village surface lands lie within NPR-A, the Arctic Slope Regional Corporation is selecting equal amounts of "in lieu" sub-surface lands outside the reserve.

Village entitlements under the Alaska Native Claims Settlement Act are limited to the surface estate. The basic purpose of village entitlements is to protect subsistence lands around villages; however, the village corporation can sell or lease parcels of land as prescribed by the act.

Principal activities located within the U.S. Navy tract are: the 1,816 hectare (4,541-acre) research laboratory and its airport; the 107 hectare (268-acre) POW Main DEW Line facility (U.S. Air Force Tract "A"); a small National Aeronautics and Space Administration weather rocket launch site just south of the Point Barrow spit; and a Coast Guard communications site south of South Salt Lagoon (see Figure 14). To the east of Barrow is the South Barrow Gas Field Tract No. 2, which is under the control of the Office of Naval Petroleum and Oil Shale Reserves. The field supplies all natural gas for the city and NARL.

Major blocks of ownership in the city are the state airport, occupying

ETC/IDE T 12

BARROW COMMUNITY STUDY BARROW REGION LAND STATUS

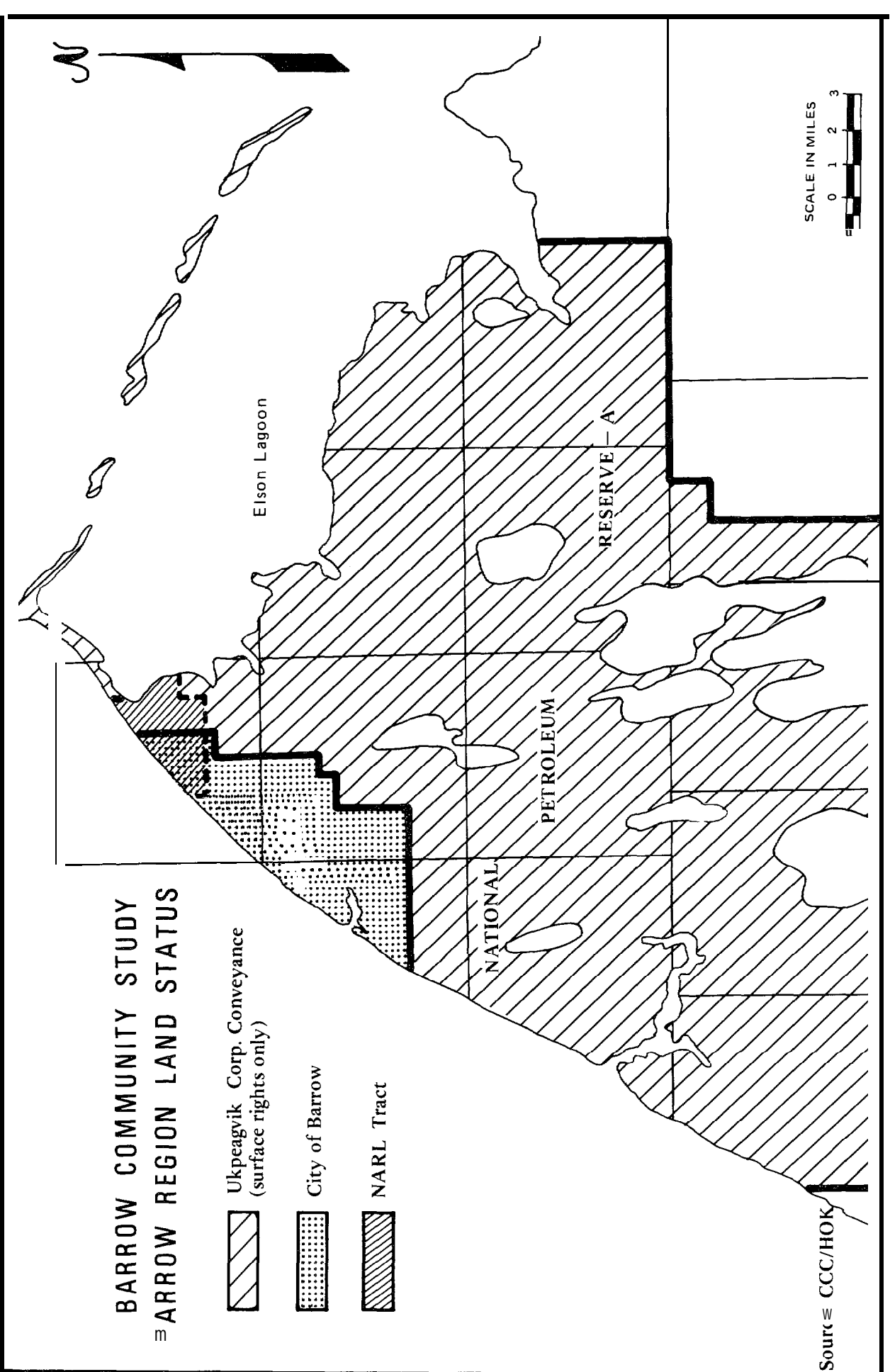
Ukpeagvik Corp. Conveyance
(surface rights only)



City of Barrow

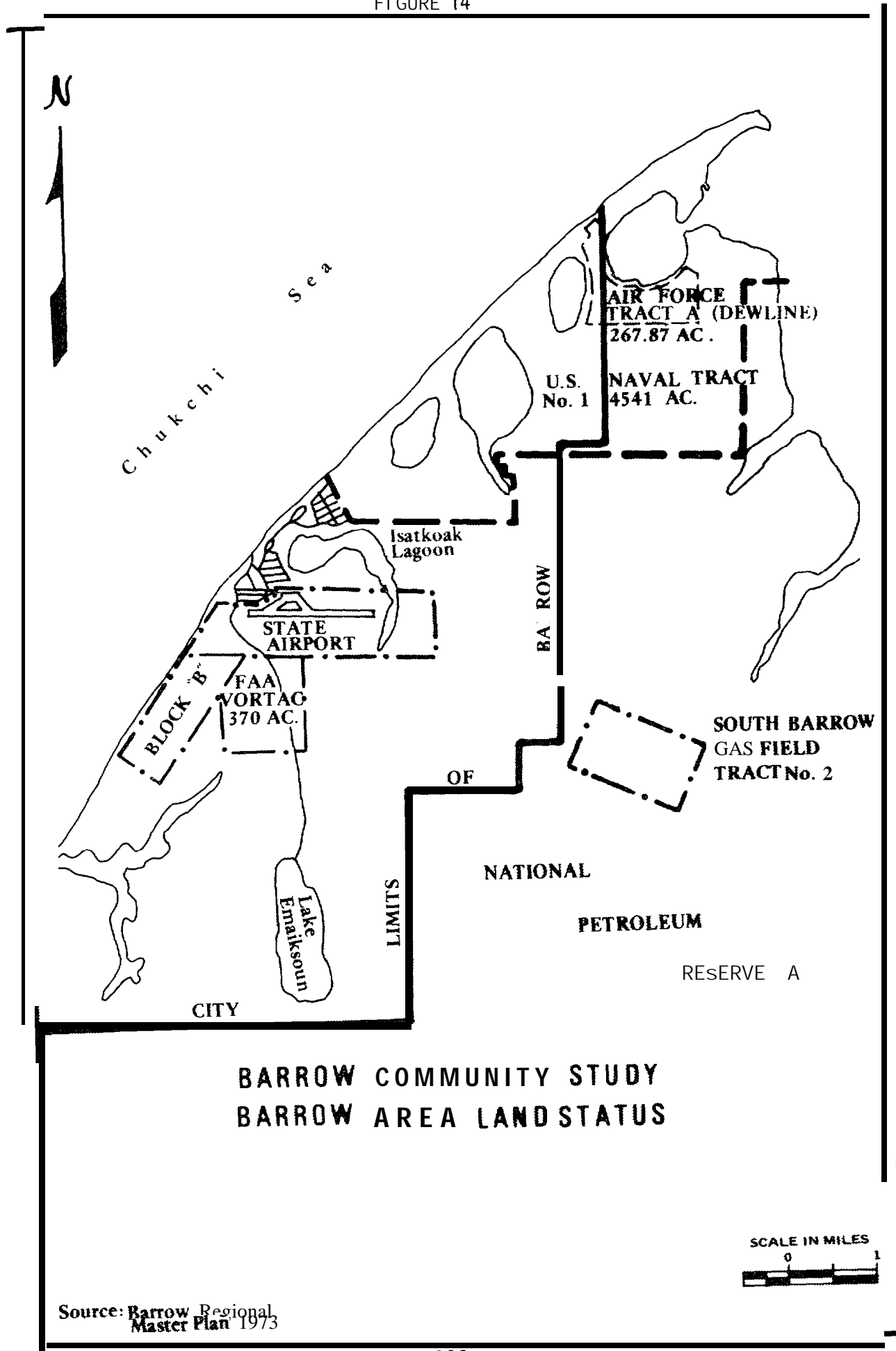


NARL Tract



Source = CCC/HOK

FIGURE 14



**BARROW COMMUNITY STUDY
BARROW AREA LAND STATUS**

Source: Barrow Regional
Master Plan 1973

approximately 292 hectares (730 acres) of land, and the Federal Aviation Administration's Very High Frequency **Omnirange** and Tactical Air Navigation (**VORTAC**) facility on a 148 hectare (360-acre) tract.. Both are south of the developed portion of the city. Most of the remaining land in Barrow is privately owned. Estimates are that more than 85 percent of the single-family units in the city are owner-occupied (**Dupere & Associates 1974**).

Other smaller **blocks** of ownership in the city proper are the 3.2 hectare (8-acre) U.S. Weather Service site; the approximately 10-acre elementary school site located adjacent to **Isatkoak** Lagoon; and the Public Health Service (**PHS**) hospital, also located adjacent to the **lagoon** on an approximately 3.8 hectare (9.5-acre) site. The North **Slope** Borough occupies a new administration building in the city and owns other facilities, such as the Polar Bear Theatre and Inupiat University.

Local land ownership patterns are an important determinant of future city growth. Potential expansion to the north and south is blocked by state and federal ownerships. The city is bounded on the west by the Chukchi Sea and on the east by **Isatkoak** Lagoon. The best options for city expansion **are** additional development on Navy land east of **Browerville** and land south of the airport known as Block "B". The North Slope Borough is seeking to lease Navy lands for contiguous **community** residential expansion east of **Browerville**. Although portions of Block "B" have already been platted by the Bureau of Land Management, residential development could require costly connections to existing and future Barrow utilities

as well as other commercial infrastructure. Because of its proximity to the airport, the approximately 14 hectare (35 acre) Block "B" has been proposed for industrial development by the Borough.

Continued development on lands within the city will be carried out under government sponsorship. However, there has been a pronounced shift from the federal government role to land ownership and development by local borough government and the quasi-public Arctic Slope Regional Corporation. The Borough has built single-family housing and apartments. The ASRC has built the Top of the World Hotel, the Barrow supermarket, a warm-storage facility, and a heavy equipment shop and fuel storage facilities in the NARL tract.

Community Facilities and Services

CITY POWERS AND PROGRAMS

The City of Barrow was incorporated on June 8, 1959 and became a first-class city on April 30, 1974. Barrow adopted the council-manager form of government. The Council consists of six **councilmembers** and a mayor, all elected at large. **Councilmembers** are elected to three-year terms, and the mayor's term is two years. The city manager, who is hired by the council and serves at its pleasure, directs day-to-day city operations, with policy direction from the mayor and the council.

Under Alaska law, a first-class city in an organized borough may only

exercise those municipal powers which are not reserved as areawide borough powers (tax assessment and collection, education, planning and zoning). Although first-class cities in organized boroughs can normally exercise a wide variety of municipal powers, Barrow has elected to transfermost of its powers to the North Slope Borough. When a borough assumes powers normally reserved for cities, cities in the borough may not exercise the same authority. In addition to the three basic powers mentioned previously, the following municipal powers were transferred to the Borough as the result of an areawide election held April 30, 1974:

- sewer and sewage treatment facilities
- water
- transportation systems, including airport and aviation systems and streets and sidewalks
- libraries
- garbage and solid waste collection and disposal services and facilities
- housing and urban renewal, rehabilitation and development
- preservation, maintenance and protection of historic sites, buildings, and monuments

The police power was transferred to the Borough in an election held July 1, 1976.

The two municipal powers retained and exercised by the City of Barrow are recreation and fire protection. Specific services provided by the City in these areas are described in a previous section of this report. To

pay for these services, a first-class city within an organized borough may levy a property tax not to exceed 30 mills for operating and maintenance purposes and a sales and use tax of not more than 3 percent if it is approved by referendum. If this taxing authority were exercised by the City of Barrow, it would be administered by the Borough and revenues would then be remitted to the City.

Although it has the power to do so, Barrow does not levy a property tax. It does, however, levy a 3 percent sales tax. In 1976-77 the sales tax brought \$183,958 in revenue to the City of Barrow; estimated revenues from the tax for 1977-78 are \$100,000. The expected decrease in revenue is attributed to the closing of the City-owned liquor store as of January 1, 1978 because City residents voted to become "dry." Other anticipated sources of revenue for Barrow during FY 1977-78 are profits from the liquor store (\$200,000), State revenue sharing (\$35,000), refunds from business licenses (\$20,000), rents and leases (\$20,000), sale of City property (\$75,000) and a Bureau of Indian Affairs (BIA) social services contract (\$16,270) for total estimated municipal revenues of \$466,420.

Recreation

The City of Barrow is responsible for recreation programs. A six- or seven-member recreational advisory committee and a recently hired director administer and guide recreational facilities and activities. Local service clubs (VFW, Lions', and Mothers') assist the City in funding a program which provides an older building for ping pong and billiards

The City's recreational program has no direct relationship with the school's program, which includes operating a **summer** camp for local children. (A discussion of recreational land use appears earlier in this report.)

Recreational opportunities are relatively limited in Barrow. Indoor recreation includes two movie theaters (one owned by the Borough and the other by the Arctic Slope Regional Corporation), two **poolrooms**, city-owned ping pong and **billiard** facilities, the school gymnasium, a youth center, and the young **children's play** area in the village **corporation**-owned supermarket. NARL has a theater and a small recreational building, but these facilities are small and restricted to use by camp personnel (U.S. Department of the Navy 1977).

Outdoor recreation in the vicinity includes hunting and fishing by local residents. Because of the rigorous climate, relative inaccessibility, and the absence of nearby big game **and** game fish, there is little local sport hunting and fishing by tourists. Older children and many adults enjoy riding snow machines and three-wheeled motorcycles within the community and in the surrounding area.

There is one playground in Barrow, built in 1977 with U.S. Bureau of Recreation funds. The City invested \$140,000 for outdoor equipment at a now completed 0.6 hectare (1.5-acre) **Browerville** park site. The school has some outdoor play equipment.

Potential Recreational Land Uses

More recreational facilities, particularly indoors, are needed in Barrow. The youth center is severely overburdened since **it** also serves as a community hall (U.S. Department of the Navy 1977). Outdoor recreation potential is restricted by lack of available land. Anticipated development of facilities has been slowed by limited funding.

The City is investigating areas in the older part of the city for another park to be built in **summer** 1978. Possible facilities under consideration at the second site are tennis courts (convertible to an ice skating rink in winter), a baseball diamond, and areas for other field sports. The City is investigating federal funding sources for these park facilities. Potential for other outdoor recreation includes cross-country skiing and boating. The North Slope Borough Department of Public Works has considered the possibility of developing Lower Isatkoak Lagoon into a **small-**boat harbor.

The City has expressed interest in building a library, a dance **hall**, a new theater, and a multipurpose building addition to the community laundry/shower/sauna facility. The 2976 square meter (32,000 square foot) supermarket-department store recently opened by the Barrow **Ukpeagvik** Inupiat Corporation is apparently the first phase of a complex which **will** eventually include a theater, bowling alley, laundry, restaurant, and new corporate headquarters for the Arctic Slope Regional Corporation.

Fire Protection

The City of Barrow provides fire protection services to all areas of the community, except for the state-owned airport and the Naval Arctic Research Laboratory. The **local** fire-fighting force is made up of two partially salaried employees (the fire chief and his assistant) and 22 volunteers.

The fire station is located on Kiogak Street across from the old post office. The building was constructed in 1975 with a U.S. Economic Development Administration (EDA) grant of \$235,000 and \$50,000 in local matching funds. In addition to fire-fighting personnel, the station houses the department's rolling stock, which includes a 3,785-liter (1,000-gallon) pumper truck, a tracked vehicle with the same tank capacity, and a **fully** equipped ambulance. A second firehouse will be built by the City in **Browerville** in 1978. Funded with a \$695,000 EDA grant, the new structure **will** house a new fire truck and several municipal offices upstairs.

Barrow has Insurance Services class ratings of 8 for residential buildings and 9 for commercial structures. This poor rating is largely due to the lack of a public water system. The fire department uses local lakes as a water source in **summer** but in winter must purchase water from Barrow **Utilites** or from a private distributor. The deteriorated condition of many of Barrow's structures, the fact that the department is volunteer (i.e., **not** full-time coverage), and other considerations also contribute to the poor rating. Two of the largest **commercial** buildings in town

(the borough building and **Stuaqpak**) have sprinkler systems, but they are not hooked up to a water source.

Despite the fact that its fire department is well organized and **fire-**fighting equipment is adequate, Barrow remains vulnerable to serious fires, particularly during periods of high wind. Most of the main part of town is very densely developed, and substandard wood frame structures predominate.

LAW ENFORCEMENT

Police protection services in Barrow, as in other traditional communities of the region, are provided by the North Slope Borough **Public Safety** Department. The office of the public safety director and an assistant are **in** the main borough building, but day-to-day police operations are conducted from the old fire hall across from the post office. The Barrow **police** staff is made up of 11 officers and 7.5 civilian support personnel (including 5 dispatchers, 1 records clerk, a supervisor and a part-time janitor). A local magistrate operates out of the District Court building located on the main road between the Borough building and the airport.

The police station dates from 1946 but was remodeled in 1975 to provide space for police personnel and a jail. The station is internally divided into two offices (a squad room and a supervisor's office) plus a dispatch/communications center, a **small** kitchen, a garage, and a holding facility with four temporary detention cells--three for men and one for women.

Juveniles cannot be held in the jail, and no one can be held here for more than 24 hours. Prisoners requiring detention for longer periods are transported to Fairbanks. Although the police station is in reasonably good condition, its area of 464.5 square meters (5,000 square feet) is now much too **small** and the building **lacks** running water. The lack of running water in the building was also cited as a problem. Police equipment consists of two multi-purpose patrol vehicles, **two** staff vehicles and two **snowmachines**.

According to the borough public safety director, almost all law enforcement problems in Barrow are related to alcohol abuse. In **1977** the Borough instituted a policy of detaining severely intoxicated persons from four to **eight** hours and then releasing them without being booked.

Some idea of the scale of the alcohol abuse problem in Barrow can be gauged by comparing the number of arrests and detentions in September 1977, the peak activity month for the public safety department that year. Nineteen persons were arrested on criminal charges, and **102** were detained for their own protection. Most criminal charges, some of them extremely serious (there were four homicides in August/September) were also related to alcohol abuse.

Construction of a new **public** safety building in Barrow is planned in 1981. The site for the new facility has not yet been finalized, but a **location** next to the fire hall on U.S. Weather Service property is seen to be the most desirable. The new building will house the public safety

director and his assistant as well as police officers and support personnel. According to the borough public safety director, the new facility should have more space for law enforcement and emergency medical functions than is presently available.

HEALTH AND SOCIAL SERVICES

Basic health care services in Barrow are provided by the U.S. Public Health Service, which has a hospital in the community. In addition, the Alaska Department of Health and Social Services operates the Barrow Health Center, and the North Slope Borough Health Department is in the process of developing its own health program in the community to supplement services provided by other agencies.

Hospital

The Barrow Public Health Service hospital is a regional facility which serves an area of 217,560 square kilometers (84,000 square miles), the entire North Slope Borough except for the villages of Point Hope and Anaktuvuk Pass. This general medical-surgical hospital was constructed in 1965 and is accredited by the Joint Commission on Accreditation of Hospitals. Although Public Health Service hospitals in Alaska normally serve only Alaska Natives (and foreign seamen), Barrow has no other health facilities, so emergency medical services are also made available to whites on a fee basis.

The hospital has **14** general hospital beds and five bassinets as well as a combined surgery/delivery room, an emergency room, an outpatient clinic, a laboratory and X-ray department, and a pharmacy. **Emergency** transportation service and enroute care are provided by the City's ambulance and emergency medical treatment (EMT) personnel attached to the volunteer fire department. A hospital vehicle is used mostly for nonemergency transport of patients.

The hospital's professional staff includes three doctors, a dentist, eight registered nurses, six to eight nurses' aides, a social worker, a pharmacist, an X-ray technician, a laboratory technician, two medical records personnel, and the hospital superintendent. Another 21 persons perform kitchen, laundry, janitorial, maintenance, supply, and clerical functions. Besides resident medical personnel, the Public Health Service periodically brings in specialists from Anchorage and Fairbanks to hold clinics in Barrow, and a dietitian visits the hospital for three days each quarter. In addition, the North Slope Borough employs an interpreter and a dental assistant at the hospital.

According to Public Health Service statistics, a total of 1,520 inpatient days were logged at the hospital during **FY1976**, with the average length of stay for patients being 3.9 days. During the same year, the outpatient **clinic** received 23,393 visits, an extraordinarily high number of visits for a town of 2,700 **people (plus** some visits by people from other communities in the region). Mental health patients are sent to Anchorage.

The hospital nursing supervisor stated that the health level of Eskimos in the region had risen dramatically during the past 10 to 15 years and that considering the lack of public water and sewer **systems**, local residents maintained a fairly good **level** of hygiene. Tuberculosis, once the scourge of Alaska Natives, is no longer a major health problem. Today, alcohol abuse is considered the community's number one health problem. Other problem areas include upper respiratory infections (such as pneumonia and bronchitis), **otitis** media, skin diseases (such as impetigo), gastroenteritis (much of it alcohol related or due to poor sanitary conditions), strep throat and colds, and accidents (**most** of them alcohol related). Venereal disease and mental health **are** also considered to be problem areas.

Barrow Health Center

The Barrow Health Center is located in a building on the grounds of the Public Health Service hospital and is operated by the Alaska Department of **Health** and Social Services. This facility is normally staffed by two state public health nurses and a borough **community** health aide and is charged with providing a range of public health care services in Barrow and other villages in the region. These services generally come under the heading of disease prevention and **health** promotion and include health education, screening clinics for women (pap smears and venereal disease) and children, communicable disease control and follow-up, immunizations, family planning and maternity care education, well-baby clinics, and a number of other programs.

North Slope Borough Health Program

The North Slope Borough operates health clinics in **all** villages of the region except Barrow (although a new clinic at Point Hope is being funded with **an** EDA grant directly **to** the City). **However**, the Borough is **also** engaged in programs designed to supplement the health care provided by the Public Health Service and in providing health-related services which are needed but which are not locally available.

Except for its system of health clinics, the Borough health program is still in its formative stages. The Borough **Health** Department has given top priority to upgrading the **level** of mental health, dental, optometric, and alcoholic detoxification and rehabilitation care available to North Slope residents. Toward this end, it was interviewing applicants for the positions of a psychologist and a paraprofessional assistant in early 1978. **In** addition, it is acquiring the services of a second dentist in Barrow. This person will operate out of the **Public Health** Service hospital, but his salary will be paid by the National Health Service Corps with the Borough supplementing the cost of his and an assistant's travel to smaller **communities** of the region. Other scheduled improvements include the establishment of an alcoholic detoxification and rehabilitation program at the Barrow hospital and initiation of optometric care.

The **old** Barrow post office building has been acquired by the Borough and will be remodeled to **accommodate** health administration and social

services offices **plus** a senior citizens' center. The psychologist and his assistant and the newly trained optometrist will operate from this building, as will members of the health department staff.

EDUCATION

Educa tion in Barrow is provided by the North Slope Borough School **Dis- trict**. The school district is responsible for hiring teachers and **main- taining** the school plant, while the Borough is responsible for the con- struction of new school facilities, as required.

At the present time, **all** school children in Barrow are housed in one cen- trally located complex on **Okpik** and **Momegama** Streets. The main school building was constructed by the Bureau of Indian Affairs in 1965, and nine temporary classrooms have been used by the school since January 1976. Vocational education and vocational education technology classrooms were added in 1975 and 1976.

Included within the Barrow school plant are 22 elementary (early child- hood education through the sixth grade) classrooms and 15 high school (seventh through **12th** grade) classrooms. In addition, there is a gymna- sium, a multipurpose room/lunchroom, a kitchen, an instructional materials center, two nurses stations, a **TV** studio, 10 offices, nine storage rooms, and five mechanical rooms. The school site covers an area of about 5 hectares (**12.36** acres). Approximately 75 percent of this is covered by school buildings with the remainder being devoted to playground facilities and maintenance shops.

In addition to regular academic courses, the **school** offers a number of special programs. Title I federal funds provide individualized instruction in mathematics, reading, and language. Special education in language, speech, mathematics and reading is available to primary and intermediate students, while improved **skills** in English **communication** are taught through music and language classes. Summer school is provided for junior and senior high school students. A day care center, developed in cooperation with the high school work-study program, provides **after-school** child care for working parents between **2:30** p.m. and **6:00** p.m., and a drop-in center provides crisis care for children whose homes are temporarily unsafe or unhealthy. The instructional materials center offers a recreation program before and after school which includes story telling, songs, movies, and other similar activities. Finally, during **nonschool** hours the school multipurpose room and gymnasium are open for **community** league basketball, public meetings, and such special events as the Arctic **Winter** Games and the Eskimo Olympics.

The Barrow school is one of the largest employers in town. The professional staff includes **54** teachers (25 elementary and 29 high school), six administrators, a nurse, and nine secretaries. In addition, there are 33 aides, including people with special skills in traditional crafts as well as general classroom assistants. The kitchen has a staff of 13, and there are **18** maintenance personnel. Janitorial and transportation services are contracted.

The school **complex** is in fair condition with an estimated remaining

useful life of 12 years for the main complex. Major problems include plumbing and inadequate space, but both of these should be relieved with planned renovations to the **school** plant and the construction of a new high school and vocational education facility in 1979.

As presently planned, the new school complex will be designed to **accommodate** general community as well as student needs and will contain 16 general classrooms, a learning resource center, two science laboratories, two business education rooms, and a home science room. The new facility is also planned to house a trades and industries area, including constructions (i.e., woodwork), power mechanics, welding/metal, drafting, and career work study rooms; a physical education area, including a **gymnasium**, **swimming** area and indoor ice activities; a fine arts area, **including** an art room, a band/chorus room and TV production studio; and auxiliary spaces such as an auditorium, administrative offices, and food services. The total floor area of the new school facility is tentatively planned to be approximately 9,290 square meters (100,000 square feet) and is currently estimated to cost between \$24 and \$25 million. However, it is highly likely that the facility **will** be scaled down before it is actually built.

Final enrollment in the Barrow school system in 1976-77 was 618 students, a decline of 11.3 percent from the peak year of 1970-71 of 697 (see Table 34). The 1970-71 figures, however, included 51 "beginners", an equivalent of the early childhood classes now offered by the Borough but which are not counted in State statistics. Even when these **students are**

TABLE 34

ENROLLMENT TRENDS
FINAL ENROLLMENT, BARROW, ALASKA
1959-60 - 1976-77

Year	Grades K - 8		Grades 9 - 12		Total
	Number	% of Total	Number	% of Total	
1959-60	356	100.0			356
1960-61	380	100.0			380
1961-62	340	100.0			340
1962-63	458	100.0			458
1963-64					469 <u>a/</u>
1964-65					465 <u>a/</u>
1965-66	526	100.0			526
1966-67	493	88.8	62 <u>b/</u>	11.2	555
1967-68	517	92.0	45 <u>b/</u>	8.0	562
1968-69	459	93.3	33 <u>b/</u>	6.7	492
1969-70	650 <u>c/</u>	93.9	42 <u>b/</u>	6.1	692
1970-71	667 <u>c/</u>	95.7	30 <u>b/</u>	4.3	697
1971-72	615 <u>c/</u>	88.5	43 <u>b/</u>	6.2	695 <u>d/</u>
1972-73	613 <u>c/</u>	89.9	30 <u>b/</u>	4.4	682 <u>d/</u>
1973-74	544	92.4	45 <u>b/</u>	7.6	589
1974-75 <u>e/</u>					
1975-76	504	82.5	107	17.5	611
1976-77	498	80.6	120	19.4	618

a/ No breakdown by grade available.

b/ High school classes 1966-67 through 1973-74 limited to the 9th grade.

c/ Elementary school enrollment includes early childhood classes.

d/ Total enrollment includes special education (ungraded) students.

e/ No enrollment data available for 1974-75.

Source: Alaska Department of Education.

subtracted from the total, all of the decline has taken place in the elementary school, where **final** enrollment dropped from 616 in 1970-71 to 498 in 1976-77, a decrease of 19.2 percent. A complete high **school** program was not offered in Barrow **until** 1976-76; however, final enrollment in the ninth grade has remained fairly constant during the past 10 years.

Declining school enrollments have been experienced in many school districts around the state in recent **years** as a result of a declining birth rate, an occurrence that is being felt nationwide. At the time of the 1970 census, the largest age group in Barrow was children between five and nine **years** old. Most of these children are now in high school, and their place in the elementary grades **has** been taken by a numerically smaller group.

Another factor in the decline in elementary enrollments in Barrow is believed to be the **outmigration** of young adults from the community to resettle the traditional villages of Atkasook, Point Lay, and **Nuiqsut**. The combined **final** enrollment for elementary students at Point Lay and **Nuiqsut** in 1976-77 was 80 students, almost all of whom **would** otherwise have been attending school in Barrow. While Barrow's population is believed to have grown since 1970, despite this planned **outmigration** of Eskimos, the group which has replaced them contains a high proportion of whites with few or no dependents. (The Barrow school system reported only 53 white students in 1977-78, 42 of them in the elementary grades.) Future trends in school enrollment in Barrow are **likely** to be influenced

not only by Native birth rates but also by immigration by whites from outside the region.

UTILITIES

Basic utilities service in Barrow is critical for economic development of the community and for the physical health and survival of its inhabitants. Under winter conditions of darkness and severe cold (averaging $-18^{\circ}\text{F}[-32^{\circ}\text{C}]$ in February with a wind chill factor of $-55^{\circ}\text{F}[-99^{\circ}\text{C}]$), safe and reliable heating and electricity is essential. In a location where limited clean water sources are frozen for at least eight months of the year, methods of water supply, storage, and distribution and disposal of liquid wastes must be developed to guarantee minimum standards of sanitation. Surface drainage must be controlled so that spring thaw does not produce annual flooding of low-lying homes.

Unfortunately, most of the utility systems in Barrow needs significant improvement. Water and sewer service is limited to a few governmental and commercial facilities, and the extremely costly extension of service to all of the homes in the city is unlikely for a number of years. The gas supply and distribution network for Barrow and NARL is dangerously unsafe and in need of immediate repair. There is no storm sewer system. Surface runoff is now dammed by raised roadways, and a plan for providing culverts is proceeding very slowly.

Water, Sewer, and Solid Waste Disposal

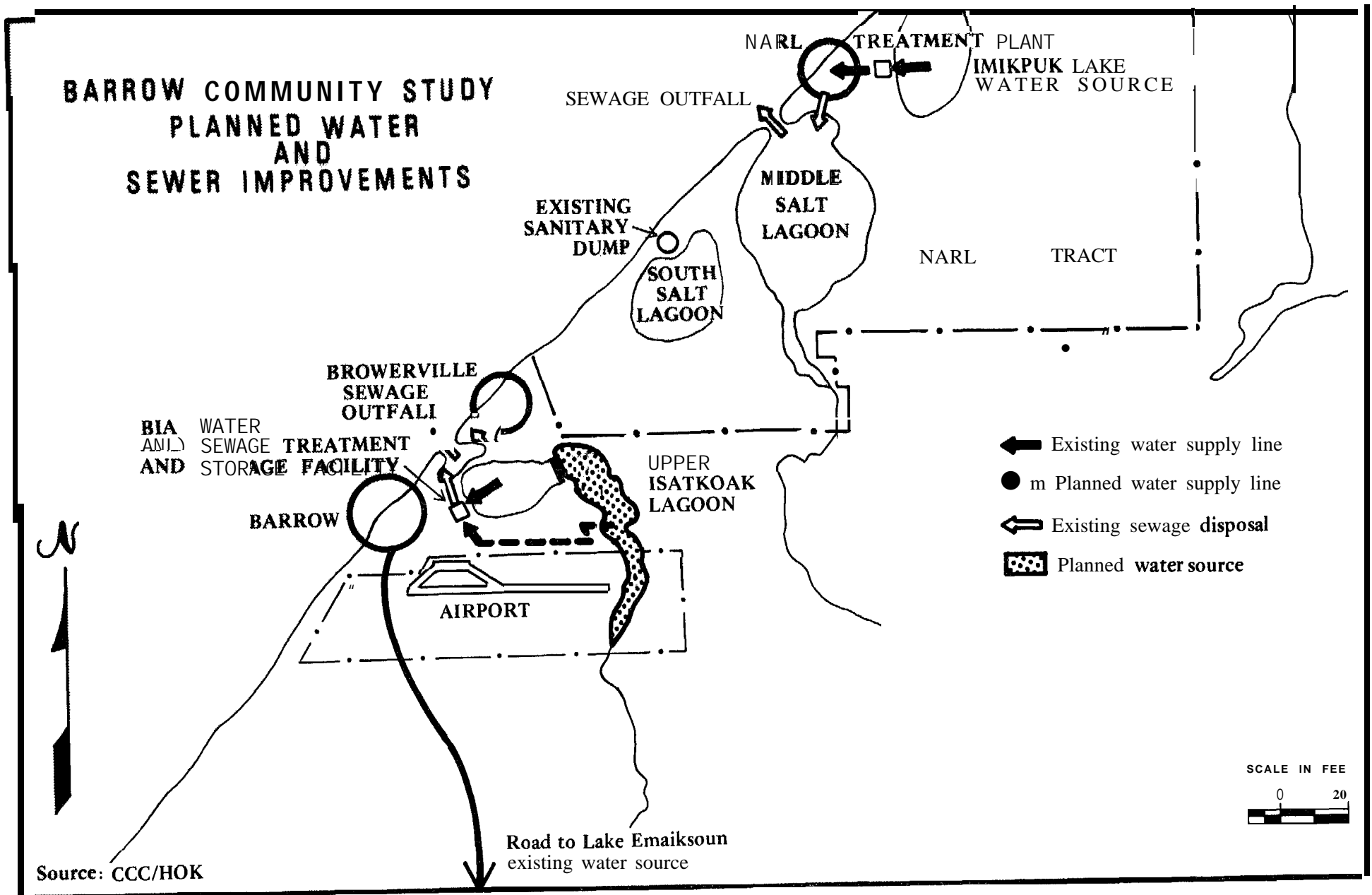
Barrow is the largest community in Alaska without a piped water supply and sewage disposal system. **With** the exception of a few governmental facilities, **all** housing, commercial, and other government buildings rely on costly purchase of hauled water or ice and inconvenient and often unsanitary disposal of stored wastes.

The provision of city-wide water distribution and sewage disposal systems has long been planned, but high costs and federal agency priorities have delayed construction. Such factors as a limited supply of potable water, technical difficulties of piping and storing water in an extremely cold climate, and a limited number of housing units to be served have historically made unit costs extremely high (see Figure 15) .

The recent implementation of an interim water supply and sewage disposal system has allowed for the construction of new housing, which in turn justified federal funding of the first phases of a long-range plan. These improvements will eventually create a utilities infrastructure which will allow for more upgrading of existing housing and more systematic growth of the community. Without this infrastructure, the community may not be able to support some of the new **commercial** and industrial development that could diversify its economy and provide additional **ser-**vices.

Water. There are two separate water systems in the Barrow area, that of the Barrow **community** and that of the Naval Arctic Research

FIGURE 15



Laboratory. The latter facility is physically isolated from the rest of town and uses **Imikpuk** Lake as its water source. Treatment includes desalination, which has been necessary since 1963 when the lake was flooded by a storm surge. Water is piped to the dining hall and laboratory and is trucked from the boiler to storage tanks at other buildings.

The Navy **plans to** utilize **Imikpuk** Lake as a water source for the **foreseeable** future (John Graham & Company 1973). The planned capacity of **the** treatment unit was 30,000 gallons per day. A second unit of similar capacity was to be installed **when** needed, however the treatment unit has not performed reliably. The camp's reservoir capacity is unknown, but it is estimated that per-capita water usage is nearly 125 gallons per day (ITT Arctic Services, Inc.).

In town, a limited system was originally developed by the Bureau of Indian Affairs and the Public Health Service to serve the hospital, school, **and** nearby employee housing. **Until** recent upgrading, raw water from lower **Isatkoak** Lagoon was pumped to a plant in town owned by the **Bureau** of Indian Affairs but operated under contract by the Barrow Utilities and Electric **Co-op**, Inc. (**BUECI**) where **it** was distilled and then chlorinated before being piped to these government installations. In January 1978 the **Public** Health Service completed construction of a dam across **Isatkoak** Lagoon to create a new water reservoir in the upper lagoon. From an intake building with a heating plant at the dam site, a 7,500-foot transmission line runs to the **BUECI** plant in town where the water is treated by a clarifier and a reverse osmosis system, chlorinated, and stored in a **BUECI** 100,000-gallon tank and a new **Public Health** Service

600,000-gallon **tank**. The hospital, school, and associated government housing now use piped water from this source as it is clearly superior in quality to that from lower **Isatkoak** Lagoon. According to Public Health Service officials, reverse osmosis should not be necessary once the new reservoir **fills**.

The new water source and water storage capabilities have been designed as the first phase of a community piped water system for Barrow and have been engineered to supply 5,000 people with 454.21 **liters** (120 gallons) of water per day. This is **almost** double the town's present population and many times current per capita rates of water usage.

The development of a safe water source is an important step. However, most **people** in Barrow **still** must individually haul water or purchase it from private operators. The private operators obtain their water from the **BUECI plant** and deliver to individual homes or businesses, some of which have large storage capacities to permit the use of running water. Other Barrow residents **haul** their own water or ice from **Emaiksoun** Lake about 6.4 kilometers (4 miles) south of town or purchase untreated water or ice hauled by truck from the same source.

Emaiksoun Lake however, is an unsanitary and unreliable **source of** potable water. The lake is **only** 1.35 meters (54 inches deep), and winter supplies of ice have run out as early as January in some years (U.S. Department of the Navy 1977). When the lake has not completely frozen to the bottom, water beneath the ice has been nearly completely pumped out, leaving only

small amounts of brackish and muddy water (Dupere & Associates 1973). Possible contamination of the lake at the source and of ice outside of houses may contribute to the periodic outbreaks of hepatitis in the village.

The lack of a conventional piped water system in a town of Barrow's size causes daily inconvenience for almost all local residents. It also poses significant health and public safety hazards. According to the Public Health Service, the development of an adequate water and sewer system in the community is essential if local health levels are to be upgraded. In particular, it believes that the incidence of skin infections, neonatal diarrhea, gastroenteritis, and most communicable diseases would decline in Barrow if there was a piped water and sewer system and possibly, also, the incidence of mental illness and alcoholism. Aside from health problems, the lack of piped water and hydrants makes fire protection more difficult and dangerous. This, in turn, is reflected in relatively poor Insurance Services class ratings and, thus, in high fire insurance premiums.

The major factor in the long delay in construction of a water and sewer system at Barrow appears to be its very high cost. The most recent estimate developed by the Public Health Service for a water distribution and sewage collection system at Barrow was about \$30 million. Furthermore, this estimate is undoubtedly low as it was based on an aboveground system, whereas the North Slope Borough wants a buried system.

Normally, the Public Health Service participates up to 100 percent in the construction **of** water and sewer systems for Alaska Native communities. However, these systems are generally primarily residential as the basic philosophy behind this agency's involvement in sanitation facilities programs **is** not to build **community** water systems so much as it **is** to provide safe and potable water to Alaska Natives as **a** means of upgrading Native health levels. Barrow obviously requires more **than** a residential system. Since additional funds are not immediately forthcoming from the Public **Health** Service, the Borough has determined to proceed with the design portion of a community water and sewer system by itself, with the **Public** Health Service to participate as soon as possible. To this end, the Borough has set aside funds to undertake preliminary engineering work. The Borough is **committed** to having piped water in Barrow at **the** earliest possible date. **The** need for such a system is already apparent and is becoming increasingly urgent as **the** construction of **new** public and commercial buildings and multi-family units takes place.

Sewage. **The community** of Barrow and the Naval Arctic Research Laboratory have completely separate systems for the disposal of sewage and solid wastes. Furthermore, Barrow has two different sewer "systems". Sewage from the hospital, school and associated government housing is treated but that from the remainder of the **community** is **hailed** to the local dump.

Wastes at **NARL** were **originally** stored in 55-gallon drums and left on **the** ice to go out to sea at break-up. However, this method of disposal

proved **to** be undesirable because some of the barrels drifted back to the beach. A number of other methods of disposal were tried over the years, none of them entirely satisfactory. Today, waste water from the laboratory is fed into a **comminutor** to pulverize wastes before primary and secondary treatment and discharge into Middle Salt Lagoon. Kitchen, shower and waste water is discharged into the ocean via an **old** sewer line.

In Barrow, sewage from the school, hospital and associated government housing is treated by extended aeration, chlorinated and dumped into a sewage lagoon only 3 meters (10 feet) away from **Lower Isatkoak** Lagoon which was, until **very** recently, the community's water source. The proximity **of** the two facilities was **highly** undesirable since there was a danger that spray from the plant outfall **could** be picked up by the wind and pathogens transferred from the sewage **lagoon** to the water supply lagoon. Largely because of this, a new water source was developed on upper **Isatkoak** Lagoon. Local residents, especially those in **Browerville**, also complain about the **smell** associated with the sewage lagoon and treatment **plant**.

Honeybucket wastes from the remainder of Barrow and trash are collected by Borough trucks or a private operator and hauled to the **local** dump at South Salt Lagoon, about half way between town and the Naval Arctic Research Laboratory. Residential collection service is presently provided by the Borough free of charge but a fee is scheduled to be imposed in **1978**. (Raw sewage from commercial structures is **billed** by the Borough at 5 cents per gallon.)

Drainage

Some residential **areas** of the city are susceptible to flooding during spring thaw. These are older homes constructed **close** to the **ground** with inadequate foundations, which contribute to dampness and structural deterioration (John Graham & Company 1973). Most of the newer homes have been **built** on pilings, and much of the commercial area is built on a continuous gravel pad which was laid **over** ponds and potholes.

Spring runoff is light because annual snowfall amounts rarely exceed 0.75 meters (**30** inches). However impervious ground conditions combined with road barriers that block surface **flow create** standing water and ponds that sometimes remain **until** freezeup. Because surface **soils** in the region are highly susceptible to erosion, there has been reluctance to excavate drainage ditches or trenches for underground drainage pipes. Some runoff is diverted into culverts and directed towards natural drainage channels, but additional cross-drains are needed.

The 1973 Barrow Regional Master Plan (John Graham and Company) discussed options for alleviating drainage problems in the city. An underground drainage system was ruled out because of the potential construction **problems** with permafrost, extensive ice lenses 0.6 to 0.9 meters (2 to 3 feet) thick, and the need for insulated pipes. The **plan** recommended filling of **all** residential areas with **gravel** to a depth of 0.6 meters (2 feet) and raising some residential streets an additional foot to divert water to natural channels. A few existing houses would have to be raised as the fill material is brought in.

In 1976 an alternative plan, prepared by H.V. Lounsbury Associates, provided for a total of approximately 20 culverts to be built and 10 to be replaced in the older part of Barrow, approximately 10 culverts to be built and 10 to be replaced in **Browerville** (where most newer housing has been built), and eight new culverts in **Block "A"**. The Barrow and **Browerville** system drains into the sea and Block "A" drains into **Isatkoak Lagoon**. Thus far, the Borough's public works department is repairing streets and adding culverts on an as-needed basis, with no particular reference to the plan.

Electrical Power and Heat

Unlike other traditional villages in the North Slope region, electric power in Barrow is gas-generated. In addition, natural gas is piped via an "above ground" system directly into individual homes and other **structures** in Barrow and **Browerville**. A second electric and gas system serves the Naval Arctic Research Laboratory area.

The history of electric power and heating utilities in the Barrow area is a long and complicated one. For many years, Barrow used coal hauled from a mine at **Atkasook** as its primary fuel source. However, following the discovery of the South Barrow gas **field** by the Navy during its 1944-53 **exploration** program in NPR-4 and the successful conversion to natural gas by the Naval Arctic Research Laboratory, the government agencies (Bureau of Indian Affairs, Public Health Service, Weather Bureau and Bureau of Standards) requested permission from the Navy to

use gas at their facilities in town. Approval was granted and the **con-**version to natural gas was undertaken in 1958.

The **City of** Barrow petitioned Congress in 1959 requesting that the community be allowed **to** purchase natural gas from the Navy. Congress passed a bill making this possible in 1962 and the federal agencies in charge of the Barrow pipeline were authorized to transmit the gas for non-government consumption. After a brief period when the **Golden** Valley Electric Association obtained a **local** power generation and distribution franchise and installed an electric distribution system in the **community**, the Bureau of Indian Affairs assisted in the formation of **BUECI**, then Barrow Utilities, Inc. Installation **of** gas lines in town did not begin until 1964.

In 1968 the quantity of recoverable gas in this field was estimated at 7.7 billion **cubic** feet **a** 15-year supply. By 1972 an estimated **11.6** billion cubic feet, sufficient for seven or eight years, was thought to remain. Before Barrow renegotiated its contract with the Navy in **1974**, additional wells were drilled **which** gave some positive signs of success. A 1976 study by **H.J. Gray & Associates** indicated that there were 16.1 billion cubic feet of recoverable gas remaining in the field, enough to meet demand requirements (increasing at a rate of 5 percent per year) **until** 1986 (U.S. Department of the Navy 1977).

Gas pressure in the **field** began **to** drop in 1976, and the North Slope Borough pressed for further drilling. In February 1977 a "significant

reserve" of gas was discovered by Husky Oil. Although the exact size of the discovery has **not** been confirmed, indications are that there are sufficient quantities to serve Barrow's needs for at least 20 years.

The cost of gas for **Barrow** customers has always been a source of concern. In 1974 **commercial** rates were **\$1.25** to \$1.65 per thousand cubic feet (MCF), and residential rates **56¢** per MCF. Government installations got their gas free, and consequently there was much waste. In 1976, the borough negotiated an agreement with the Navy under provisions of the Naval Petroleum Reserve Act of 1976, which reduced the wholesale costs to the Borough's utilities contractor, Barrow Utilities and Electrical **Co-op, Inc.**, to **\$.32.4/MCF** for both residential and commercial customers. **At** the same time, a rate of **\$.61.4/MCF was** established for governmental customers.

Today, electric power and natural gas are provided to all users in the immediate Barrow and **Browerville** area except for the Naval Arctic Research Laboratory camp by **BUECI**, a member-owned cooperative set up with the assistance of the Bureau of Indian Affairs. Gas **from** the South Barrow gas field is purchased from the Department **of** the Interior and transported to Barrow via a 15.24 centimeter (6 inch) all-welded steel pipeline at a pressure of 200 **lbs.** per inch. Pressure is reduced in **two** stages using pressure reducing valves to 80 **lbs.** per square inch and down to 20 **lbs.** per square inch before entering the community distribution system.

According to **BUECI** officials, the 15.24 centimeter (6-inch) gas transmission line is in good repair. However, the gas distribution system was constructed under the supervision of the Bureau of Indian Affairs with surplus Navy pipe which is mounted on top of 55-gallon drums sawed in half through **much of** town. Significant leakage problems have been experienced and accidents periodically occur when **snowmobilers** crash into the **lines** (although serious damage to date has been to the snowmobiles, not the lines).

The prevalence of bent pipes between houses is evidence of the frequency of these accidents. No backup system exists for use while a **faulty** section is being repaired. Also, when the pipes are broken, there is risk of explosion and fire. If an explosion were to **occur** between closely spaced homes or near the PHS Hospital, for example, there could be a disaster.

The U.S. Army Corps of Engineers has designed a replacement pipeline system for the BIA. The planned project would replace **all** the 20-psi piping and existing pressure regulators at each building (Bureau of Indian Affairs 1976). All pipe **would** be elevated on steel supports, which would be backfilled and frozen into **place**. Old clamp joints would be welded using weld fittings, and pipes **would** be sized to handle future load requirements. Alignments would follow property **lines** to permit orderly development and inspection.

The \$6.4 million project estimated to require 18 months to complete, has

not yet begun. **Funding** would come entirely from **BIA**, and construction would utilize local labor crews. To obtain the necessary federal funding, a **tri-party** agreement was made **between** BIA, the Borough, and Barrow Utilities and Electrical **Co-op (BUI)** in September 1975. In principle, this agreement provided for:

- Forgiveness by the **BIA** of a \$750,000 loan of indebtedness of Barrow Utilities, Inc., so that BUI **could** obtain the necessary new funding for expansion of service and system maintenance once the gas pipeline improvements are made;
- Transfer of distribution system owned by **BUI** to BIA (carried out in 1976);
- **BIA** upgrading of the entire gas distribution system to meet federal pipeline standards; and
- Transfer of the system to the borough, which would contract **BUI** for its operations and maintenance.

The Borough is also planning for new gas **and** electrical distribution in **Block "A"** and renovation of existing power lines in Barrow. The Draft 1977 Capital Improvements Program allocates \$330,000 for gas distribution and \$200,000 for electrical distribution to 163 lots in Block "A". Approximately 100 power poles have been shipped **to** Barrow for this project. Although no contracts have been negotiated pending resolution of litigation which suspended the CIP, the Borough rates both of these as high priority projects.

Barrow's electric power is gas-generated. However, **BUECI's** main **genera-**tor is a 2,500 **kw dual-fuel** unit which permits a switch over to liquid

fuel if gas supplies are disrupted. The power plant also houses **two** 750 **kw** gas turbines which are used for standby power and a 450 **kw** unit for use in emergencies.

Normal loads on Barrow's electric power system have recently been averaging between 1,000 and **1,500** kw, with peak **loads** in 1977 approaching 1,600 **kw**. **While** the system's generation capacity is adequate **to** handle present demands, continued rapid growth in electric power consumption in Barrow is expected with the construction of new buildings such as the **ASRC** building, a new high school, new Borough structures and new multi-family complexes.

The Naval Arctic Research Laboratory's electric power and natural gas systems are independent of those of Barrow. Gas is transmitted from the South Barrow gas field via a **10.16** centimeter (4 inch) line mounted on barrels and drums. This line is reportedly in poor condition. Electric power is provided by four 800 dw dual-fuel generators.

Although the **BUECI** and NARL systems have individual deficiencies, the most serious problem facing electric power and gas systems in the Barrow area is the present lack of back-up capacity in the event of a serious interruption in service. The **lack** of a back-up capacity for natural gas service **could be** particularly serious if there was a failure of either system in winter since there would **be** no alternative heating source. Recognizing this, the development of gas and electric inter-ties to **connect** the **BUECI** and NARL systems has been proposed. However, development **awaits** decisions as to funding.

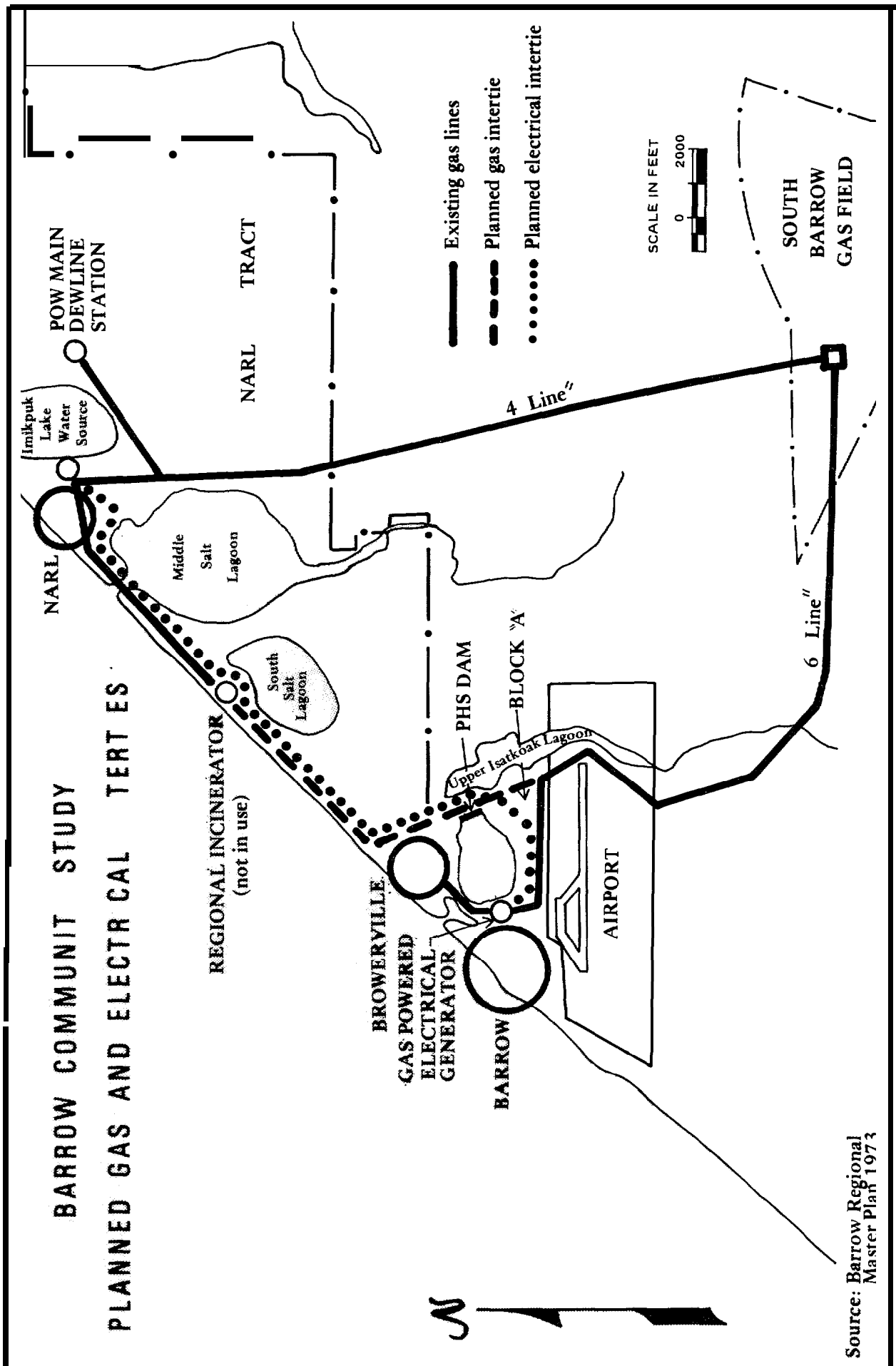
The Borough's Draft **1977** Capital Improvements Program included both a gas and electrical intertie between the city and **NARL**. The Borough anticipates that funding for the estimated \$625,000 gas **intertie** and the \$375,000 electrical **intertie** would be shared among the Borough, Barrow Utilities and Electrical **Co-op, Inc.**, and the U.S. Navy. These costs were originally identified in the 1973 master plan, so undoubtedly they have escalated since then.

Figure **16 shows** the recommended alignments. The 3.2 kilometer (two-mile) long gas tie in would extend from the incinerator building, southwest along the Beach Road along the easterly boundary **of Browerville**, across **Isatkoak** Lagoon, and to the 15.24 centimeter (6 inch) line at the easterly limit of Block "A". The new 15.24 centimeter (6-inch) **welded steel** pipe **would** be elevated **to** 1.2 meters (4 feet) along the Beach Road and not less than 2.4 meter (**8** feet) in the vicinity of **Browerville** and Block "A", with additional height for street crossings. A pressure-reducing **valve** and meter could be added in **Browerville** to serve that area and to provide a second point of supply to Barrow across the lower sewage lagoon dam.

The planned 15-kilovolt electrical intertie **would** be mounted on conventional 45-foot power poles spaced at approximately 39 meters (130 feet). Two transformer banks and switching systems would be built in enclosed metal buildings of approximately 6 meters by 9 **meters** (20 feet by 30 feet) for ease of maintenance and operation during adverse weather. The 6 kilometer (3 3/4 mile) long recommended alignment extends south from

FIGURE 16

BARROW COMMUNITY STUDY PLANNED GAS AND ELECTRICAL TERTES



Source: Barrow Regional Master Plan 1973

the NARL power plant to **Imikpuk** Lake along the Beach Road (parallel to the existing 2,400-v feeder) to the incinerator, to **Browerville** and south across the new dam to the BIA power **plant**.

Communications

Activities in the Arctic can be severely hampered by marginal or limited communications. Telephone **communications** provide a link to specialized medical facilities in emergencies, to suppliers of essential **community** materials, and cultural interchange between isolated communities in the region. **Barrow** currently has radio, public television, and **cable** television services.

In February 1977, an earth satellite communications station began operations in Barrow. This station replaced the poor quality General Telephone system installed **12** years before. Some of that equipment was 30 years old. Electronic switching was installed in the school and government offices, and the number of long distance lines was increased from eight to 20. General Telephone expects to provide electronic switching capability for all telephones in the city in 1978. Cable buried beneath the streets can serve an eventual capacity of 1,300 phones.

Today there are approximately 850 telephones in the city, double the number of just three years ago. Requests for phones average approximately three a day. Hookup fee is \$30 for residences and \$50 for businesses. Monthly charges are **\$16** and **\$21** a month, respectively.

The earth satellite station can also perform other functions, such as transmission of radio and television broadcasts.

Transportation

The **only** passenger transportation available between Barrow and other communities is by airplane. Cargo is either delivered by barge or supply ship during the short ice-free season **or by large** cargo planes year round. There are two airports in the **community** but no marine facility for direct off-loading of cargo. Goods are **lightered** to shore in **small** vessels and unloaded on the beach. None of the roads in the community is paved. Their condition varies from wide, well-maintained gravel surfaces **to** narrow, soft or badly eroding roads. Sidewalks are nonexistent, and pedestrian safety is jeopardized by reckless snowmobile drivers. Overland transportation beyond Barrow consists mostly of snowmobile transport to hunting and fishing camps. Tractors and all-terrain vehicles transport some supplies overland to petroleum exploration base camps in National Petroleum Reserve-Alaska (**NPR-A**).

AIR TRANSPORTATION

Barrow is served by commercial air transportation to the state-owned airport **south** of the village and by military aircraft to the Navy's airstrip at NARL.

Operations

Wien Air **Alaska** maintains scheduled service to the **Wiley** Post/Will Rogers Memorial Airport at Barrow. As of this writing, however, **Wien** pilots are on strike, service has been disrupted, and more costly air transportation via smaller carriers has become necessary in some cases. **Wien's** normal service is daily during winter and twice daily during **summer** via 737 jets from Fairbanks. Other scheduled service is two or three times a week via nine-seat Frontier Flying Service aircraft and Great Northern Airlines, Inc. jet from Fairbanks. One-way passenger fares from Fairbanks to Barrow via **Wien** are \$77.24 and via Frontier **Flying** Service, \$123.26.

Interregional air transportation has increased significantly since discovery of **oil** on the North **Slope** in 1968. The Wiley Post/Will Rogers Memorial Airport is also used as a transfer point for scheduled aircraft originating at **Wainwright** and for charter operations to other communities or hunting and fishing areas. British Petroleum has a daily round-trip flight via Twin Otter to **Prudhoe** Bay for **commuting** employees. The **total** number of revenue passengers boarding scheduled and unscheduled aircraft at Barrow nearly doubled **from** 1966 to 1970, from 4,682 passengers in 1966 to 9,119 in 1970. By **1975** the annual number of **enplaned** passengers rose to 12,000 (Federal Aviation Administration 1976).

The airport also serves unscheduled **cargo** planes, such as C-130 Hercules aircraft, carrying goods for the **community** as well as for certain NARL operations. Navigational aids allow for 24-hour-per-day, all-weather

landings throughout **the year**. Most cargo comes **via** U.S. Postal Service **parcel** post **or** by private charter air carriers. The two principal **inter-regional mail** carriers are Wien Air Alaska and **Alaska** Airlines. Although airmail **costs** are considerably lower than air **freight** costs, **airmail** is restricted to relatively small, light cargo. Hercules-type and other cargo aircraft **handle nearly all** of the total tonnage delivered to North Slope communities. For example, the North Slope Borough chartered the Air Force's largest propeller-driven aircraft, a **C-133B**, to transport its new 7.2 meter (24-foot) by 2.1 meter (7 foot), **18,140** kilogram (20 ton) electrical generator to Barrow in November 1976. Some air freight is handled by major airlines and air taxi companies. Large commercial jets are **sometimes** used to ship specialized cargo.

Most NARL operations use contract and charter aircraft. **Generally, the** Hercules aircraft is the most efficient for moving drill rigs, cement and fuel hauling, and transportation of outsized **cargo**. The Lockheed Electra is used for general cargo resupply and passenger movement. Helicopters are used for **oil** exploration survey, scouting, and cleanup operations (U.S. Department of the Navy 1977). It is anticipated that both the state airport and the NARL strip **will** be used to support current exploration.

Airport Facilities

The Wiley Post/Will Rogers Airport was built in the early 1960's on a 293 hectare (732-acre) parcel of state-owned land adjacent to the **older,**

southern portion of Barrow. Its location was determined by an existing underlying gravel bar. The runway is 1981 meter (6,500 feet) long and 45 meter (150 feet) wide, covered with an asphalt like surface, and is perfectly aligned with the prevailing easterly winds. There is also a paved taxiway and apron, limited fuel storage (particularly when compared to storage **facilities** at NARL), the FAA Flight Service Station, an air charter service hangar, the State Division of Aviation office, and a new Wien terminal. Navigational aids include the recently installed FAA Very High Frequency **Omnirange** and Tactical Air Navigation (**VORTAC**) facility south of the airport, **radio**, UHF, and VHF directional finders, and visual landing aids (lights). Other approach aids include high-intensity lights along the runway and medium-intensity taxiway lighting.

The NARL airport includes a terminal building, storage warehouses, two hangars, and extensive fueling facilities, consisting of five tanks with **a** total gasoline and JP-5 jet fuel capacity of 9,063,000 **liters** (2,385,000 gallons). The 1524 meter (5000 foot) airstrip was built in 1946 adjacent **to** the beach along a northeast-southwest alignment. In 1963 approximately **70** percent of the strip was destroyed during a storm. After repairs in 1964, steel planking was laid in the center 15.24 meter (50 feet) of the 45 meter (150-foot) wide surface. Although the steel deck is painted with antiskid paint, it is extremely slippery when wet. The runway and taxiway are illuminated with high-intensity lighting. Navigational aids consist of two rotating homing beacons, ground-to-air radio communication, and wind-measuring equipment.

In addition to the airstrip at NARL, a **floatplane** airstrip operated in **summer** on Middle Salt Lagoon south of camp. In winter, **planes** with skis can land on one of two ice strips in **Imikpuk** Lake just north of camp. These **small** facilities are essential to operation of outlying research sites. Facilities **at** the **summer** strip consist of fuel tanks and a **vehicular** approach, which also serve ski **planes** in winter (John Graham & Company 1973).

The NARL airstrip serves the laboratory itself, the **DEW** Line station, and oil exploration in **NPR-A**. The better-equipped state airport at Barrow **could** meet NARL needs as well as those of the **community**. The need for and cost of maintaining two airports in a community of less than 3,000 people is open to question. The NARL airstrip **is poorly** oriented to the prevailing easterly winds and three rows of quonset-type camp **buildings** are located on the east side of the last 914 meter (3,000 feet) of the runway approach pattern. Normal landings from the southwest are extremely hazardous if crosswinds are strong.

The 1973 Barrow master plan suggested that consideration **be** given to consolidating all air operations at the Barrow airport. Not only is **the** Barrow airport equipped with navigational aids for all-weather operation but its orientation to prevailing winds is much safer than at NARL. Further, the community strip is protected from the effects **of** storm surges which could again destroy the NARL airstrip. However, since the Barrow airport has no **fuel** tanks, **new** ones would have to be **built** near enough to the coast to receive fuels pumped from barges yet close enough to the apron to allow for aircraft refueling.

Both the **State** and the Borough would play a role in such a consolidation. The State Division of Aviation **could** lease undeveloped state land surrounding the airport for industrial purposes and fuel tanks as long as this was consistent with state policy. The division would try **to** restrict warehousing activities to privately owned land near the airport. Improvements by the federal government or private industry **would** include expansion of existing apron and servicing areas.

The Borough has land south of the airport (Block "B") which has been designated for future industrial or warehouse development. It is approximately **1.2** kilometer (**3/4 mile**) wide and extends south of the airport along the coast approximately 2.4 kilometer (1 1/2 miles). Portions of Block "B" have been platted by BLM.

Expansion possibilities at the NARL base have not been analyzed, but informal assessment indicates that while there is space along the coastline within the 1800 **hectare** (4,500-acre) research tract, it is not contiguous to the NARL camp. The presence of **Imikpuk** Lake to the north and Middle Salt Lagoon to the south restricts linear expansion of the camp.

MARINE TRANSPORTATION

Marine transportation to Barrow consists of annual deliveries of **community** goods via cargo ship and shipments of supplies to NARL and **NPR-A** exploration operations via barge. Because waters off Barrow are shallow,

approximately 2 meters (6 feet) deep to 305 meters (1000 feet) offshore, all goods except petroleum products, **which** come ashore through hoses, **must** be **lightered to** the beach.

The **BIA** cargo ship, North Star III, delivers supplies to **Barrow** once a year, usually in early September. The North Star is based in Seattle, the major staging point for freight **moving** to northwest and arctic Alaska. The ship anchors one to 3.2 kilometers (two miles) off Barrow and lighters cargo ashore with four landing craft kept aboard ship. When shore-ice conditions-warranted, goods have been transported to shore **by** helicopter. Tonnages vary each year depending on need (see **Table 35**).

Since the transfer of the region's **BIA** schools to the Borough in 1975, the North Star has carried less cargo for the BIA and more for the Borough, the City, **PHS**, store owners, and private individuals. The ship can carry 30,280 to 45,420 liters (8,000 to 12,000 gallons) of fuel oil and has refrigeration capacity for frozen food. Other common commodities are snowmobiles, **lumber** for houses (but no prefabricated units), and other construction materials.

During the last few year the total amount of marine freight shipped to Barrow decreased because aircraft were carrying more of the perishable foods and the **BIA's** requirements had dropped. Cargo shipped by sea is once again increasing, however, as more construction and development occurs. According **to** military estimates, a total of 5,074,000 kilograms (5,594 tons) of cargo were shipped by the cargo ships and barges to

TABLE 35

BARROW TRANSPORTATION
Marine Transportation

CARGO DELIVERED TO BARROW VIA NORTH STAR 111

<u>Year</u>	<u>Tonnage</u>
1975-1977	800-1500
1974	561
1973	2,431
1972	1,020
1971	773
1970	1,257
1968	1,767
1967	1,920

Source: David Jallie, Bureau of Indian Affairs, Seattle Liaison Office.

Barrow in 1975, including 325,000 kilograms (358 tons) of goods to the PHS hospital, 3,428,000 kilograms (3,779 tons) to NARL in support of NPR-4 operations, and 1,684,000 kilograms (1,847 tons) for NARL activities. This does not include special barge cargos, such as the new Barrow power utility poles and prefabricated houses. The total annual barge and cargo ship tonnage remained at approximately 5,442,000 kilograms (6,000 tons) between 1967 and 1975.

Continued oil exploration in **NPR-A** will require that approximately 18,140,000 kilograms (20,000 additional tons) of cargo be shipped to Barrow each year until 1982. During this time the Navy plans to **drill** 19 more exploratory wells (Stefano-Mesplay and Associates, Inc. 1975). **Fuel will** constitute a significant portion of this cargo since each of the 19 wells will require 1,892,500 to 2,271,000 liters (500,000 to 600,000 gallons) of fuel (for a medium-depth **well**) for site preparation, drilling, abandonment, and camp use. Based on storage tank capacity at NARL and the Lonely **DEW** Line station, NARL **will** receive, store, and supply approximately 35 percent of the fuel for the planned exploration program.

In order to capitalize on future exploration and development of oil, gas, and other natural resources as **well** as to serve the needs of the city and NARL, the North Slope Borough proposed the funding of a Barrow port facility in its 1974 through 1986 Capital Improvements Program (Alaska International Academy 1974). The **site** it **recommended** for investment is on the western (**Chukchi** Sea) side of the **tip** of Point Barrow.

Compared to other potential port sites along the Arctic coast, the sand spit north of Barrow has the advantages of proximity to deep water, a good gravel base, and proximity to Barrow. According to the proposal, the effects of ice scour produce a channel approximately 9.6 meters (32 feet) in depth almost at the shoreline. An area of approximately 90 by **150 meters** (300 by 500 feet) would be excavated and sheet piling **driven** around the perimeter of dredged harbor to protect it from the pressures of pack ice. A port could eliminate the need for lightening of cargo, which might lower freight rates.

The CIP identified possible sources of federal and state funding for the estimated \$10 million project. The federal portion was to come from the U.S. Army Corps of Engineers Civil Works Program, and legislation was actually before the Alaska State Legislature for the State's portion (\$2.5 million) in **1974**. More recent studies (Parker 1974; **Stefano-Mesplay** and Associates, Inc. **1975**) however, have concluded that the construction of a marine facility at Barrow is not feasible because of the low terrain history of being inundated by high seas and ice storms,

In the absence of a suitable port development site in the region, the **Stefano-Mesplay** report recommended the following improvements to existing operations:

- Acquisition of modern lightening craft;
- Development of oil and gas staging areas;
- Development of offloading ramps and paths;
- Construction of warehouses;

- Institution of harbormaster control of operations; and
- Investigation of new barge-to-shore offloading techniques.

LAND TRANSPORTATION

Barrow has approximately 24 kilometers (**15** miles) of gravel-surfaced roads. The most important routes include a 6.4 kilometer (4 mile) road between **Browerville** and **NARL** and a 4.8 kilometer (3 mile) road to Lake Emaiksoun, the village's principal water source.

Existing roads were constructed by laying 3 to 5 feet of gravel directly atop the tundra. Planned construction of new roads in Block "A" will be 1.5 meters (5 feet) thick and 3.6 meters (12 feet) wide, while other **arterials** will be 5.4 meters (18 feet) in width. Normally, a binder material, such as clay fines, is placed in the upper 0.45 meters (**18** inches) of gravel to create a **solid** base that does not slump or erode. During summer the primary roads are **oiled** to reduce dust.

Road conditions vary according to season, frequency of use and maintenance, and local erosion conditions near the beach. Spring thaw undermines roadways, particularly in sections where little or no binder materials have been used or where raised roads are used to dam runoff. Occasionally, sections of road near the coast are washed out and made temporarily impassable. This causes considerable inconvenience and requires extensive reconstruction.

Road maintenance is costly and frequent. All streets and roads in the city were constructed and maintained by the Bureau of Indian Affairs **until** 1974 when equipment and responsibility for maintenance were transferred to the Borough. Some capital improvement funds have been used to maintain BIA road equipment. Borough maintenance includes the 4.8 kilometer (3-mile) road to the water source, but the road from **Browerville** to **NARL** is maintained by the Navy.

Roads in Barrow are used by an estimated 200 automobiles and trucks and numerous three-wheeled and conventional motorcycles and snow machines. Reckless driving and narrow roads, made narrower by snow accumulation, create dangerous conditions for pedestrians.

Snow machines are the most **common** form of vehicular transportation in Barrow. Often as many as eight or 10 machines are parked around individual homes in various states of repair. Machines are driven on **roads** and between houses, where they occasionally strike natural gas pipes. Collisions not only endanger the driver, but occasionally rupture the pipe. Resulting fire potential is great, but so far explosions have not occurred. Snow machines are driven over gravel as **well** as snow. During spring thaw, their movements are directed between patches of snow on roadways; hence, driving is often erratic and **dangerous**.

Similar pedestrian safety and road maintenance problems exist at the research lab. The Barrow Regional Master Plan (John Graham & Company 1973) discussed the extreme safety hazards due to conflict between

vehicles and pedestrians in the existing camp plan. The main camp consists of four access routes between parallel rows of facilities and the beach, but vehicular traffic is not confined to this road system.

Wheeled vehicular traffic is permitted any place on the gravel fill which will support the vehicles, including smaller access areas between buildings. Camp speed limits, set at 24 kilometer per hour (15 mph) and 8 kilometer (5 mph) for the family housing area are generally unenforced. Because the roadway system is not aligned with the predominantly easterly winter winds, substantial snow drifting occurs, and snow removal along roadways and between buildings is costly.

The Borough's Capital Improvements Program for FY 1974 through FY 1980 authorized funding for road improvements and drainage construction (\$303,000) and streetlights (\$2 million). The Draft 1977 CIP showed an expenditure of \$348,000 by January 31, 1977 of a total of \$588,000 for construction of a storm drainage culvert system and provision of additional gravel on Barrow roads and streets. The cost of planned new roads in Block "A" and improvements to three other streets totaled \$943,000.

Footpaths

Pedestrian safety in Barrow is increasingly problematic. The raised, narrow roads present little room for foot traffic. There is often no space off the roadway because of snow accumulation from road plowing. The increasing number of automobiles, trucks, snow machines, and other

vehicles is not as great a problem as reckless driving and restricted road width. Given the propensity of snow machine drivers to use any available path, pedestrian safety on footpaths could be enhanced by enforced restrictions on snow machine use.

The North Slope Borough has included two projects in its Draft 1977 Capital Improvements Program which, when funded, may alleviate some of the problems. A total of \$300,000 has been earmarked for the construction of foot paths, some of it state funds. The second project calls for installation of street lights, but the CIP identified no specific streets. The long periods of uninterrupted darkness in winter make good lighting imperative for both drivers and pedestrians.

Collector Road Maintenance

The North Slope Borough has made a request to the Federal Aid Secondary Highway System for a "major collector road" in Barrow (North Slope Borough 1976). Such a designation would relieve the Borough of maintenance costs along the 2.24 kilometer (1.4-mile) segment which extends from the Barrow terminal area, down Diogok Street in the center of the village, and through Browerville to the NARL road. It links the post office to the airport and is a public school bus route. It provides access to the barge offloading sites along the beach road to NARL and to the sanitary dump near the incinerator plant at NARL. Other major facilities along the route include the hotel, bank, fire station, and the planned borough administration building and state service building. Based on experience

with the spine road at **Prudhoe** Bay, the Borough estimates an annual maintenance cost of more than \$25,000 per mile for the collector road.

An earlier request to the State Highway Department for FAS designation was rejected (April 1976). The State suggested that funds under a Local Service Roads and Trails Program would be more suitable, but this program does not provide maintenance funds. State revenue sharing, another possible funding source, would provide only \$1,500 per mile per year.

The Borough is adamant that state and federal funds should be used for **local** road improvements before any funds are **committed** to that portion of the **trans-Alaska** pipeline haul road that is within borough boundaries. The Borough Planning Department noted that the State Department of Transportation and **Public** Facilities Six-Year Transportation Construction Program (1977) included no improvements for any communities in the entire region.

Alternative Access Between Barrow and **Browerville**

A portion of the collector road for which the North Slope Borough is currently seeking federal highway maintenance funds is located **along** the beach between Barrow and **Browerville**. Spring thaw occasionally makes this road impassable, and coastal erosion, accelerated by past gravel removal, threatens the entire beach road. Relocation of the road away from the beach in 1969 and recent construction of a section of **seawall** (using **gravel** ballasted steel tanks) have not stopped roadbed erosion.

Consequently, studies were undertaken to explore alternative, all-weather road access between Barrow and **Browerville** (John Graham & Company 1973). One of these options was to build a beach bypass road along the top of a dam across Isatkoak Lagoon. The dam is being built by the PHS to impound enough water to supply the city for one year. The dam is scheduled for **completion** in mid-1978. The BIA provided the necessary funds to widen the dam so the top could be used as a road to link **Block "A"** to **Browerville**, where it will connect with the collector road from the beach. The roadway will be paved (1,000 psi) to handle light vehicles only, limiting its usefulness as an emergency **all-weather** bypass to the coastal road.

In the summer of 1976 the Borough started a road to connect to the dam on the south side of the lagoon in the summer of 1976, but the project was suspended because of lack of funds. A total of \$458,000 was originally authorized, a portion of which was set aside for road improvements in Block "A". The Borough has subsequently requested state assistance for this road.

Gravel Availability

Gravel availability is an important consideration in any plans for construction or improvement of roads or any other large-scale project. Gravel is used as a sub-base for roads and buildings (where ice lenses occur and placement of pilings is difficult), and it figures importantly in some plans for elevating large land areas to improve surface drainage.

Planned construction of platted roads in Block "A" or potential construction of roads for new housing east of **Browerville** could require significant quantities of gravel. Industrial development in Block "B" could **require** new **gravel** roads and **gravel** paths for heavy construction.

Unfortunately, **gravel** is in short supply in Barrow. Traditionally, gravel had been obtained from the **Chukchi** Sea beach, the only source where it could be easily removed without damage to permafrost. Several million cubic yards have been removed from the beach for federal projects since the 1940's. This practice was halted in 1973 because of increasing beach and beach road erosion. The City then began extracting gravel from a pit (estimated to eventually yield about 764,600 cubic meters [one million cubic **yards**] **on** the beach at the west end of the airport runway (**Dupere** & Associates 1973). A 1973 study by **J.C. LaBelle** of the Arctic Institute of North America indicated that gravel was available in about the same quantities as the beach pit from **two inland** sources located on Navy land about 8 kilometers (5 miles) from the community.

Recently, the village corporation was given interim conveyance to the surface rights to these sites and any other within a 518,000 square kilometer (**200,000-square-mile**) area of Barrow under provisions of the Alaska Native Claims Settlement Act.. The regional corporation has begun a survey to determine the location of other gravel sites within **the** area. Reliable and economic sources are critical to residential road expansion **and** the laying of building pads. Without new sources, Barrow could be forced to limit its expansion, residential densities **would** increase even

further, and construction **costs** for large-scale development would rise dramatically.

V. CITY OF KAKTOVIK

Population

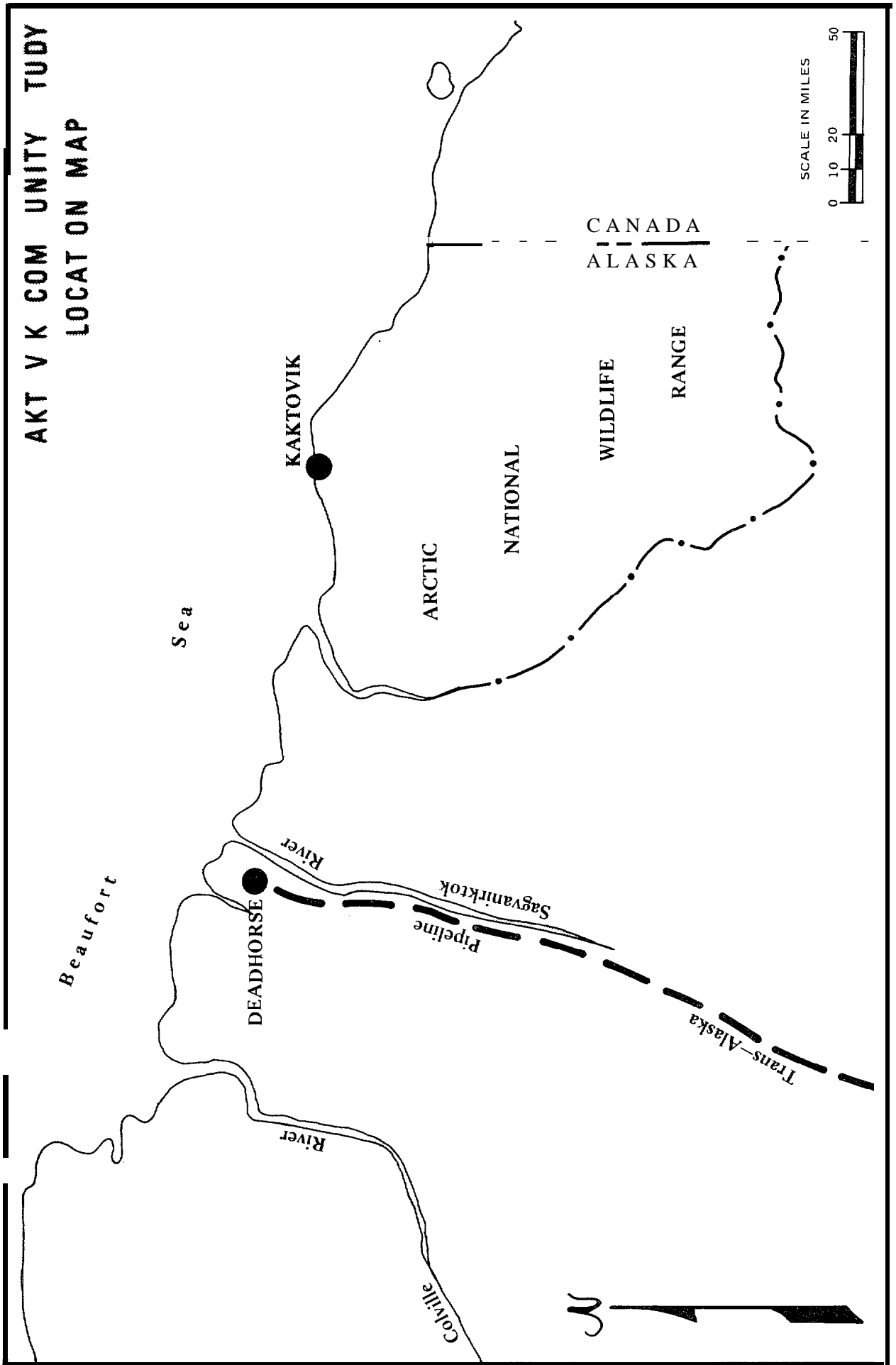
PAST TRENDS

Kaktovik is a Native village of fewer than 140 people. Located on a coastal island in the eastern Arctic, it lies 560 kilometers (360 air miles) east of Barrow, 208 kilometers (130 miles) each of Prudhoe Bay, and approximately 144 kilometers (90 miles) west of the Canadian border (see Figure 17). The village and nearby BAR-Main DEW Line station are situated on the northeast coast of Barter Island, one of the largest barrier islands in a 40-mile-long chain. The island is 11.2 kilometers (7 miles) long, 8 kilometers (5 miles) wide, and separated from the mainland by Kaktovik Lagoon. Kaktovik took its name from the Eskimo word meaning "seining place," reflecting the excellent net fishing in the lagoon.

In 1960, Congress established the Arctic National Wildlife Range, extending from the Canning River on the west to the Canadian border on the east. It included all of Barter Island except the village area. Although access to the range by nonresidents was carefully managed, no restrictions were placed on Native subsistence activities.

The village of Kaktovik began as the settlement of Elupak, a traditional Tareumiut village which served as a trading center for nomadic Eskimos in this general area. Barter Island, on which the present village of

FIGURE 17



Kaktovik is located, is a translation of the Inupiat word for "place of barter," the name applied to the place by local inhabitants. The establishment of Kaktovik as a permanent community dates back to 1923 when a trading post was established there. From that time until the establishment of a DEW Line station at Barter Island, villagers largely maintained a subsistence life-style.

During the late 1940's, the construction of the DEW Line system was determined to be an essential part of the United State "cold war" defense posture. This decision had a major impact on Kaktovik as the community was subsequently moved three times to accommodate the needs of the BAR-Main DEW Line station. However, on the positive side, the BAR-Main DEW Line station has also afforded local residents some opportunity for employment, and its airstrip is now available for general community use.

The village was first moved in 1952 to allow construction of an airstrip and hangar facilities, while a second move took place in 1953 because of changes in the layout of the DEW Line station. Despite these moves, the arrival of the federal government and the possibility of employment for wages attracted population to the village. Between 1950 and 1960, Kaktovik's population rose from 46 to 120, an increase of about 160 percent (see Table 36).

Kaktovik was moved for a third time in 1964, again to accommodate the increased space needs of the DEW Line station. However, the community's population has remained quite stable since 1960. The 1970 census counted

TABLE 36

POPULATION TRENDS
KAKTOVIK, ALASKA
1939 - 1977

<u>Year</u>	<u>Population</u>	<u>Percent Change</u>
1939	13	
1950	46	253.8
1960	120	160.9
1970	123	2.5
1977	134	8.9

Sources: U. S. Census.
North Slope Borough.

123 Kaktovik residents. According to the most recent North Slope Borough estimate (July 1977), the village now has a population of 134, a nine percent increase over the 1970 figure. In the opinion of Dupere and Associates (1974), the stability of Kaktovik's population results from substantial **outmigration**, primarily to Barrow.

Population Composition

The 1970 census showed three outstanding features of Kaktovik's population--it is primarily Eskimo, young, and heavily dominated by males (see Table 37 and Figure 18). In 1970, 87 percent of the village's population was Eskimo; the remainder included one Indian and 15 whites. Even though Eskimos were clearly the dominant racial group, Kaktovik's 1970 population included a higher proportion of whites than that recorded for any other community in the region.

In 1970, 28.9 percent of the population in Kaktovik was under 10 years of age. This was less extreme than the 1970 boroughwide norm of 34.1 percent under 10; however, it was significantly higher than the national and state figures of 19 and 22.8 percent, respectively. In 1970 the median age of Kaktovik males was 16.3 and that of females was 22.0. Although this is not atypical of rural Alaska (in the Barrow Census Division the male median was 19.6 and the female median was 16.4), it is younger than normal for the state and much younger than national averages. In 1970 the median age of males in the state was 22.3, and in the nation as a whole it was 27.0. For females, the state median age was 22.9 and for the country, 29.6.

TABLE 37
COMPOSITION OF POPULATION BY RACE AND SEX
KAKTOVIK, ALASKA, 1970

<u>Race</u>	<u>Sex</u>			<u>Percent of Total</u> %
	<u>Male</u>	<u>Female</u>	<u>Total</u>	
White	10	5	15	12.2
Indian	0	1	1	.8
Eskimo	63	44	107	87.0
<u>TOTAL</u>	<u>73</u>	<u>50</u>	<u>123</u>	<u>100.0</u>

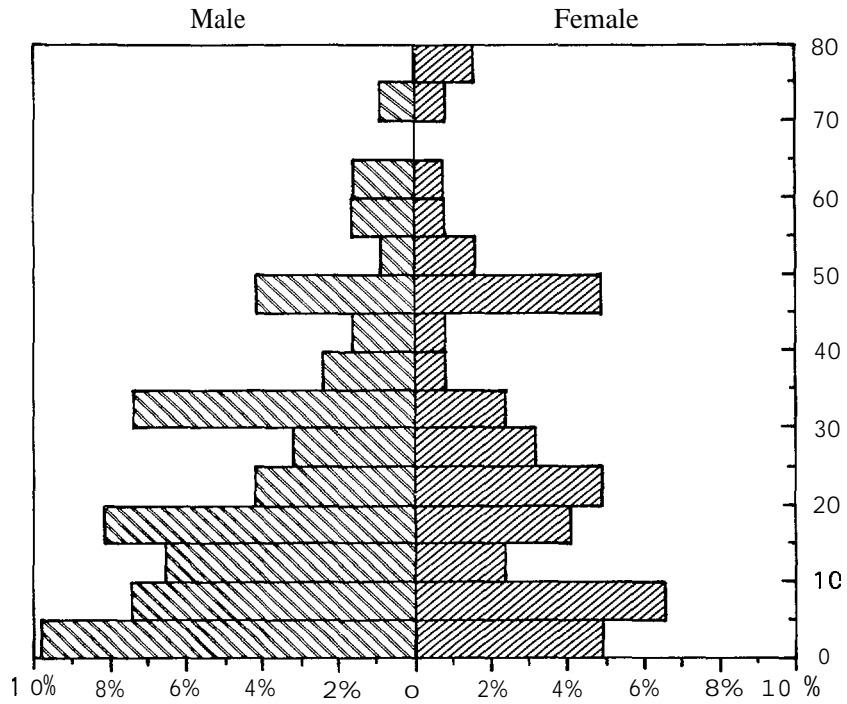
Source: U. S. Census.

TABLE 38
HOUSEHOLD DENSITIES
KAKTOVIK, ALASKA, 1970

<u>Persons Per Household</u>	<u>Total Housing Units</u>	<u>Percent Total Population</u> %	<u>Percent Total Housing Units</u> %
1 person	2	2	8
2 persons	5	8	19
3 persons	4	10	15
4 persons	1	3	4
5 persons	7	28	27
6 persons	1	5	4
7 persons	3	17	12
8 persons or more	3	27	12
<u>TOTAL</u>	<u>26</u>	<u>100</u>	<u>100</u>

Source: U. S. Census.

FIGURE 18



KAKTOVIK

COMPOSITION OF POPULATION

1970

Males outnumbered females 59 to 41 percent in Kaktovik in 1970. This is significantly more disproportionate than the 1970 state ratio of 54 percent male to 46 percent female and quite at odds with the 1970 U.S. ratio of 49 percent male to 51 percent female.

Household densities in Kaktovik are relatively high. The average number of people per household in 1970 was 4.7 (see Table 38). While this is lower than the average recorded for the Barrow Census Division in 1970 (3.7), it is well above the 1970 statewide average figure of 3.5.

Growth Prospects

At the present time, Kaktovik has a very limited economic base. The community exists not because of the presence of some economic activity and attendant employment opportunities but primarily because it was a convenient location from which to provide services to people who had traditionally lived in the area. It has survived mainly because of family and cultural ties. Although these will be the major reason for Kaktovik's continued survival, opportunities for employment and cash income are seen as the primary factors determining future rates of growth in the community. With few new prospects for employment and a reasonable level of income, many young people will continue to leave Kaktovik, and the community's population could actually decline in the longer term. However, if prospects for local employment and income improve, more young people are likely to remain, and the community can expect steady rates of population increase.

It is assumed that no significant **immigration** of population into Kaktovik **will** take place. Thus, future rates of population growth in the community will **depend** almost entirely on rates of natural increase and rates of **outmigration**. If the North Slope Borough continues to expand the range of services provided here, resulting **small** but significant increases in employment should ensure some continued **community** growth. Additional jobs for local residents may also be afforded by the Kaktovik Inupiat Corporation and the **BAR-Main DEW** Line station, although the latter's long term presence in the area is occasionally rumored to be uncertain. Another employment option is working in the Prudhoe Bay area and returning to the village during **leave** periods. Persons desiring entry into professional and technical occupations will continue to leave the community.

ECONOMY

Composition of Employment

A study of employment in Kaktovik was undertaken by Alaska Consultants, Inc. in December 1977 because there were no meaningful employment statistics collected by the Employment Security Division of the **Alaska** Department of Labor which can be disclosed for communities of Kaktovik's small size. When converted to average annual full-time employment, a **total** of 35.5 jobs was counted in Kaktovik in December 1977 (see Table 39). Roughly 62 percent **were** in government occupation, most of them associated with the Kaktovik school. The school is the largest single

TABLE 39
 AVERAGE ANNUAL FULL-TIME EMPLOYMENT
 KAKTOVIK, ALASKA
 1977

<u>Industry Classification</u>	<u>Number</u>	<u>Percent of Total</u> <small>0/ 10</small>
Mining	0	---
Contract Construction	3.0	8.5
Manufacturing	0	---
Transportation, Communications and Public Utilities a/	6.5	18.3
Trade	1.0	2.8
Finance, Insurance and Real Estate	3.0	8.5
Service	0	---
Government	22.0	62.0
Federal	(1.5)	(4.2)
State	(0)	(---)
Local	(20.5)	(57.7)
<u>TOTAL</u>	<u>35.5</u>	<u>100.0</u>

a/ Four local residents employed at the Barter Island DEW Line station included in the Transportation, Communications and Public Utilities sector. The remaining personnel at this facility are not included in local employment data.

Source: Alaska Consultants, Inc.

employer in town, accounting for an equivalent of 10.5 full-time jobs. However, about half of the jobs connected with the school were held by whites.

Aside from the school, there were an additional 11.5 government jobs in Kaktovik in 1977. These were divided between the federal government (Postal Service and Fish and Wildlife Service) and local government (city, the local IRA [Indian Reorganization Act] council, and the North Slope Borough) sectors. There are no state government employees in Kaktovik.

After government, most jobs in Kaktovik are in transportation, communications, and public utilities. This sector has three employers and 18.3 percent of all the jobs in the village in 1977. The largest single employer was the BAR-Main DEW Line station (four jobs); the remaining 2.5 jobs in this sector were associated with a locally based air-taxi service and Wien Air Alaska. Finance, insurance, and real estate accounted for three jobs, all of them with the Kaktovik Inupiat Corporation. The trade sector accounted for one job in 1977 derived from the operation of the village corporation store.

There were 13 additional full-time temporary jobs associated with state and North Slope Borough construction projects in December 1977. Three residents were employed on the school construction project funded by the state, two were employed by the Anchorage Electric Company on the North Slope Borough power plant project, and two were employed by General Services Electric on the borough electrification project. Blackstock Homes had another six employees working on a Borough housing project.

Unemployment and Seasonality of Employment

No unemployment statistics are available for individual communities within the North Slope Borough. Statistics collected by the Employment Security Division of the Alaska Department of Labor are on a boroughwide basis and can be misleading when applied to individual communities. For example, the Barrow-North Slope Labor division had an unemployment rate of 3.7 percent in 1976, the lowest of any area in the state and well below the statewide average of 8.2 percent. This unemployment rate may be reasonably accurate for the region as a whole, but it is not representative of all areas of the borough. In July 1976, 71.1 percent of the borough's residents lived outside the region's traditional villages, mainly in the Prudhoe Bay/Deadhorse area and in pipeline camps. All of these people were employed since housing is provided only for workers. One can assume from this that unemployment rates in some of the traditional villages are much higher.

Unemployment is not currently viewed as being a problem in Kaktovik, although there is undoubtedly a good deal of underemployment. In an interview with Alaska Consultants in December 1977, the mayor of Kaktovik stated that no one in the community was on welfare and that there was only one household which required "some help from time to time." Unemployment has been a problem in the past, however, and could very well be again in the future if jobs do not materialize to replace those currently emanating from borough and state construction projects.

Seasonal variations in employment in Kaktovik result from the closure of the local school during summer months and from **summer** construction activities. School teachers normally leave the region during the long summer vacation, and other school positions except for maintenance jobs also cease temporarily. The number of available construction jobs fluctuates from year to year depending on the projects scheduled, but **most** construction activity takes place during **summer** because of the region's harsh winter climate. The temporary loss of jobs associated with the school and the addition of those associated with construction offset each other to some extent. Thus, while seasonal variations in employment do occur in Kaktovik, they do not appear to be severe.

Recent Trends and Changes

The composition of employment in Kaktovik has undergone a fundamental change in the past several years. Two main events appear to have caused this: the passage of the Alaska Native Claims Settlement Act in 1971 and the formation of the North Slope Borough as an areawide unit of local government in 1972. Limited data make it difficult to measure trends caused by these events, but within this limitation some trends and changes have been noted.

Employment has increased significantly in Kaktovik in the past five years. In 1974 the U.S. Department of the Interior noted in its Alaska Natural Gas Transportation System EIS (1975) that there was a total of only 19 jobs in Kaktovik. In 1977 Alaska Consultants counted an annual

average of 35.5 full-time jobs in the village, an 87 percent increase since Kaktovik's population remained constant during this period. The DEW Line station was the village' largest single employer in 1974, accounting for roughly two thirds of the total wage and salary employment (13 out of 19 jobs). In 1977 the DEW Line station accounted for only four jobs in Kaktovik, or eight percent of the total employment.

There were only four jobs in the government sector in Kaktovik in 1974, and only one of these was in local government. By contrast, the government sector represented 62 percent of total employment in the community in 1977. Furthermore, of the 22 jobs in this sector 20.5 were in local government. The largest employer in the community is now the North Slope Borough. There were no jobs in either the contract construction or finance, insurance, and real estate sectors in 1974. In 1977, because of North Slope Borough and village corporation activity, these sectors accounted for an annual average full-time equivalent of six jobs, or 16.8 percent of the total employment in the community.

Aside from new jobs within the village of Kaktovik, additional employment opportunities have also been available outside town during the past few years as a result of the development of the Prudhoe Bay field and construction of the trans-Alaska pipeline. Although the pipeline is now operational, construction of the proposed natural gas pipeline is likely to offer similar employment opportunities in the near future.

Occupational Skills

Comprehensive information on the skills of the work force in the North Slope region is generally lacking, and there are no reliable or current statistics on an individual **community** basis. Some general idea of the occupational **skills** of Kaktovik residents can be inferred, however, from Barrow Manpower Center statistics if one assumes that work **force skills** are **fairly** consistent boroughwide. The occupational skills of Barrow Manpower Center registrants are listed on Table 29 of this report.

Income Levels

There are no figures **available on** income levels in Kaktovik prior to **1973** but, since that time, incomes appear to have been static or to have decreased slightly. A 1974 survey of 20 Kaktovik families by **Dupere** and Associates found the village's median 1973 family income to be \$16,500, well above that of the other permanent North Slope Borough communities (see Table 40). However, when household income and family size are matched against U.S. Department of Agriculture poverty level income standards for eligibility in the federal school lunch program, at **least** 20 percent of Kaktovik's households were at or below it in 1973. At that time the U.S. Department of Agriculture considered \$7,340 or less to be a poverty level income for a **family** of five and \$6,390 or less to be a poverty level income for a family of four. Using **Dupere's** figure of an average of 4.9 persons per household in Kaktovik, at least four families earning less than \$5,000 in 1973 thus fell into the poverty category.

TABLE 40
FAMILY INCOME DISTRIBUTION
KAKTOVIK, ALASKA
1973

<u>Family Income</u>	<u>Number of Families</u>	<u>Percent of Total</u> %
Under \$1,000	0	---
\$ 1,000-\$4,999	4	20.0
\$5,000-\$10,999	3	15.0
\$11,000- \$15,999	3	15.0
\$16,000- \$20,999	4	20.0
\$21,000-\$24,999	6	30.0
\$25,000 or more	0	---
<u>TOTAL</u>	<u>20</u>	<u>100.0</u>

Source: Dupere and Associates.

TABLE 41
GENERAL ASSISTANCE PAYMENTS a_/
KAKTOVIK, ALASKA
FY 1973 - FY 1976

	<u>FY 1973</u>	<u>FY 1974</u>	<u>FY 1975</u>	<u>FY 1976</u>
Total Payment	\$16,100	\$14,700	\$9,200	\$200
Number of Cases	11	19	13	b/
Average Payment:				
Annual	\$ 1,464	\$ 774	\$ 707	b/
Monthly	\$ 122	\$ 64	\$ 59	b/

a/ Payments made by the Bureau of Indian Affairs.

b/ No information available.

Source: U.S. Bureau of Indian Affairs.

Of 20 families surveyed, 35 percent had incomes below \$11,000, and 35 percent had incomes of between \$11,000 and \$20,999. Six families, or 30 percent, had incomes between \$21,000 and \$24,999.

A March 1976 survey conducted by the North Slope Borough School District found that the median family income in Kaktovik had dropped slightly to \$15,289, although it remained second only to Barrow among the region's villages. Using the same data sources, all other borough communities experienced significant income growth during the period from 1973 to 1976. In 1977 the mayor of Kaktovik estimated the average annual household income in the community to be approximately \$15,000, about the same as that found by the school district in 1976.

Public assistance or welfare programs provide an income supplement for some Kaktovik residents (see Table 41). No 1976 data were available for Kaktovik, but in 1975 two village residents received an average monthly payment of \$132 in Old Age Assistance from the Alaska Department of Health and Social Services. No residents were eligible for other state public assistance programs. General assistance payments by the U.S. Bureau of Indian Affairs (BIA) have decreased radically since 1973 when the BIA paid out a total of \$16,100 to 11 "cases," an average monthly payment of \$122. In fiscal year 1976, the BIA distributed only \$200 in general assistance to Kaktovik residents. No data are available on the number of recipients.

Despite Kaktovik's relatively high income levels and lack of unemployment,

subsistence activities continue to play an important role in the culture and economy of the village. There are no current figures available on the village's subsistence activities, but a 1974 study by Dupere and Associates found that a majority of Kaktovik residents' annual food supply came from subsistence hunting and fishing. This study estimated that employed residents had a 30 percent dependency on subsistence, and unemployed residents significantly more than that (from 40 to 80 percent). Not only are subsistence activities an important part of the culture and social organization of Kaktovik, but because food obtained this way does not require a direct cash outlay, it substitutes to some extent for earned income.

It is difficult to assign dollar values to products obtained from subsistence activities since their pursuit has other than economic values, but some cost comparisons can be made with subsistence products and comparable items in the market place. The Alaska Planning Group estimated in 1974 in its final environmental impact statement for the proposed Arctic National Wildlife Range (U.S. Department of the Interior 1975) that if subsistence resources were valued in terms of Anchorage prices for substitutable items, the annual per capita gross value of subsistence items in Kaktovik would be about \$475. The sale of pelts from trapping would provide an additional \$35 per capita. This is based on a total estimated average annual subsistence harvest value for Kaktovik of \$64,129.

It should be emphasized that subsistence has very strong social and cultural as well as economic implications in Kaktovik. However, from a

strictly economic standpoint it is apparent that given the extremely high cost of living in Kaktovik and the limited cash incomes of some of the village's residents, subsistence activities are an essential element in the local economy.

While median family incomes appear to be remaining fairly static in Kaktovik, costs are increasing. In 1974 Dupere and Associates found the median monthly fuel bill in Kaktovik to be \$110.37. In December 1977 Alaska Consultants found that Kaktovik households averaged \$180.00 a month in fuel expenses, an increase of 63 percent. Monthly costs for electricity have also risen, from \$40 to \$50 per month. Furthermore, the purchasing power of the Kaktovik dollar is significantly lower than that of virtually all other communities in the state. In December 1977 prices for fuel oil in Kaktovik were 36 percent above those in Anchorage. Food prices in Kaktovik and Anchorage showed an even greater disparity. A review of 11 market basket items by Alaska Consultants in December 1977 indicated that prices in Kaktovik averaged 70 percent above those in Anchorage. At that time, the mayor of Kaktovik estimated that the average household in the community had an annual income of about \$15,000, whereas the average household income in Anchorage in 1976 was reported by the Alaska Department of Administration to be \$25,053.

Land Use

OVERALL PATTERNS

Development in Kaktovik has assumed a linear form (see Figures 19 and 20).

FIGURE 19

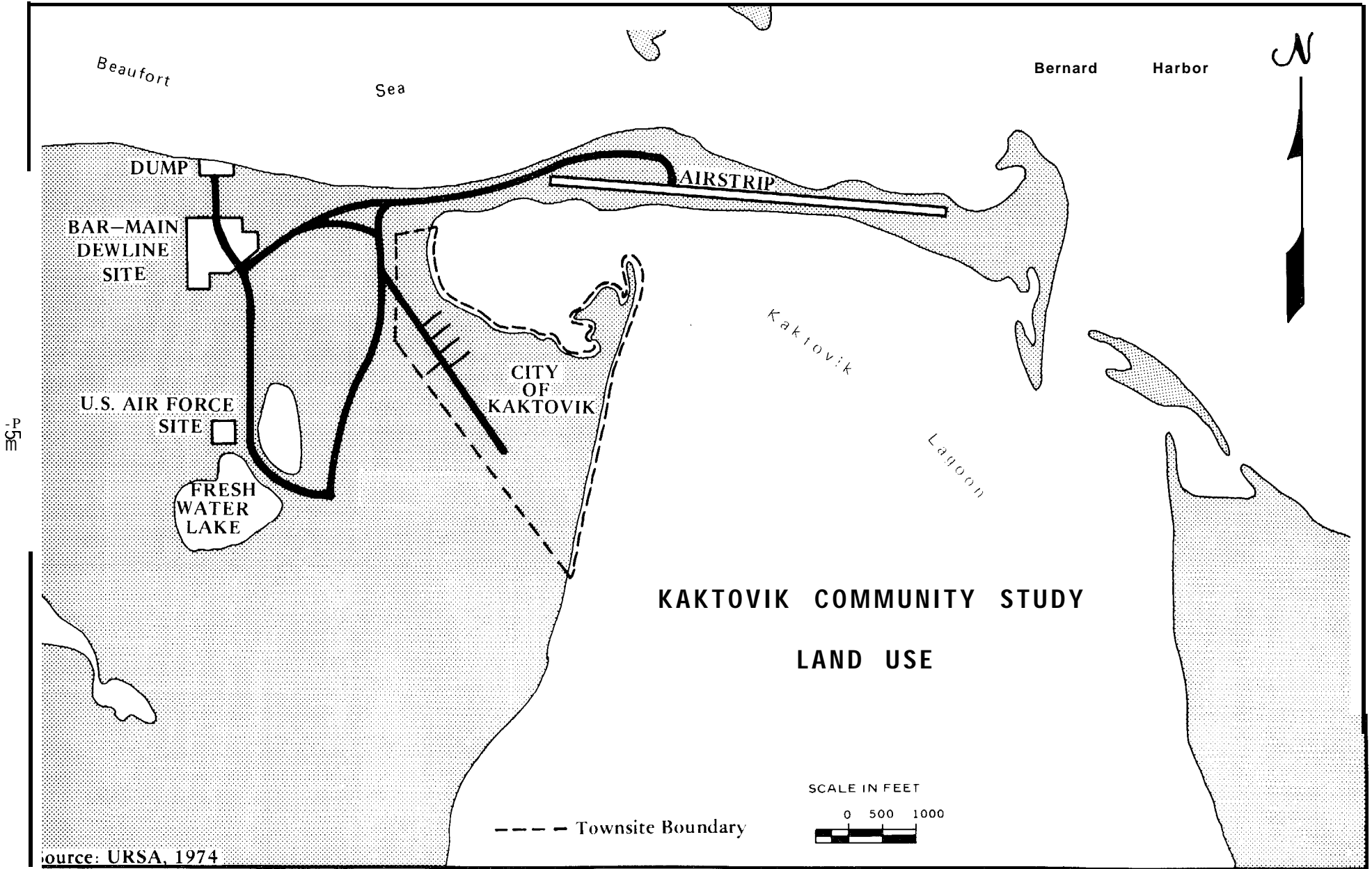
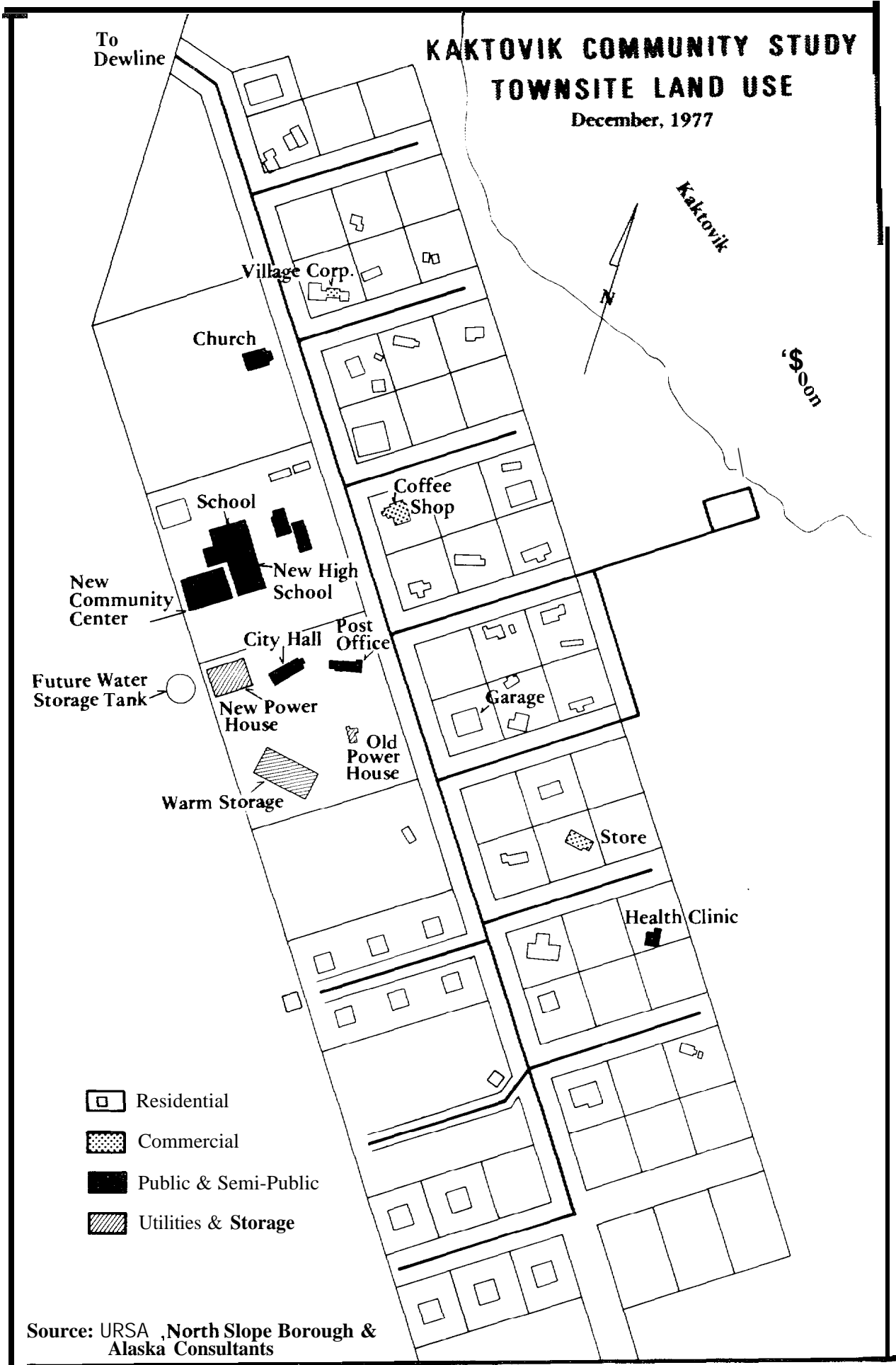


FIGURE 20



Barter Avenue, which runs the length of the community, forms a spine from which a series of short one-block long streets protrude. Barter Avenue's extension connects Kaktovik with the nearby DEW Line station and the airport.

Kaktovik's corporate limits take in a 2.6 square kilometer (1 square mile) area but only a fraction of this has been developed. The platted townsite area takes up slightly more than 48 hectares (120 acres) but, excluding platted and developed streets, the amount of land actually in use in the townsite as of December 1977 was much less, approximately 5.7 hectares (14.2 acres).

Of the 5.7 hectares (14.2 acres) of occupied land in Kaktovik in December 1977 (excluding streets), 3.36 hectares (8.4 acres) were taken up by residential uses. Public and semi-public uses, represented by the school, post office, city hall, health clinic and church, took up another 1.24 hectares (3.1 acres), while utility and storage uses (the power plant, warm storage building and new generator building on which construction had just begun) accounted for an additional 0.84 hectares (2.1 acres). Finally, commercial uses--the Kaktovik Inupiat Corporation office, a coffee shop, a garage under construction and the village store--occupied 0.32 hectares (.8 acres). The platted width of most streets in town is 18 meters (60 feet); however, their developed width is usually no more than 3.6 to 5.6 hectares (12 to 14 feet).

Until very recently, all except one house in Kaktovik not associated with the school were located on the northeast side of Barter Avenue.

However, the North **Slope** Borough has since built 11 homes on the south side of Barter Avenue in the southwest corner of town. All commercial uses are located on the north side of Barter Avenue although they are not concentrated in any one area. **The** school, post office and city hall are located near each other on the south side of Barter Avenue but in the central portion of town. Immediately south of these facilities are the present power plant, a warm storage building and the new power plant now under construction.

Outside the community's platted area, the BAR-Main **DEW** Line station lies about 1 kilometer (two-thirds of a mile) by road to the northwest, with the **DEW** Line airstrip which is shared with the **community** lying to the northwest. Other facilities outside town include the village water source and dump, the latter at the **DEW** Line station and the former south of town. **All** of this development is within the northeast portion of Barter Island.

Kaktovik's land use pattern has changed significantly over the years as the village has been moved three times by the U.S. Air Force to accommodate the needs of its **DEW** Line station. The first move took place in 1952 when the village site was deemed **to** be needed for the **DEW** Line airport and hangar facilities. Homes **and** buildings were hauled about 1500 meters (1,650 yards) northwest of the old site which was soon covered by a cement pad. In 1953, the village was **moved** again to a site further to the **west and back** a short distance more from the beach because of changes in the **layout** of the **DEW** Line station. The most recent move took place

in 1964 when the village was moved to its present site, again to accommodate the increased space needs of the DEW Line station. However, the present site is not as desirable as earlier sites as it is on silty soils and lacks gravel whereas the traditional site was located on well-drained gravels.

The land tenure situation in the Kaktovik area has imposed development constraints on the community in the past as the village was bounded to the north and west by the DEW Line station and to the south and west by the Arctic Wildlife Range. Under the terms of Section 12(a) of the Alaska Native Claims Settlement Act, the Kaktovik Inupiat Corporation was entitled to select the surface estate of 37,300 hectares (92,160 acres) of land in the Kaktovik area. However, the most desirable lands, those of the DEW Line station, were not open to selection. Nevertheless, as a result of the Claims Act, the Air Force did relinquish title to a 108 meter (360-foot) wide strip of land along the western boundary of the townsite to the Corporation in 1972. The Corporation, in turn, issued a quitclaim deed to this property in favor of the City of Kaktovik. Since 1972, the Air Force has reduced the size of its reserve on Barter Island by an additional 1460 hectares (3,609 acres).

HOUSING

A total of 41 housing units were counted by Alaska Consultants, Inc. in Kaktovik in December 1977. Slightly less than one-third of these units were judged to be in acceptable condition whereas about half were in poor or very poor condition. The remaining units afforded their occupants

some comfort but were in need of several major repairs. Almost all houses in acceptable condition have been constructed by the North Slope Borough. Eleven new Borough homes are located in the southwest end of town and teacher housing has also been provided. All of these units would meet the standards of a conventional building code except that they lack running water and flush toilets.

The Borough's 1974 through 1980 Capital Improvements Program states that Kaktovik clearly has the poorest housing in the Borough. With the exception of prefabricated houses constructed in 1974 under the Alaska State Housing Authority Remote Housing Program and a teacher's house constructed in 1976, most housing in Kaktovik was constructed by individuals using such dunnage as plywood or secondhand quonset hut materials obtained from the DEW Line station. Of the 23 occupied older houses in Kaktovik, 21 have been designated by the village corporation for replacement. Fourteen houses in various states of disrepair were vacant.

Most of the housing is more than 10 years old, and some dates from the last relocation of the community in 1964. Houses are small, averaging 63 square meters (685 square feet) and in 1974 housed an average of 4.9 persons per unit. Heat is provided by fuel oil stoves, which consume approximately four 55-gallon drums of fuel per year (Urban and Rural Systems Associates 1974).

The housing units constructed in 1974 were provided under the Alaska State Housing Authority's Remote Housing Program and administered by the

Kaktovik Village Corporation with the assistance of Inupiat Builders Inc. , the housing development corporation of the Arctic Slope Regional Corporation. Under terms of the program, eligible families received a grant for 75 percent of **the** \$30,000 cost of the unit, and financed the remained portion under a long-term loan (Urban and Rural Systems Associates 1974).

Plans for replacement of dilapidated housing in Kaktovik are proceeding under borough direction. The recently constructed \$70,000 teacher's house was purchased in Fairbanks and constructed by **Alaska** Public Works Department crews. Five new prefabricated houses were built in 1977 at a cost of \$34,000 each. More housing is scheduled for replacement after a more detailed assessment of need **is** made.

The latest CIP estimated that at least five additional new houses will be needed by 1980, mostly because existing housing is substandard, not because of any anticipated growth.

Sufficient land is available for any anticipated residential expansion, even if none of the new housing is constructed on lots with existing dilapidated housing on them. **Currently**, approximately 30 lots within the BLM **townsite** are vacant, and sufficient land outside the BLM **townsite**, but within the city limits, could help accommodate additional growth.

The suitability of this land for development, however, has not been

assessed. Gravel to fill in poorly drained areas and for roads is in short supply. Consequently, limitations on gravel availability may present a severe limitation to growth.

RECREATION

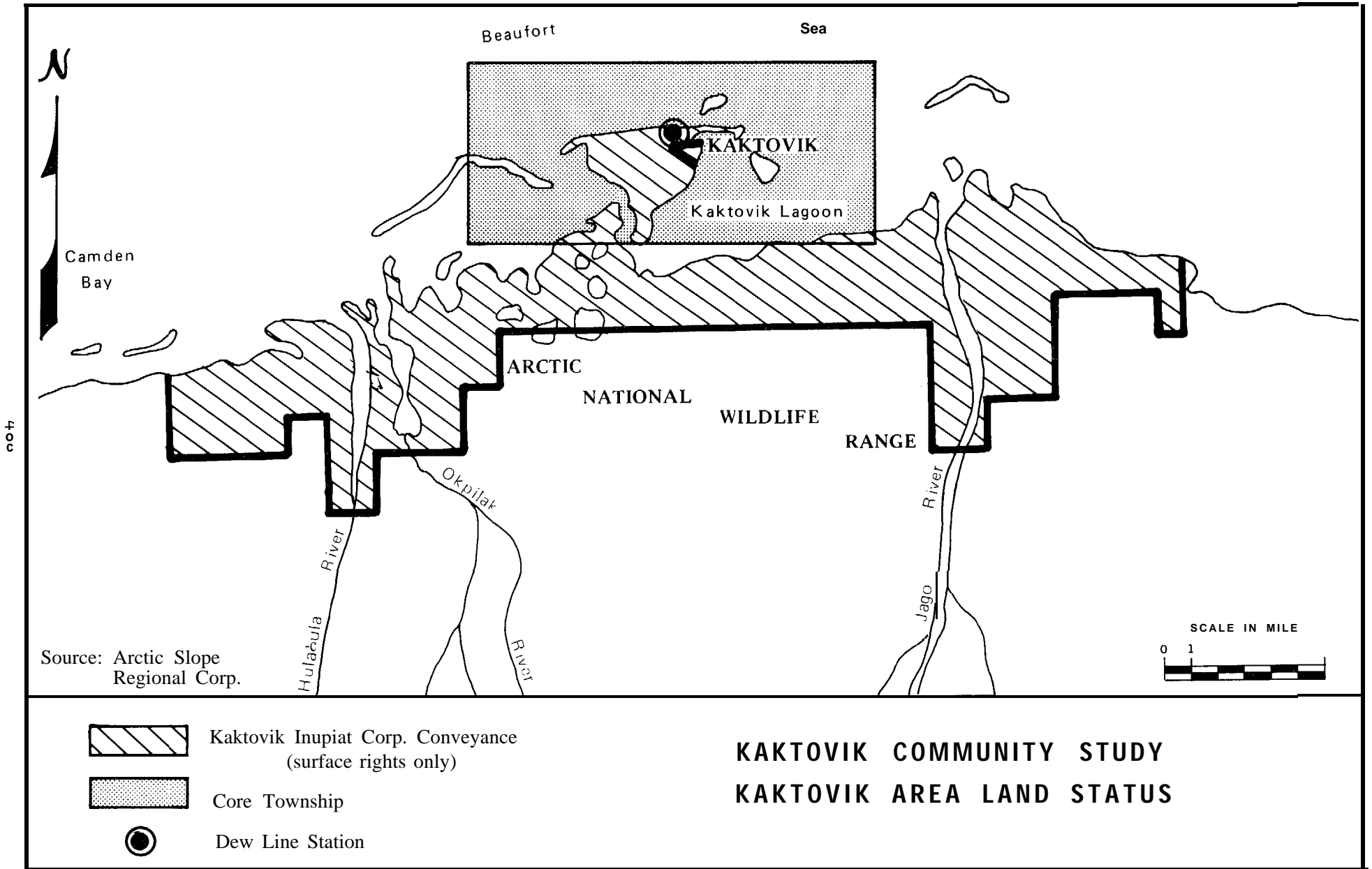
The city hall contains an approximately 93 square meters (1,000 square foot) room designated as a recreation center, and the city has financed construction of a basketball court in the school yard.

The school provides Kaktovik's other major recreational facility. Classrooms are available for club meetings when school is not in session and the school playground is open at all times. When the new North Slope Borough community center is opened in August 1978, Kaktovik's existing recreational facilities will be considerably expanded. The gym, sauna, showers, kitchen, and library will function in coordination with the school program but will be open to the community at large during non-school hours.

LAND STATUS

Land status in the vicinity of Kaktovik has recently undergone significant change as a result of interim conveyance of approximately 26,000 hectares (65,000 acres) of land to the Kaktovik Inupiat Corporation (see Figure 21). Land outside the village had formerly been either in sole ownership of the Air Force or Department of Interior-managed Arctic

FIGURE 21



National **Wildlife** Range. Because of these preexisting federal ownerships, only surface rights were conveyed to the village corporation. The village selected four townships outside the refuge to make up for this deficiency.

Village concepts of land use are very informal. There is consensus that land and resources are everyone's birthright. Consequently, there is **little** interest in platting, planning, and zoning. Buildings supposedly occupy lots surveyed by BLM in 1964, but buildings often overlap lot lines.

The lands that have always been perceived as owned by everyone have finally been formally so designated. The conveyance of surface rights to these lands will have important long-term economic consequences for the village of Kaktovik. The potential now exists for economic recovery of surface minerals and the leasing of village land to industries such as oil exploration and development companies.

The latest Borough Capital Improvements Program indicated that Kaktovik's development potential is severely limited by lack of gravel. The Bureau of Land Management originally restricted the removal of any gravel from the Arctic National Wildlife Refuge, but this restriction was effectively removed by the interim conveyance. Within this area are three known sources of gravel: a borrow pit on the western tip of the island; the **Huĭahula** River, approximately 24 kilometers (15 miles) southwest of Kaktovik; and the Jago River, approximately 16 kilometers (10 miles) southeast of the **community** (Urban and Rural Systems Associates 1977).

Community Facilities and Services

CITY POWERS AND PROGRAMS

Kaktovik was incorporated as a fourth-class city in 1971 and reclassified a second-class city in 1972. State law provides that second-class cities shall have an elected seven-member council which must meet at least once a month. A mayor elected by the council serves as the chief administrative officer.

As a second-class city within an organized borough, Kaktovik may exercise all municipal powers except those of assessment and collection of taxes, education, and planning and zoning, which are mandatory areawide borough powers. Although the City could theoretically exercise a wide range of other municipal powers, it has transferred all but recreation and fire protection to the Borough. In addition to the three mandatory powers, the following municipal powers were delegated to the Borough as a result of an election held April 31, 1974:

- sewer and sewage treatment facilities
- watercourse and flood control facilities
- health services and hospital facilities
- telephone systems
- light, power, and heat
- water
- transportation systems, including airport and aviation systems
and streets and sidewalks

- Libraries
- o garbage and solid waste collection and disposal services and facilities
- housing and urban renewal, rehabilitation, and development
- preservation, maintenance and protection of historic sites, buildings, and monuments

The police power was transferred to the Borough in an election held July 1, 1976.

Any future property tax could not exceed 5 mills or a half a percent, and it would have to be approved by referendum. A resurrection of the sales and use tax would also have to be approved by referendum and could not exceed three percent. If the City were to exercise this authority, the tax would be assessed and collected by the Borough and then remitted to the City. Although it has the power to do so, the City of Kaktovik has not levied a sales tax since 1973 and has never levied a property tax.

Funds for city services are obtained from state revenue sharing for recreation and from proceeds from city-sponsored bingo and movies. State revenue-sharing funds are available to local governments for fire protection, but Kaktovik's application for these funds was not approved in 1976 because the city failed to indicate that it had expended local funds for this purpose.

Recreation

The City of Kaktovik has retained the municipal power of recreation. There is no paid recreation staff, but the city hall does include an approximately 92.9 square meter (1,000 square foot) area designated as the recreation center. The room contains a pool table, and city-sponsored bingo games and movies are held here weekly. The City has also financed construction of a basketball court in the school yard.

The school provides Kaktovik's other major recreational facility. Classrooms are available for club meetings when school is not in session, and the school playground is open at all times. When the new school building is opened in August 1978, Kaktovik's existing range of recreation facilities will be considerably expanded. The gymnasium, pool, showers, kitchen, and library will function in coordination with the school program but will be open to the community at large during nonschool hours.

Fire Protection

Fire protection services, power retained by the City of Kaktovik, although limited, are nevertheless superior to those offered by any other community in the region except Barrow. The village has an organized 30- to 35-man volunteer fire department but no fire-fighting equipment; however, a fire truck and personnel based at the nearby DEW Line station are available in emergencies. Within the village, water for fire fighting is presently obtained from the school's tank and those of several private homes.

Fire has long been a hazard in Kaktovik, and there have been several serious fires in the past decade. In December 1975, three houses and a church burned to the ground, and two children lost their lives in a house fire in 1971.

The City of Kaktovik is engaged in an active fire-protection improvement program. The City is purchasing 9.07 kilogram (20 lb.) portable extinguishers to be installed in each household in town without adequate equipment, and proceeds from the recreation committee will be used to purchase smoke detectors for each home. In addition, three fire sirens will be placed at strategic locations around town. Local fire protection capabilities will be further upgraded in 1978 when a new 2,271,000 liter (600,000 gallon) community water storage tank is completed and when an emergency fire-fighting water supply in the form of the school swimming pool comes on line.

LAW ENFORCEMENT

The North Slope Borough is responsible for providing police protection services in Kaktovik but has no officer stationed permanently in the community. In fact, no policeman has been based in the village since 1974 when protection was provided as needed by unpaid local volunteers. Today, borough officers fly in from Barrow or state troopers are brought in from Deadhorse or Fairbanks, as required.

There were no jail facilities in Kaktovik in December 1977, but the North Slope Borough plans to construct a simple 8.53 by 13.41 meter (28 by 44

foot) modular public safety building for this purpose in 1978. Funded with state and federal money, the anticipated cost of the new facility is about \$82,000. Following completion of the public safety building, the North Slope Borough plans to base a full-time policeman in Kaktovik.

HEALTH AND SOCIAL SERVICES

Kaktovik's population is not sufficiently large to warrant construction of a hospital, but the community does have a fairly good range of health care services for a town of this size. The Kaktovik health clinic has a staff of one primary health aide and an alternate, with one aide being on call at all times. In addition to locally based personnel, Public Health Service doctors and dentists and a state public health nurse periodically visit Kaktovik from Barrow. People requiring hospital care are flown to Barrow, Fairbanks, or Anchorage. Seriously ill patients are sometimes also flown to Inuvik, Northwest Territories, Canada, a distance of approximately 322 kilometers (200 miles).

The Kaktovik health center is operated by the North Slope Borough in space leased by the U.S. Public Health Service. Located in a building constructed in 1920 (reputedly the first building on Barter Island), the facility is in poor condition and has an extremely inadequate heating system. It is divided internally into a waiting room, an examination room, a kitchen, and a bathroom. Replacement of this facility is scheduled by the North Slope Borough within the next couple of years.

The North Slope Borough is currently developing a boroughwide health service to supplement local services. Aside from the replacement of the existing clinic, this will not involve the establishment of additional facilities in Kaktovik, but it will provide more visits to the community by medical and dental personnel. In addition, Kaktovik residents will have access to planned Borough health facilities in Barrow as well as to services already provided by the U.S. Public Health Service in that community.

EDUCATION

Education services in Kaktovik are provided by the North Slope Borough School District. The school district is responsible for hiring teachers and for maintaining the school plant, while the Borough is responsible for the construction of new school facilities, as required.

At the present time, all schoolchildren in Kaktovik are housed in two separate but connected buildings located in the central part of town. Kindergarten through sixth grade students are housed in a building constructed by the Bureau of Indian Affairs in 1964. A high school building completed by the North Slope Borough in 1977 contains grades seven through 12.

The school site covers an area of 8,361 square meters (90,000 square feet). In addition to the two school buildings, the site also contains two teacher housing units, two storage buildings, and the school

maintenance shop. The remaining area accommodates a playground, (including a basketball court) and the new 1,021.9 square meter (11,000 square foot) community center **building** scheduled for completion in August 1978. This building is located adjacent to the high school and will contain a three-quarter-size gymnasium, a **small** swimming pool, and a community library center plus office, a kitchen, and shower/locker room space. The existing library is limited to several shelves in a hallway in the high school.

Administratively, the Kaktovik school is divided on an elementary (kindergarten through the sixth grade) and high **school** (seventh through the 12th grade) basis (**see Table 42**). The present **school plant** contains three classrooms plus a separate room for vocational education.

School facilities are also used after hours for school advisory council meetings, for both adult and youth craft clubs, and for the community school program. The school plant is reportedly in good condition but is too small. Completion of the community center building should help alleviate the space problem; however, the Borough is already considering **a** further addition to the Kaktovik school **plant**. Plans have not yet been finalized, but two options are under study. The first involves the addition of a vocational education facility to the new state-constructed **community** center building. This addition would be about 185.8 square meters (2,000 square feet) in area and would include facilities for three vocational education programs--construction (i.e., woodwork), metals/welding, and power mechanics. The second option is more compre-

TABLE 42

ENROLLMENT TRENDS
FINAL ENROLLMENT, KAKTOVIK, ALASKA a/
1964-65 - 1976-77

<u>Year</u>	<u>Grades K - 8</u>		<u>Grades 9 - 12</u>		<u>Total</u>
	Number	% of Total	Number	% of Total	
1964-65	35	100.0			35
1965-66	40	100.0			40
1966-67	39	100.0			39
1967-68	35	100.0			35
1968-69	35	100.0			35
1969-70	40	100.0			40
1970-71	41	100.0			41
1971-72	34	100.0			34
1972-73	44 <u>b/</u>	100.0			44
1973-74	37 <u>b/</u>	100.0			37
1974-75	18 <u>b/ c/</u>	100.0			18
1975-76	35 <u>b/</u>	87.5	5 <u>d/</u>	12.5	40
1976-77	35	85.4	6 <u>d/</u>	14.6	41

a/ School not operating prior to 1964-65.

b/ No kindergarten classes held 1972-73 to 1975-76 inclusive.

c/ No enrollment in kindergarten through the 2nd grade in 1974-75.

d/ Ninth grade classes taught only.

Source: Alaska Department of Education.

hensive. It calls for the addition of between 743.2 (8,000 square feet) and 836.1 (9,000 square feet) square meters of floor area to the new community center building. The library now being added by the State would be converted to a science lab and space for a new library, three secondary school classrooms, a business education room, a home economics room, and offices.

UTILITIES

Utilities in Kaktovik are very limited. Village residents still have to haul their water and dispose of wastes in honey buckets. Fuel essential for heating and operating equipment is expensive and often in short supply. Communications have recently improved through installation of two long-distance telephone linkages between the community and the DEW Line station, which is tied into communications equipment at Prudhoe Bay/Deadhorse. There are no other phones in the community.

Improvements to utilities services in Kaktovik are planned by the Borough, the State, and the U.S. Public Health Service, but the schedule for completion in most cases is unknown. Because the existing utilities and the planned improvements are sized only to meet modest local demand, there is no excess capacity to meet the needs of new industry.

Water, Sewer, and Solid Waste Disposal

The village water source is at Fresh Water Lagoon located south of the DEW Line station and west of the village. Water is piped to the DEW

Line station but is hauled by truck to the village. None of the houses in the village is connected to the central storage tank. Six of the eight houses built in 1972 were constructed with internal systems which pipe water from a residential storage tank to the bathroom and kitchen. The water station's water is treated, the village's water is not. None of the homes has a water heater.

The road to the lake parallels the **utilidor** to the station. Another poor quality road/trail extends west **from** the village but is impassable by truck most of the year. Because of the inconvenience of hauling water over a poorly maintained road, water consumption in Kaktovik is among the lowest in the state. Only 7.6 liters (two gallons) per person per day are estimated to be consumed (Johnson and Dryer, in press), significantly below the amount consumed by the DEW Line employees who have piped and treated water. Another factor which limits water consumption is the residents' belief that the water source has been and continues to be contaminated by DEW Line **vehicles** that drive too close to the lake (Dupere & Associates 1973).

The Borough intends to expedite construction of water and sewer facilities in order to provide the necessary infrastructure for development of educational and **community** health facilities. The Borough Capital Improvements Program (1974 through 1980) indicates that the U.S. Public Health Service could complete the development of a utilities system in Kaktovik in 1978 (North Slope Borough 1977). Phase I of this **program** now under construction, will provide safe water treatment, a community watering

point, a central laundry/shower/toilet facility located at or near the school complex, and a sewage collection and disposal service.

As in other traditional communities of the region, funds for sewage and waste disposal services in Kaktovik are provided by the North Slope Borough. Human wastes and trash are collected in 55-gallon drums and taken to the dump by students who are reimbursed at the rate of \$10 per drum. The village and the nearby DEW Line station share the latter's dump, which is located on the coast about .8 kilometers (half a mile) west of town.

According to a recent study by the University of Alaska, a good deal of the human wastes and trash hauled to the DEW Line dump washes out to sea and some can be seen on the beaches. If this situation cannot be corrected, the study recommended that a new dump site be developed. The North Slope Borough has included a new dump in the most recent amendment to its capital improvements program at a site south of the community water source, on the shore of Kaktovik Lagoon. Construction of a road to the dump has also been scheduled.

Electric Power and Heat

Electric power in Kaktovik is provided by the North Slope Borough. As in all traditional communities of the region except Barrow, Kaktovik's power is diesel generated. The existing power plant is located immediately south of the post office and houses two 30-kilowatt generators.

One of these was running in December 1977 while the other was in need of repair.

The North Slope Borough is in the process of upgrading the electric power system in Kaktovik. The community electric distribution system was replaced in 1977 with work to **be completed** in 1978. In addition, a new generator building will be constructed in 1978 near the new water tank and **will** house two 90-kilowatt and one 55-kilowatt diesel units, with space in the building reserved for a fourth generator. (The capacity of the third generator has not yet been finalized and may be upgraded to 90 kilowatts.)

A new electric power generation and distribution system was urgently needed in Kaktovik. The capacity of the present system is inadequate to serve existing **community** needs and the largest power user in the community, the school, obtained its power instead from the nearby DEW Line station. The school also has a 35-kilowatt generator for standby purposes.

Fuel in Kaktovik has often been costly and in short supply. Infrequent delivery of fuel by barge and airplane and inadequate fuel storage containers have caused fuel shortages in the past. Until a tank was recently constructed in the village, rubber bladders borrowed from British Petroleum had to be used. This storage tank is located within a **bermed** area at the north end of the townsite. The school has its own fuel storage tanks.

Communications

Telephone communications in Kaktovik rely on the bush **communications** system recently installed by RCA **Alascom**. Phones at the school, the post office, the coffee shop, and in the home of the village coordinator connect to a switching center at the DEW Line station, which is tied into the earth satellite station at Prudhoe Bay. In case of medical emergencies, the health aide **relies** on radio contact between the Public Health Service clinic in Kaktovik and the PHS hospital in Barrow.

RCA also provides the specialized communications and data processing facilities at the DEW Line station. Instant **communication** with other stations and communities in the state is always available, however, security prohibits villagers from using these facilities except in an emergency.

Citizens' Band (CB) radio is used to monitor aircraft and for informal communication among residents. Snowmobiles use CB radios for emergency contact in the event of machinery breakdown at an isolated location and subsistence hunters stay in radio contact to coordinate the hunt.

AIR TRANSPORTATION

The community's only airport is operated by the Air Force at the DEW Line station, and only aircraft approved by the Air Force 48 hours in advance can land there. Facilities include the 1470 meter (4,817-foot)

gravel runway and an air terminal building. Unlike the runway at the Barrow airport, which is equipped with approach radar and runway lighting, the DEW Line airstrip has only surveillance radar and no lighting. The airstrip cannot handle 737 jets, but the State and **the** DEW Line station are improving the strip to serve larger aircraft. Located near the airstrip is a borough-owned warm storage building, where rental tractors, back hoes, and augers are available for **local** borough-funded and other projects.

Wien Air Alaska has a contract with the DEW Line station to provide scheduled air service to Barter Island. **Wien** currently uses 19-seat, Twin Otter aircraft twice a week from **Deadhorse**. Seats are made available to civilians not employed by the DEW Line station on a space available basis. The local Wien agent estimated that in 1975 there were a total of 60 to 75 personal trips made outside the village. The most **common** trip was to Fairbanks, cost \$.130 round trip, and lasted three to five days (Urban and Rural Systems Associates 1976).

The Arctic Slope Regional Corporation also has an agreement with the Air Force which provides weekly charter service. A local pilot owns a Cessna 180 that lands on the road at the DEW Line site. The **plane** is also available for medical or other emergencies (Urban and Rural Systems Associates 1974). The Public Health Service **will also** arrange to **fly** patients **to** the Barrow hospital when notified by radio.

MARINE TRANSPORTATION

Marine transport to Kaktovik is limited to barges serving the DEW Line station. Because of shallow water near shore, cargo must be lightered to an offloading area near the landing strip. These barges normally do not carry nonmilitary cargo. However, because the BIA cargo ship North Star III does not come as far east as Kaktovik, essential supplies, such as fuel oil purchased by the village corporation, were brought in by DEW Line barge in 1972 and 1973. Some goods brought to Barrow via the North Star III are airshipped to Kaktovik. Because of unreliable barge service the community is increasingly dependent upon air transportation, which means higher costs.

LAND TRANSPORTATION

Kaktovik has a rudimentary gravel road system which connects the DEW Line site to the airport and a gravel and composition side road which connects to the town site. Barter Avenue, the main road through the village, was improved in 1975. This 550 meter (1,800-foot) long, 3.6 meter (12-foot) wide road was constructed by the Borough at a cost of \$120,000. In 1976, six side streets (Second Street through Seventh Street) totalling 509 meters (1,670 feet) in length were constructed. These 4.2 meter (14-foot) wide roads were installed at a total cost of \$144,000, an expenditure for which the Borough expects to be reimbursed by the State Local Service Roads and Trails Program (North Slope Borough 1977).

Vehicles in Kaktovik consist of about five trucks, 20 to 25 snowmobiles, and various motorcycles and three-wheeled motorcycles.

The Borough's 1977 Capital Improvements Program discusses three long-range programs for development of the village's road system. The first would simply continue improvements to the community's existing roads, while the others would provide new roads to the **community** dump and community water source. The improvement program would widen Barter Avenue from 4.2 to 5.4 meters (14 to **18** feet) and add an additional 488 meters (1,600 feet) of new roads. The new road to the water source would require construction of 0.64 kilometers (0.4 miles) of new road and upgrading of 0.64 kilometers (0.4 miles) of old road. The road would be 5.4 meters (**18** feet) wide on a 1.5 meter (5 foot) deep gravel base and bypass the existing road to the lake from the DEW Line station. Total cost is estimated at \$250,000. The CIP categorizes the 0.8 kilometer (one-half mile) long road to **the community** dump as a low priority. Planned to be 3.3 meters (11 feet) wide and 1.5 meters (5 feet) deep, its total construction cost is estimated at \$210,000. It is not known whether the **alignment** of this road would follow the existing alignment from the DEW Line station or bypass the station to the east.

The Borough would continue to fund these improvements with the expectation that reimbursement would come from the State's **Local** Service Roads and Trails Program.

VI. CITY OF WAINWRIGHT

Population

PAST TRENDS

Wainwright became a permanent settlement in 1904 when a school was constructed there, but people lived in the general area long before that time. The selection of the present townsite is believed to have been largely dictated by ice conditions when the time the first school building materials were landed. The presence of the school encouraged people from the area to settle here.

The village's early economic activity centered around reindeer. Concern by the Bureau of Education over dwindling subsistence food resources led to the introduction of reindeer herds at all schools and church missions in western and northwest Alaska. By 1918 Wainwright had three herds with a total of 2,300 reindeer; by 1924 this had increased to four herds with about 8,000 head of reindeer; and by 1934 locally owned herds numbered about 22,000 animals. Shortly afterward, however, a combination of overgrazing, changes from individual to corporate ownership of herds, and the introduction of open herding led to a dramatic decline in the number of reindeer. The animals mixed with migratory caribou herds, and today there are no domesticated reindeer on the Arctic coast.

Wainwright's population has grown steadily over the past 50 years except for a substantial decline in population between 1940 and 1950. In 1939,

Wainwright and Barrow were approximately the same size, but location decisions by government agencies subsequently established Barrow as the regional center for the region and caused the rapid growth of that community to the detriment of other North Slope villages. Shortly after the end of World War II, the U.S. Navy sponsored a search for oil and gas in its Petroleum Reserve No. 4, and a large camp was established at Barrow. Other federal government agencies involved with geological and topographical surveying began major work programs in the Barrow area at about the same time. These activities attracted people looking for wage-paying jobs away from communities like Wainwright. Between 1939 and 1950, Wainwright lost about one third of its total population, while Barrow's population increased by 162 percent during this same period (see Table 43).

Wainwright has grown steadily since 1950. Most of this growth has been the result of natural increase and a decline in rates of outmigration to other communities. Employment opportunities in Wainwright have risen since the passage of the Alaska Native Claims Settlement Act and the formation of the North Slope Borough and have encouraged more people to remain in the community. A census conducted by Alaska Consultants, Inc. in April 1977 counted 380 people living in Wainwright, slightly more than 20 percent higher than the community's population at the time of the 1970 census. Including children attending school outside Wainwright, the town's present population is closer to 400.

POPULATION COMPOSITION

Wainwright is a predominantly Eskimo community. At the time of the

TABLE 43
 POPULATION TRENDS
WAINWRIGHT, ALASKA
 1920 - 1977

<u>Year</u>	<u>Popul ati on</u>	<u>Percent Change</u>
1920	99	
1929	197	99.0
1939	341	73.1
1950	227	-33.4
1960	253	11.4
1970	315	24.5
1977	380 <u>a/</u>	20.6

a/ April 1977 popul ati on count by Alaska Consul tants, Inc.
 excludes children attending school outside **Wainwright**.

Sources: U. S. Census
 Alaska Consul tants, Inc.

April 1977 survey by Alaska Consultants, Inc., 93.4 percent of the people living in **Wainwright** were Eskimo. The remaining 25 people in town were white, most of them connected with the school.

Wainwright's 1977 population exhibited some peculiarly Alaskan age and sex characteristics to an exaggerated degree (see Table 44 and Figure 22). However, in some respects it tended to be closer to national norms. Males outnumbered females, and a much higher proportion of **Wainwright's** population was in the younger age groups than was the case nationally. On the other hand, the fact that **Wainwright's** population has been more stable and permanent than that of Alaska as a whole was reflected in a higher proportion of people in the older age groups.

Males outnumbered females 55 to 45 percent in **Wainwright** in 1977. This was slightly more disproportionate than the 1970 state male (54 percent) to female (46 percent) ratio and quite unlike that of the United States as a whole in 1970. At that time, females (51 percent) outnumbered males (49 percent) nationwide.

Wainwright has a very youthful population. In 1977, the median age of males was found to be 20 and that of females to be 18. This is not atypical of rural Alaska. In the Barrow Census Division in 1970, for example, the median age of males was 19.6 and that of females was 16.4. It is younger than normal for the state, however, and much younger than national averages. In 1970, the median age of males in the state was 23.3 and in the United States as a whole it was 27.0. For females the

TABLE 44

COMPOSITION OF POPULATION BY RACE AND SEX
WAINWRIGHT, ALASKA, 1970

Race				Percent of Total
	Male	Female	Total	%
White	3	5	8	2.5
Eskimo	162	145	307	97.5
<u>TOTAL</u>	165	150	315	<u>100.0</u>

Source: U. S. Census.

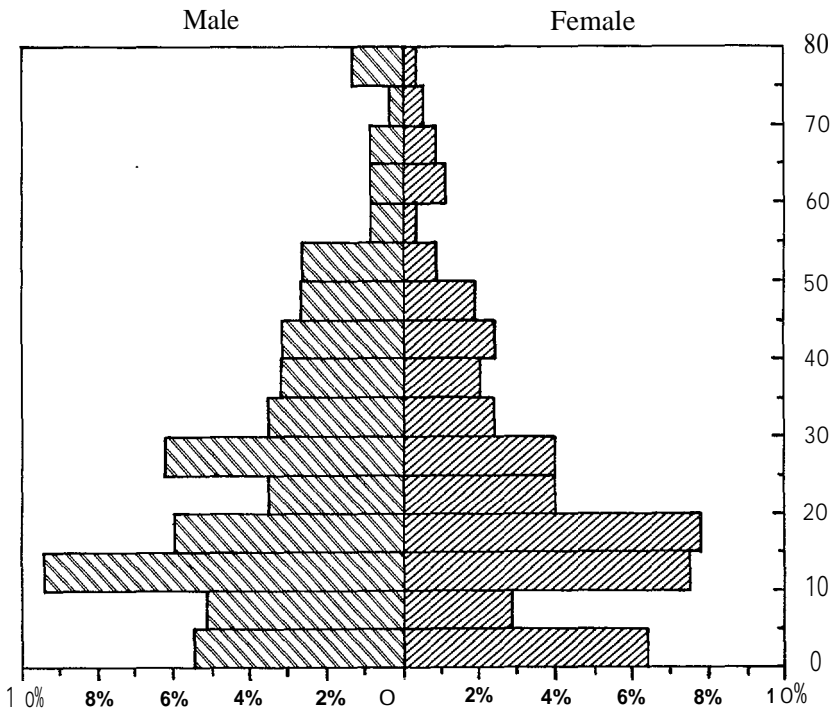
TABLE 45

HOUSEHOLD DENSITIES
WAINWRIGHT, ALASKA
1977

<u>Persons Per Household</u>	<u>Total Housing Units</u>	<u>Percent Total Population</u>	<u>Percent Total Housing Units</u>
1 person	4	1.0	5.1
2 persons	10	5.3	12.8
3 persons	11	8.7	14.1
4 persons	18	19.0	23.1
5 persons	10	13.2	12.8
6 persons	7	11.1	9.0
7 persons	6	11.1	7.7
8 persons	4	8.4	5.1
9 persons	3	7.1	3.8
10 persons	0	---	---
11 persons	1	2.9	1.3
12 persons	2	6.3	2.6
13 persons	2	6.9	2.6
<u>TOTAL</u>	<u>78</u>	<u>100.0</u>	<u>100.0</u>

Source: Alaska Consultants, Inc.

FIGURE 22



WAINWRIGHT

COMPOSITION OF POPULATION

1977

1970 state median age was 22.9 and that for the nation was a much older 29.6.

There is a relatively high proportion of **Wainwright's** population in the older age ranges. Persons aged 65 or more made up 4.0 percent of **Wainwright's** 1977 population. Although **lower** than the 1970 national figure of 9.8 percent, **Wainwright** is well above state norms where persons aged 65 or more in 1970 accounted for only 2.2 percent of the total population.

Household densities in **Wainwright** are relatively high (see Table 45).

The median number of people per household in the community in 1977 was found to be 4.8. While this is lower than that recorded for Barrow Census Division in 1970 (5.55), it is well above the statewide median figure (3.52).

GROWTH PROSPECTS

The existence of **Wainwright** is not based on any specific economic reason, nor does it have any specific economic function. Instead, it exists because it was a convenient location from which to provide services to **people** who had traditionally lived in the area, and it has survived **mainly** because of cultural and family ties. However, although cultural ties will be the major reason for **Wainwright's** continued survival, opportunities for employment and cash income are seen as the primary factors determining future rates of growth. With few prospects for employment and a reasonable level of income, a high proportion of young people will

leave Wainwright, and the community's population could even decline. If, on the other hand, prospects for local employment and income continue to improve, more young people are likely to remain, and the community can expect some further increases in population.

There are several existing and potential sources of employment in the Wainwright area which have a potential for growth in the future. These include an expansion of services provided by the North Slope Borough, investments made by the Arctic Slope Regional Corporation and the Olgoonik Corporation, the development of coal and oil and gas resources within the Wainwright region, and miscellaneous other activities such as reindeer herding and tourism. However, the development of nearby coal resources for other than strictly local use is viewed as highly unlikely while no oil or gas finds resulting from ongoing NPR-A exploration activities near Wainwright have yet been announced. In addition, only very small increases in employment would be likely to occur with the reintroduction of reindeer herding or the initiation of day tours from Barrow. On the negative side, an existing limited source of employment in the area--the nearby LIZ-3 DEW Line station--may be automated or phased out during the next 20 years.

While the prospects for increased job opportunities in Wainwright are relatively modest, they should be adequate to encourage a share of the community's young people to remain here. Others may choose to retain Wainwright as their home base but to migrate periodically to jobs at Prudhoe Bay or elsewhere in the region, returning home during leave

periods. No significant immigration of whites or Eskimos to **Wainwright** is anticipated.

Economy

COMPOSITION OF EMPLOYMENT

In April 1977 Alaska Consultants undertook a survey of employment in **Wainwright** because no meaningful employment statistics were collected by the Employment Security Division of the Alaska Department of Labor which can be disclosed for **communities** of **Wainwright's** size. Only those jobs in the **community** itself were counted, even though several local residents earned the bulk of their cash income elsewhere, such as the nearby LIZ-3 DEW Line station or at **Prudhoe** Bay.

When converted to average **annual** full-time employment, a total of 57.5 jobs were counted in **Wainwright** in 1977 (see Table 46). The government sector accounted for almost 60 percent of these jobs, most of which were associated with the North Slope Borough. The **Wainwright school** is the largest single employer in town, accounting for 36.5 percent of the average annual full-time jobs in the **community**. However, about half of the jobs associated with the school are held by whites. Aside from the school, there were another 13 government jobs in **Wainwright** in 1977. These were equally divided between the federal government (post office, EPA facility, and the WIC [Women, Infants, Children] program) and **local** government (city hall, police, light plant, health clinic, and village

TABLE 46
 AVERAGE ANNUAL FULL-TIME EMPLOYMENT a/
 WAINWRIGHT, ALASKA
 1977

<u>Industry Classification</u>	<u>Number</u>	<u>Percent of Total</u> %
Mining	0	---
Contract Construction	3.0	5.2
Manufacturing	2.0	3.5
Transportation, Communications and Public Utilities	0	---
Trade	11.5	20.0
Finance, Insurance and Real Estate	4.0	7.0
Service	3.0	5.2
Miscellaneous	0	---
Government	34.0	59.1
Federal	(6.5)	(11.3)
State	(0)	(---)
Local	(27.5)	(47.8)
<u>TOTAL</u>	<u>57.5</u>	<u>100.0</u>

a/ Employment count of jobs in Wainwright only. Several local residents are employed outside town at the LIZ-3 DEW Line station or in the Prudhoe Bay area.

Source: Alaska Consultants, Inc.

coordinator) sectors. **Wainwright** has no state government employees.

After government, most jobs in **Wainwright** are in trade. This sector had four employers and 20 percent of all jobs in the community in 1977. The largest single employer was the **Wainwright** Co-op store, followed by the **Olgoonik** Corporation tank farm. (According to **Olgoonik** Corporation officials, the tank farm had a storage **capacity of** 870,550 liters [230,000 gallons] in 1977, with a further 189,250 liters [50,000 gallons] planned to be added.) The other two businesses were Shooters' Supply and Emily's. Shooters' specializes in sporting goods. Emily's mainly sells groceries, but this store was open only intermittently in 1977.

Finance, insurance and real estate accounted for four jobs in 1977, all of them associated with the **Olgoonik** Corporation office. An estimated three persons were engaged in contract construction at the time of the 1977 survey, and another three people were engaged in service occupations. However, the number of jobs in contract construction fluctuates widely from year to year and rose later in 1977 with the construction of new housing, the community building, and the high school. Most service jobs were associated with the two churches, but this sector also included a local privately owned movie theater. An estimated two full-time jobs in 1977 were derived from the production of Native arts and crafts items.

In addition to conventional employment, the National Guard is a significant contributor to **Wainwright's** present economy. According to the North Slope Borough, there were 21 national guardsmen in the community in 1977.

Their activities contributed a combined total of about \$25,200 to the local economy in 1976.

UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT

No unemployment statistics are available for individual **communities** within the North Slope Borough, and **boroughwide** information collected by the Employment Security Division of the Alaska Department of Labor is not representative of conditions in the region's traditional villages. This is because employment in the borough is dominated by jobs in the Prudhoe Bay area. Reflecting the fact that there is no unemployment at Prudhoe Bay or the various pipeline camps, figures for the region as a whole were **the lowest** in the state in 1976. However, while unemployment rates in North Slope communities are believed to be lower than those of most Alaska Native villages, they are not nearly as low as suggested by **boroughwide** statistics.

The employment situation in **Wainwright** has improved dramatically over the past several years. According to a 1970 survey conducted by the Alaska State Housing Authority, there were no more than a dozen steadily employed Eskimos in **Wainwright**. In 1977 Alaska Consultants identified 57.5 average annual full-time jobs in the **community**, an increase of 469 percent during the seven-year period. Nevertheless, unemployment remains a problem. The 1977 population survey by Alaska Consultants identified 191 people in **Wainwright** between the ages of 18 and 65, the age range when people are normally assumed to be available for employment. Since there

were only 57.5 full-time job equivalents in the community at that time, it is obvious that a **large** share of the village's adult population is either unemployed or underemployed.

As in other **small** villages of the region, seasonal variations in employment in **Wainwright** result from the closure of the local schools during the **summer** months and from summer construction activities. School teachers normally leave the region during the long summer vacation, and other positions associated with the school except for maintenance jobs also cease temporarily. The number of construction jobs available fluctuates from year to year depending on the projects scheduled, but most construction activity is limited to the summer because of the region's harsh winter climate. Thus, depending on the amount of construction work underway during a given year, the temporary loss of jobs associated with the school and the addition of seasonal construction jobs tend to offset each other.

RECENT TRENDS AND CHANGES

There is no published information available which indicates trends in employment in individual North Slope communities. However, the incorporation of the North Slope Borough and the formation of the Native village corporations and the Arctic Slope Regional Corporation under the terms of the Alaska Native Claims Settlement Act have had a dramatic impact on the number of jobs available in the region as a whole and in individual communities, including **Wainwright**.

Prior to the existence of the Borough and the Native corporations, the employment pattern in **Wainwright** was similar to that exhibited in other rural areas of the state--a group of highly skilled people, almost all of them white, providing services such as education and health to a largely unemployed group of Native people. Today, however, **the** town's Eskimo residents have many more opportunities for employment.

New employment opportunities outside **Wainwright** have also become available during the past few years as a result of the development of the **Prudhoe** Bay field and the construction of the trans-Alaska pipeline. Although the pipeline is now operational, construction of the proposed natural gas pipeline is **likely** to offer similar employment opportunities in the near future.

OCCUPATIONAL SKILLS

Comprehensive information on the skills of the work force in the North Slope region is generally lacking, and there are no reliable or current statistics on an individual **community** basis. Some general idea of the occupation skills of **Wainwright** residents can be inferred, however, from information developed by the Barrow Manpower Center if one assumes that work force skills are relatively consistent boroughwide. A breakdown of skills listed by Barrow Manpower Center registrants is given in Table 29 of this report.

INCOME LEVELS

Household incomes in **Wainwright** are low when compared with state averages, but the incomes of many local families have risen sharply during the past few years. In 1970 the Alaska State Housing Authority reported that less than five of the 50 Native families then living in **Wainwright** had annual incomes of more than \$7,000. A 1974 survey of 51 **Wainwright** households by Dupere and Associates found that the median 1973 family income in the **community** had risen to \$5,833. By contrast, an April 1977 survey by Alaska Consultants, Inc. found the median 1976 household income in **Wainwright** to be \$10,000, almost double the 1973 figure (see Table 47).

While incomes in **Wainwright** have risen substantially, they are still low. The median family income for the state in 1969 was \$12,443, substantially above that in **Wainwright** in 1976 without even considering the increases in statewide incomes which have taken place between 1969 and 1976.

When household income and family size are compared with recent U.S. Department of Labor standards for poverty level incomes, more than one third of the 64 **Wainwright** households which reported income information in the April 1977 survey had incomes which were at or below the official federal poverty level. These federal standards do not take the extremely high living costs of remote Alaska areas into consideration, but they indicate that a significant share of **Wainwright's** households is still living in extreme poverty.

Public assistance programs are an important income supplement for many

TABLE 47
 HOUSEHOLD INCOME DISTRIBUTION a/
 WAINWRIGHT, ALASKA
 1976

<u>Household Income</u>	<u>Percent of Total</u>
Under \$1,000	3.1
\$1,000- \$ 1,999	4.7
\$2,000- \$2,999	4.7
\$ 3,000- \$3,999	14.1
\$4,000- \$4,999	1.6
\$ 5,000- \$5,999	1.6
\$6,000- \$6,999	4.7
\$ 7,000- \$ 7,999	6.2
\$8,000- \$8,999	7.8
\$ 9,000- \$9,999	- -
\$10,000- \$11,999	7.8
\$12,000- \$14,999	6.2
\$15,000- \$24,999	18.8
\$25,000- \$49,999	15.6
\$50,000 or more	3.1
 <u>TOTAL</u>	 <u>100.0</u>

a/ Based on responses of 64 out of a **total** of 78 households surveyed in April 1977.

Source: Alaska Consultants, Inc.

Wainwright households. During FY 1976, the Bureau of Indian Affairs distributed a total of \$7,300 in general assistance-payments to 15 **Wainwright** recipients, with the average recipient receiving a monthly payment of \$41 (see Table 48). However, general assistance payments in **Wainwright** are down sharply from a couple of years ago when close to \$50,000 was distributed to 68 local recipients, an average **monthly** payment of \$60. Public assistance payments (or welfare) distributed by the Alaska Department of Health and Social Services are another important source of supplemental income (see Table 49). During a typical month in 1976, 13 people in **Wainwright** received Old Age Assistance payments, four qualified for Aid to the Disabled, and 12 were eligible for Aid to Families with Dependent Children funds. The amounts paid to individuals under these programs averaged between \$90 and \$100 per month except for Aid to Families with Dependent Children, under which the average **Wainwright** recipient received \$270 per month in 1976.

Land Use

OVERALL PATTERNS

Including the airport and graveyard properties, the **Wainwright** townsite occupies a total of 179.31 hectares (443.07 acres) (see Table 50). Of the 155.78 hectares (384.93 acres) in use in 1977 (including the borough housing units and community building under construction), the largest amount (125.49 hectares-- 310.08 acres) was taken up by the **Wainwright** airport. Residential uses occupied 12.14 hectares (almost 30 acres) of

TABLE 48

GENERAL ASSISTANCE PAYMENTS a/
WAINWRIGHT, ALASKA
 FY 1973 - FY 1976

	<u>FY 1973</u>	<u>FY 1974</u>	<u>FY 1975</u>	<u>FY 1976</u>
Total Payment	\$42,700	\$48,800	\$16,800	\$7,300
Number of Cases	59	68	25	15
Average Payment:				
Annual	\$ 724	\$ 718	\$ 672	\$ 487
Monthly	\$ 60	\$ 60	\$ 56	\$ 41

a/ Payments made by the Bureau of Indian Affairs.

Source: U.S. Bureau of Indian Affairs.

TABLE 49

PUBLIC ASSISTANCE PROGRAM PAYMENTS a/
WAINWRIGHT, ALASKA
 OCTOBER, 1976

	<u>Old Age Assistance</u>	<u>Aid to the Disabled</u>	<u>Aid to Families with Dependent Children</u>	<u>Total</u>
Total Payment	\$1,250	\$ 370	\$3,238	\$4,858
Number of Cases	13	4	12	29
Average Payment	\$ 96	\$ 92	\$ 270	\$ 168

a/ October is considered to be a representative month for public assistance payments.

Source: Alaska Department of Health and Social Services.

TABLE 50

EXISTING LAND USE
WAINWRIGHT, ALASKA
1977

<u>Land Use</u>	<u>Land Area</u>		<u>Percent of</u> <u>Townsite Area</u> <u>a/</u>
	(hectares)	(acres)	%
Residential	12.12	29.95	6.8
Commercial	.73	1.80	.4
Industrial	125.49	310.08	70.0
Utilities & Storage	(.82)	(2.03)	(.5)
Airport <u>b/</u>	(124.67)	(308.05)	(69.5)
Public and Semi-Public	14.12	34.90	7.9
Municipal Reserve	(5.67)	(14.00)	(3.2)
Cemeteries	(6.11)	(15.11)	(3.4)
Other Public	(1.89)	(6.11)	(1.1)
Semi-Public	(.45)	(1.89)	(.3)
Developed Streets	3.32	8.20	1.9
<u>Total Developed Area</u>	<u>155.78</u>	<u>384.93</u>	<u>86.9</u>
Vacant	25.53	58.14	13.1
Undeveloped Streets	(4.94)	(12.21)	(2.8)
Other	(18.59)	(45.93)	(10.4)
<u>TOTAL TOWNSITE AREA</u> <u>a/</u>	<u>179.31</u>	<u>443.07</u>	<u>100.0</u>

a/ Townsite area includes the airport and cemetery tracts.

b/ Airport acreage includes developed but **unplatted** sections of Airport Road.

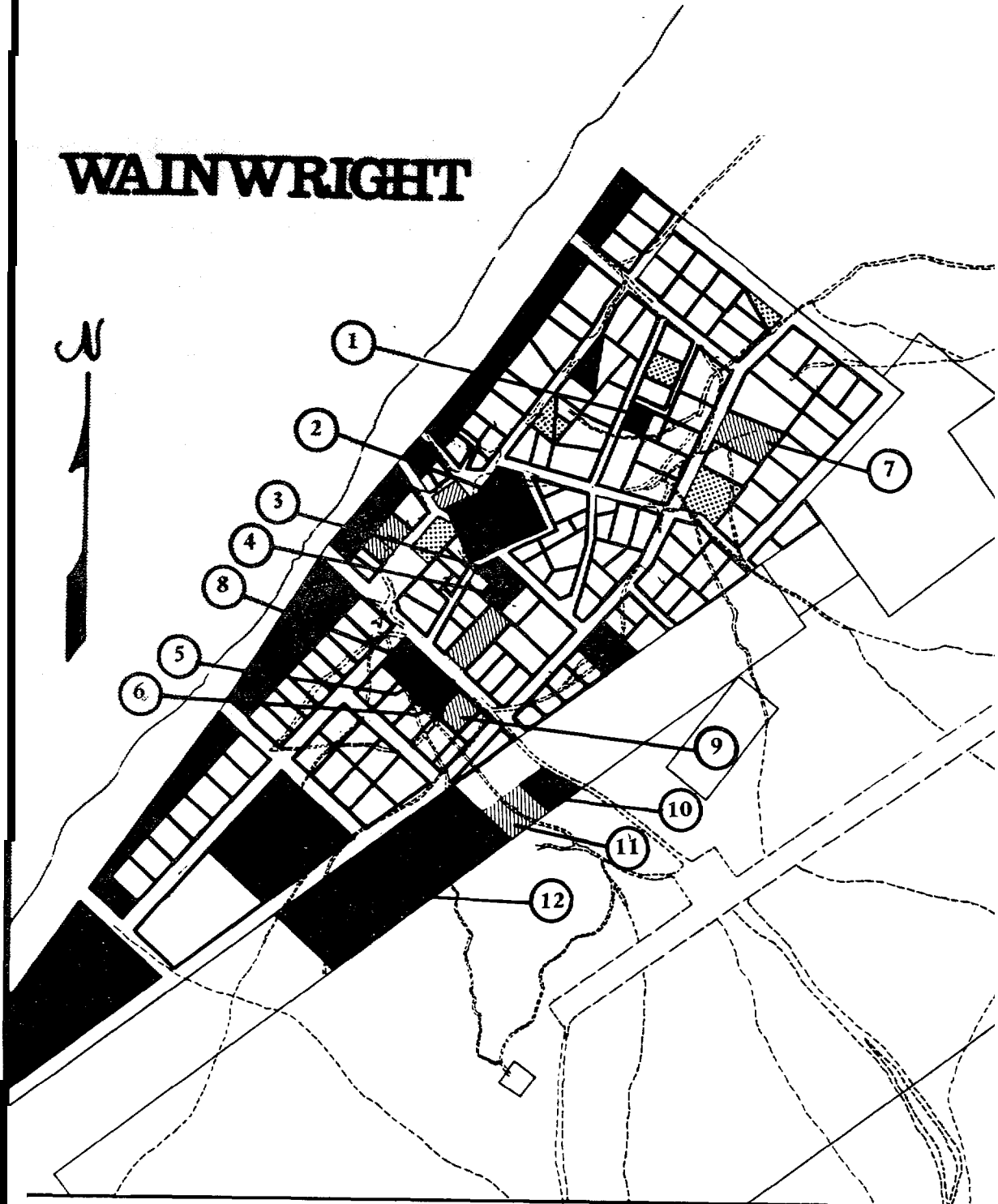
Source: Alaska Consultants, Inc.

land, while the municipal reserve (5.67 hectares--14 acres) and cemeteries (slightly over 6 hectares (15 acres) accounted for most of the remaining land in use.

Like many Eskimo communities, **Wainwright** developed in a linear form **along** the coast. This pattern was accentuated by the location of the airport parallel to the coast immediately beyond the town's inland boundary. Inside the village, the densest development is near the school which, **together** with the adjacent co-op store, city hall, and armory, serves as a focus of **community** activity. Outside this central area, the post office, a sanitation facility, the **Olgoonik** Corporation office, and the two churches are other centers of community activity, although none of these is near the others (see Figure 23).

Development around **Wainwright**, besides the airport and cemetery tracts, includes the **Olgoonik** Corporation tank farm a short distance to the northeast, the community dump located further to the north, the community water source southwest of town, the local gravel supplies along the shore of **Wainwright** Inlet south of the community, and a DEW Line station located a few kilometers **inland** and **its** associated tank farm at the coast northeast of town. Even though there is a general absence of physical development, the region around **Wainwright** is heavily used by local residents as a source of subsistence supplies (see Figure 24).

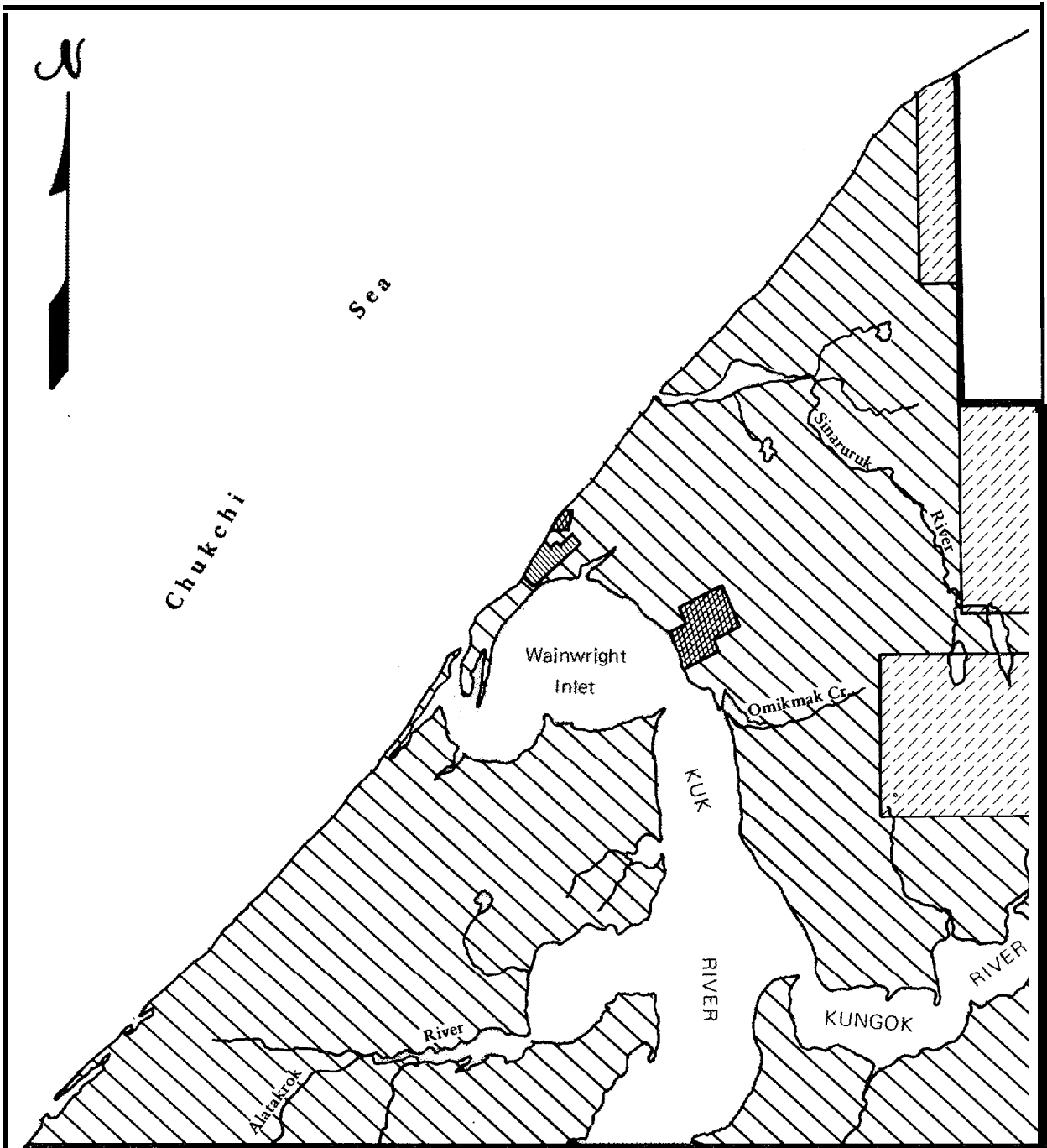
WAINWRIGHT





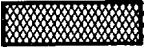

LAND USE

-  Residential
-  Commercial
-  Public & Semi-Public
-  Utilities & storage

- 1. Health Center
- 2. School
- 3. City Office
- 4. Armory
- 5. Public Safety Building (to be built in 1978)
- 6. Community Building under construction
- 7. Village Corporation
- 8. post Office
- 9. Power Plant
- 10. EPA
- 11. Water Tank
- 12. High School & Power Plant (under construction)



**WAINWRIGHT COMMUNITY STUDY
WAINWRIGHT AREA LAND STATUS**

- | | | | |
|---|---------------------|--|--|
|  | Wainwright Townsite |  | Olgoonik Corp. Conveyance
(surface only) |
|  | Dew Line |  | Olgoonik Corp.
Lands Selected but not
yet Conveyed |

SCALE IN MILES



HOUSING

Residential uses occupied a total of 12.12 hectares (29.95 acres) of land in **Wainwright** in 1977. Everyone in town lived in single-family structures except for two apartments in the school for teachers. Alaska Consultants, Inc. made a detailed survey of housing conditions in **Wainwright** in **April** 1977. At that time a **total** of 78 housing units were occupied, and since then, 12 more units have been built by the North Slope Borough.

As in many rural Alaska communities, housing in **Wainwright** is generally either very new or very old. Aside from housing constructed by the Borough during the summer of 1977, the Alaska State Housing Authority (ASHA) built 25 homes here in 1971, the Borough constructed two units of teacher housing in 1976, and six people have financed **their** homes with the help of veterans' loans during the past few years. Reflecting this building activity, 32 of the 78 units (or 41 percent) surveyed in April 1977 were less than five years old. Most of the remainder (38.5 percent) were more than **15** years old, some of them dating from the turn of the century (see Table 51).

Housing in **Wainwright** which is less than five years old can generally be described as being in acceptable condition. Although they do not meet the standards of a conventional building code, these units are nevertheless structurally sound, have a reasonably modern interior layout, and provide their occupants an adequate degree of protection from the severe

TABLE 51

AGE OF OCCUPIED HOUSING UNITS
WAINWRIGHT, ALASKA
 1977

<u>Age</u>	<u>Number</u>	<u>Percent of Total</u>
Less than 5 years	32	41.0
5 - 9 years	11	14.1
10 - 14 years	5	6.4
15 years or older	30	38.5
<u>TOTAL</u>	<u>78</u>	<u>100.0</u>

Source: Alaska Consultants, Inc.

TABLE 52

HOME OWNERSHIP CHARACTERISTICS
WAINWRIGHT, ALASKA
 1977

<u>Type of Occupancy</u>	<u>Number</u>	<u>Percent of Total</u>
Owner occupied	60	76.9
Renter occupied	11	14.1
Other <u>a/</u>	7	9.0
<u>TOTAL</u>	<u>78</u>	<u>100.0</u>

a/ People living in rent-free accommodations.

Source: Alaska Consultants, Inc.

winter cold. Older housing units associated with the school and the **Assembly of God** church are also classed as being in acceptable condition. Although not built at the time of the April 1977 survey, the 12 units constructed by the North Slope Borough during the **summer** of **1977** also qualify as acceptable housing.

The 25 homes constructed by the Alaska State Housing Authority are rated as being in acceptable condition. However, these units have major deficiencies which were assessed by ASHA in 1977 and should be corrected in 1978. **Of the** remaining 42 units, probably not more than half a dozen are capable of being brought up to an acceptable standard, **mainly** because of inadequate original construction. Nevertheless, there are several old structures dating from the turn of the century which may be retained because of their historic value.

Most people in **Wainwright** own their own homes (see Table 52). More than three quarters of the people surveyed in April 1977 by Alaska Consultants, Inc. either owned their homes outright or were buying them. Eight of the 11 renters surveyed were whites. All except one of the households living in **rent-free** housing were Eskimo.

Houses in **Wainwright** are **small** (see Table 53). Ten homes surveyed in April 1977 were less than 23.23 square meters (250 square feet) in area, and another 24 were between 23.23 and 46.36 square meters (250 and 499 square feet). Most homes of more than 46.45 square meters (500 square feet) in area were constructed by **ASHA** or are teacher housing units.

TABLE 53

SIZE OF OCCUPIED HOUSING UNITS
WAINWRIGHT, ALASKA
 1977

<u>Size of Units</u>	<u>Number</u>	<u>Percent of Total</u>
Less than 250 square feet	10	12.8
250 - 499 square feet	24	30.8
500 - 749 square feet	32	41.0
750 - 999 square feet	7	9.0
1,000 square feet or more	5	6.4
<u>TOTAL</u>	<u>78</u>	<u>100.0</u>

Source: Alaska Consultants, Inc.

TABLE 54

NUMBER OF ROOMS AND BEDROOMS BY HOUSEHOLD SIZE
 OCCUPIED HOUSING UNITS
WAINWRIGHT, ALASKA, 1977

<u>Household Size</u>	<u>Number of Households</u>	<u>Number of Rooms Per Household</u>					<u>Number of Bedrooms Per Household</u>						
		1	2	3	4	5	6	7	0	1	2	3	4
1 person	5	4	-	1	-	-	-	-	4	1	-	-	-
2 persons	10	3	2	3	-	2	-	-	3	3	3	1	-
3 persons	11	3	24	--	2	-	-	3	3	5	-	-	-
4 persons	17	1	5	5	3	2	1	-	1	6	5	5	-
5 persons	9	7	33	1	-	-	-	1	4	3	-	1	-
6 persons	8	-	-6	2	-	-	-	-	-	6	2	-	-
7 persons	6	-	-2	31	-	-	-	-	-	2	4	-	-
8 persons	4	-	-1	1	-	1	1	-	-	1	1	2	-
9 persons	3	-	-1	1	1	--	-	-	-	1	?	1	-
10 persons	0	-	-	-	-	-	-	-	-	-	-	-	-
11 persons	2	-	1	1	-	-	-	-	1	1	-	-	-
12 persons	1	-	-	-	-	1	-	-	-	-	-	1	-
13 persons	2	-	-	-	2	-	-	-	-	-	2	-	-
<u>TOTAL</u>	<u>78</u>												

Source: Alaska Consultants, Inc.

Wainwright homes have few rooms (see Table 54). This is particularly true of older units which tend to be less well insulated. Instead of erecting permanent partitions which impede heat circulation and thus increase fuel costs, residents in these older homes have traditionally preferred to use temporary barriers such as curtains to gain a degree of privacy, especially for sleeping purposes. Twelve homes in **Wainwright** consisted of a **single room**, and nine of these were 15 years old or older. By contrast, the newer homes in the community tend to be larger in area, better insulated, and divided internally. This is indicated by the fact that of the 32 homes surveyed which were five years old or newer, none had fewer than three rooms.

The combination of small homes with relatively few rooms (the average home in **Wainwright** at the time of Alaska Consultants' April 1977 survey had three rooms) and large numbers of people per household result in a good deal of overcrowding. If the commonly used standard for overcrowding of more than one person per room is used, 53 of the **78** houses surveyed in **Wainwright** were overcrowded. According to U.S. Public Health Service standards, any home having **less** than 7.43 square meters (80 square feet) per person is considered seriously overcrowded. Using these standards only 17 houses in **Wainwright** in 1977 were overcrowded, six of them to a serious degree.

In April 1977 most **Wainwright** residents paid very little in direct housing costs, i.e., for house payments or rent. In fact, 37 of the 73 households for which this information was obtained by Alaska Consultants,

Inc. either made no house payments or lived rent free (see Table 55). On the other hand, utilities costs, particularly fuel, were very high. Most households which made no monthly utilities payments had these costs "hidden" in their rent. However, several households still obtain their own water supply or have coal stoves.

The typical household in **Wainwright** currently makes monthly payments of about \$250 for direct housing and utilities costs. While this is low in terms of average costs in larger population centers, it consumes a high portion of the disposable cash income (the 1976 median household income in **Wainwright** was found to be \$10,000) of many households.

Land Status

Two very important considerations in land use planning are the ownership of land and the conditions under which it is held. **Wainwright** is located within the former **Naval** Petroleum Reserve No. 4, which was transferred to the Department of the Interior in 1976 and is now known as the National Petroleum Reserve-Alaska (**NPR-A**). However, lands in town in the immediate vicinity of the community are held under several forms of ownership. These include the **Wainwright** townsite patented to the townsite trustee in the U.S. Bureau of Land Management; a patented U.S. survey property on which the school is located; airport properties within the townsite which were patented to the State Division of Aviation by the **Townsite** Trustee in May 1977 (excluding several graveyard tracts); lands used by the nearby DEW Line station and its associated tank farm; and lands selected by the

TABLE 55

MONTHLY HOUSING COSTS
WAINWRIGHT, ALASKA

<u>Costs</u>	<u>Rent/House Payments</u>	<u>Electricity</u>	<u>Water</u>	<u>Costs</u>	<u>Fuel</u>	<u>Total Housing Costs</u>
Zero	37	8	14	Zero	0	0
\$1 - \$20	13	0	39	- \$50	0	
\$21 - \$40	6	46	16	\$ - \$∞	1	1
\$41 - \$60	4	15	2	\$101 - \$150	6	0
Over \$60	13	1	0	\$151 - \$2∞	34	4
Unknown	5	8	7	\$201 - \$250	12	17
<u>TOTAL a/</u>	<u>78</u>	<u>78</u>	<u>78</u>	<u>\$251 - \$300</u>	<u>6</u>	<u>23</u>
				Over \$300	2	12
				<u>TOTAL a/</u>	<u>78</u>	<u>78</u>

a/ Total of 78 units surveyed.

Source: Alaska Consultants, Inc.

Olgonik Corporation under the terms of the Alaska Native Claims Settlement Act.

MAINWRIGHT TOWNSITE

The Bureau of Land Management surveyed the **Wainwright townsite** between August and October of 1970. The survey was approved on January 26, 1976 and the townsite trustee visited **Wainwright** in September 1977 to take applications from residents for title to individual **lots**. Until these applications are approved and title conveyed, however, all property within the **Wainwright** townsite except the school site and lands patented to the Division of Aviation will continue to be owned by the federal **government**.

Because **Wainwright** is a Native townsite, Alaska Natives applying for title to lands which they occupied at the time the plat of survey was approved can choose to hold their land in either a restricted or unrestricted status. Unrestricted lands are held under normal fee simple title, while lands **held** under restricted title retain some of the trust relationship between the federal government and Native citizens. Title conditions **limit** the Native owner's ability to **sell** or transfer his property. On the other hand, **lands held** under this type of ownership are not subject to taxation, nor can zoning, housing, building, or other regulatory codes be enforced.

Thus far, **all** individuals applying to the townsite trustee for lands in

Wainwright have elected to receive restricted title. The imposition of areawide property taxes by the North Slope Borough has undoubtedly been the major reason for this. However, while there are advantages to restricted deeds, there are also disadvantages. These include difficulties in transferring title and in obtaining state or federal housing assistance.

Title to land held in a restricted status cannot be transferred except after the owner's death to his or her heirs. Instead, permission for the sale or transfer must be sought from the Bureau of Indian Affairs, which then appraises the property to establish a fair market value and approves the actual sale. Restricted property sold or willed to non-Natives assumes an unrestricted status.

It can also be more difficult to obtain federal or state housing assistance when property is held under a restricted status. Unless the Bureau of Indian Affairs signs a statement that the property in question can be encumbered with a mortgage, restricted property cannot be condemned if the property holder does not make his or her payments. Given such conditions, agencies are understandably reluctant to enter into long-term housing agreements.

Owners of property to which improvements were made after January 26, 1976 (the date the plat of survey was approved) cannot obtain restricted title to their land from the townsite trustee. However, the trustee can give title to the City of Wainwright, which can then transfer the deed to individuals. In these cases, however, the deeds will be unrestricted

and subject to property taxation. All housing constructed by the North Slope Borough on lots not previously occupied will, therefore, be on unrestricted lands. The owners of ASHA housing, on the other hand, can obtain restricted deeds to their properties since these houses were built before the **townsite** survey was approved. Other lands in the **Wainwright townsite** which are owned by **public** agencies, corporation, church groups, or the like will all be owned in an unrestricted status.

WAINWRIGHT AREA

Lands outside the **Wainwright** townsite are within **NPR-A** and under the jurisdiction of the U.S. Department of the Interior. In the **immediate** vicinity of **Wainwright**, however, surface rights to lands are also vested with **the** U.S. Department of the Air Force and the **Olgoonik** Corporation.

The Air Force's **DEW** Line site, LIZ-3, is located inland about 8 kilometers (5 miles) southeast of town and has an associated tank farm at the coast northeast of the community. All told, **this** facility occupies close to **526.1** hectares (**1,300** acres) of land.

The **Olgoonik** Corporation is a Native village corporation established under the terms of the **Alaska** Native Claims Settlement Act. Its enrollment of 369 people entitled it to select the surface rights to 46,620.1 hectares (115,200 acres) of **land** surrounding the **Wainwright** townsite under Section 12(a) of the claims act. Under the terms of Section 12(b) of the act, **Wainwright** was also entitled to receive surface title to

some lands from the Arctic Slope Regional Corporation. Since no subsurface rights were selectable in the petroleum reserve, the Arctic Slope Regional Corporation was given alternative lands outside **NPR-A** from which to make its selections.

As of September 30, 1977 the village corporation had received interim conveyance to 42,619.2 hectares (105,312 acres) of its Section 12(a) entitlement, and it had received all of its Section **12(b)** entitlement, determined by the Arctic **Slope** Regional Corporation to be 18,060 hectares (44,625 acres). Thus, unlike village corporations in other regions of the state, the **Olgoonik** Corporation had received close to 94 percent of its total land entitlement by late 1977.

Community Facilities and Services

CITY POWERS AND PROGRAMS

The City of **Wainwright** was incorporated as a second-class city in 1962. State **law** provides that second-class cities shall have an elected **seven-**member council which must meet at least once a month. A mayor elected by the council serves as the chief administrative officer. As a **second-**class city within an organized borough, **Wainwright** can theoretically exercise all municipal powers except those of assessment and collection of taxes, education, and planning and zoning, which are mandatory **area-**wide borough powers under Alaska **law**, however it has transferred **all** but recreation and fire protection to the Borough. The Borough's broader

tax base enables it to provide a much more comprehensive range of services. The following municipal powers were delegated to the Borough in an election held April 30, 1974:

- sewer and sewage treatment facilities
- watercourse and flood control facilities
- health services and hospital facilities
- e telephone systems
- light, power, and heat
- water
- transportation systems, including airport and aviation systems and streets and sidewalks
- libraries
- garbage and solid waste collection and disposal services and facilities
- housing an urban renewal, rehabilitation, and development
- preservation, maintenance, and protection of historic sites, buildings, and monuments

Wainwright's police power was transferred to the Borough in an election held July 1, 1976.

To pay for retained services, the City may levy a sales and use tax upon all sources taxed by the Borough in the manner provided by the Borough. The property tax may not exceed five mills or one half of one percent, and it must be approved by referendum. The sales and use tax must also be approved by referendum and may not exceed three percent. If the City

were **to** exercise this authority, the tax would be assessed and collected by the Borough and then remitted to the City.

Wainwright raises money for its limited municipal services through a three percent local sales tax, but the village has never levied a property tax. Additional funds have been obtained from city-sponsored bingo games. State revenue-sharing funds are available to local governments for fire protection and recreation, but the City did not **apply** for them in 1976.

RECREATION

Wainwright presently has very limited recreational facilities. The school has a half basketball court and conducts some physical education classes in the hallways for younger students. In addition, children play Norwegian baseball in an informal open area between the school and **co-op** store. The Assembly of God church has a ping pong table and some table games, and the Presbyterian church offers a calisthenics program for children.

Formal recreation facilities for **adults** in **Wainwright** are almost non-existent. The school and the National Guard armory are usually made available when needed for community meetings or special functions. The armory is also used heavily during the two major community celebration periods each year (Christmas and Fourth of **July**) when a series of recreational contests are staged and prizes are awarded from community bingo

proceeds. The only other formal recreation facility in **Wainwright** is the Kuk Theater, which is located in the home of a village resident. According to the owner, however, few movies were shown in 1977 because of the unreliability of the **community** power system.

Bingo is a **major** recreational activity in **Wainwright**. Games are sponsored about nine times a month by three different **community** organizations: the **Wainwright Motormushers**, the Search and Rescue Group, and the **Wainwright Recreation Committee**. This **latter** group, which is selected by the City Council, raises about \$6,000 annually from bingo most of which is used to put on the Fourth of July and Christmas programs.

The range of formal recreation facilities in **Wainwright** will be greatly improved in 1978 when a high school gymnasium and a community building are scheduled **to** be completed. The gymnasium **will** enable the **school** to offer an adequate indoor recreation program, and it should also be available to the public after school hours. A community building has been a top priority item in **Wainwright** since a previous facility of this type burned down in November 1968. **As** designed, this will be a 173.91 square meter (1,872-square foot) structure and, except for toilets and a furnace room, will not be divided internally so it can be used for major **community** events as **well** as activities requiring less space.

FIRE PROTECTION

Fire protection is one of the two municipal powers retained by the City

of **Wainwright**. However, except for a fire siren at city hall, fire protection services in the community are nonexistent. There is no organized volunteer fire department nor any fire-fighting equipment. Except for the loss of the original Environmental Protection Agency (EPA) sanitation plant in November 1973, **Wainwright** has had few serious fires, but the community could lose a number of buildings if a major fire got started in one of the more densely developed sections of town during a period of high winds.

As part of the April 1977 household survey conducted by Alaska Consultants, Inc., people were asked to name three community facilities or services which they would most like to see added or improved in **Wainwright**. Fifty of the 72 people who answered this question said they would like better fire protection services. (The next most often listed community need was an improved power system with 38 responses). Although fire protection was on people's minds at the time of the survey because a fire had destroyed a home in town a short time before, it is still obvious that this is a service which **Wainwright** residents want very much.

LAW ENFORCEMENT

The North Slope Borough is responsible for providing police protection services in **Wainwright** and has a trained public safety officer stationed there. The City of **Wainwright** has sometimes retained as many as two additional officers at its own expense to make sure that a policeman was always either on duty or on call in the community. This situation has

now been resolved, but because it is very important to people in Wainwright that a policeman be available in the community at all times, the Borough is planning to hire a second officer on a part-time basis.

Serious crime is rare in Wainwright. Like elsewhere in Alaska, most crime here is related to alcohol abuse, even though Wainwright is officially "dry". Some problems with drug abuse have also been encountered.

There are presently no offices in Wainwright for the borough police officer or, if one were appointed, a local magistrate. Also, there are no formal holding facilities for prisoners. In response to this need, an 81.75 square meter (880-square foot) structure containing space for the borough police officer and an assistant, an office for a magistrate, and two temporary holding cells for prisoners (which cannot be used to house minors) is scheduled for construction at Wainwright in the spring of 1978. Funding for the project is from the U.S. Law Enforcement Assistance Administration and is being administered by the Criminal Justice Planning Agency in the Office of the Governor. The new facility will be located on a site between the post office and the new community building and should help improve local law enforcement.

HEALTH AND SOCIAL SERVICES

Wainwright's population is too small to justify building a hospital, but the community does have a fairly good range of health care services for a town this size. The Wainwright health center, operated by the North

Slope Borough, is located in a converted house near the north end of town and is divided internally into two examination rooms, a waiting room, and an unused fourth room. Although **Wainwright's** clinic is superior to facilities in many other communities in the borough, the building was not designed as a clinic and is poorly laid out for this purpose. **Plans** are being made to replace this facility, but other villages with even more inadequate clinics have a higher priority for borough funds.

The **Wainwright** health center has a staff of two primary health aides and one secondary aide, with one primary aide being on call at all times. In addition, two doctors were temporarily based at **Wainwright** between December 1976 and December 1977 to assist with health aide training and with establishing a health education program in the **Wainwright** school. Aside from locally based medical personnel, a state health nurse from Barrow visits **Wainwright** every three months, and Public Health Service doctors and dentists make periodic visits. For people requiring **hospital** care, the Public Health Service hospital at Barrow is a reasonably convenient distance away.

Wainwright's health problems are typical of those found elsewhere in the North. Most cases treated by the health aides involve colds, sore throats, and other minor health **problems**. However, **health** problems associated with snow machines and exposure, **otitis media**, hearing problems (related to noise from snow machines and guns), trichinosis (from eating undercooked walrus), and nutritional problems (related to borderline intakes of Vitamin C) were also cited by one of the doctors based in the community.

EDUCATION

Education services in Wainwright are provided by the North Slope Borough. The Borough is responsible for hiring teachers, maintaining the school plant and, when needed, for the construction of new school facilities.

Almost all school children in Wainwright attend classes in one physical plant located in the heart of the community. The main school building was built by the Bureau of Indian Affairs, with the oldest part dating from the early 1960's and the remainder being built in 1968. Major repairs to the main building were carried out in 1975, and relocatable classrooms were added in the summer of 1976.

The school site covers an area of about 0.8 hectares (slightly less than 2 acres). Most of the site is covered by buildings, so outdoor playground space is very limited. Formal playground space is limited to a half basketball court, and many children are forced to play off the school site when they are outdoors.

Administratively, the Wainwright school is divided on an elementary (early childhood through the eighth grade) and high school (ninth through the 12th grade) basis (see Table 56). During the 1976-77 school year, elementary classes occupied five classrooms, while another four rooms were used by high school grades. Early childhood classes through the sixth grade were held in the main school building, and the seventh and eighth grades were held in a relocatable unit. High school grades were

TABLE 56

ENROLLMENT TRENDS
FINAL ENROLLMENT, WAINWRIGHT SCHOOL
1959-60 - 1976-77

Year	Grades K - 8		Grades 9 - 12		Total
	Number	% of Total	Number	% of Total	
1959-60	69	100.0			69
1960-61	59	100.0			59
1961-62	60	100.0			60
1962-63	72	100.0			72
1963-64	74	100.0			74
1964-65	83	100.0			83
1965-66	94	100.0			94
1966-67	90	100.0	0		90
1967-68	89	100.0			89
1968-69	97	100.0			97
1969-70	104	100.0			104
1970-71	100	100.0			100
1971-72	97	100.0			97
1972-73	110 <u>a/</u>	100.0			110
1973-74	107 <u>a/</u>	100.0			107
1974-75	96 <u>a/</u>	100.0			96
1975-76	102 <u>b/</u>	82.3	22 <u>c/</u>	17.7	124
1976-77	89 <u>b/</u>	73.6	32	26.4	121

a/ No kindergarten classes held 1972-73 - 1974-75 inclusive.

b/ Elementary school enrollment figures exclude early childhood classes.

c/ 9th and 10th grade classes only were offered in 1975-76.

Source: -Alaska Department of Education.

taught in a relocatable unit, in a permanent building on the school site, and in an old church off the school site. In addition, sewing classes were held in two private homes.

The main school building the the relocatable units are structurally sound and in good condition, but the school plant was not designed to house both elementary and high school students. Grades nine and 10 were added during the 1975-76 school year, and a complete high school program was offered for the first time in 1976-77. While some local students are completing high school at Mt. Edgecumbe (Sitka) or elsewhere outside the community, the present school plant and site are inadequate to accommodate even those high school students who have chosen to finish school in their home town.

Because the Wainwright school was not designed to house high school students and because the present school site cannot be easily enlarged, a separate high school is presently being built on a 4.05 hectare (10 acre) site at the south end of town. This facility will have five classrooms (with one doubling as a science lab), a library, and rooms for TV/radio, home economics, and vocational education. A gymnasium large enough for basketball is also being constructed.

UTILITIES

Water, Sewer, and Solid Waste Disposal

The water system in **Wainwright** is operated by the U.S. Environmental Protection Agency (EPA) which selected this community as the site of one of its Alaska Village Demonstration Projects, intended to show how sanitary conditions in Alaska Native villages could be improved. Water is pumped via a **summer pipeline** from a lake 3.2 kilometers (2 miles) southwest of town near Point **Collie** to a central 3,785,000-liter (1 million-gallon) storage tank where it is filtered and chlorinated. The storage tank was installed by the U.S. Public Health Service and is filled annually.

Water is piped to the school while that for home consumption is delivered by a 1,892.5 liter (500 gallon) Bombardier tundra tank truck. Delivered water costs \$.06 per gallon; water collected individually at the central storage tank costs slightly less, \$.04 per gallon. Accounting is handled by the city clerk.

Basic to the **Wainwright** project are the concepts of central community facilities and water conservation. The central EPA facility, which is adjacent to the water storage tank and connected to it, contains laundry and shower rooms for use by the entire village. The central laundry room includes four coin-operated washers and dryers as well as folding tables and chairs for laundry patrons. Separate shower rooms for men and women each contain four toilets, four showers (coin operated), and a sauna. Plant capacity for **community** drinking water, showers, laundry,

and toilets is 45,420 liters (12,000 gallons) per day, with 18,925 liters (5,000 gallons) of storage. Effluent water (gray water) from showers and the laundry is recycled an average of two and one-half times and is treated each time by disinfection, flocculation and sedimentation, sand filtration, carbon filtration, and post chlorination. Gray water is also available for fire protection. A maximum of 94,625 liters (25,000 gallons) of gray water can be treated each day, with 18,925 liters (5,000 gallons) of storage provided for untreated water.

According to the University of Alaska (June 1977) the use of water from the original EPA facility averaged about 79,485 liters (21,000 gallons) per month or about 7.57 liters (2 gallons) per capita per day. About half of this water was used by the school. This estimated water usage figure did not include water for laundry, showers, or toilets at the EPA facility itself, nor did it take into consideration the fact that several households continue to haul their own water requirements. However, because the water at the EPA facility is recycled and low-flow showers are timed, total per capita water use was still estimated at a low 15.14 liters (4 gallons) per capita per day. This is well below average rates of water use at the nearby DEW Line station, estimated at 124.91 liters (33 gallons) per capita for 15 people.

Honey buckets are used for collection and disposal of human waste in Wainwright homes. The North Slope Borough pays individual residents \$7 per drum for hauling these to a dump about 4.8 kilometers (three miles) northeast of town. Wastes from the six recirculating chemical toilets in

the original EPA facility were originally incinerated, but this system was changed in the reconstructed plant. (The original building burned down in 1973). In the reconstructed facility, wastes are treated biologically via extended aeration and lime disinfection. Wastes from the school toilets are piped to this same treatment facility. Sludge from both the black water and gray water treatment systems is hauled to the dump. Sewage effluent and excess gray water are dumped onto the sand near the ocean.

The water system and EPA facility are currently operated and maintained by the U.S. Environmental Protection Agency, but it is the intent of the demonstration project ultimately to turn the facility over to the local community. The system is by no means economically self-sufficient, and the City of Wainwright does not have the funds to maintain and operate it. As the North Slope Borough has assumed areawide responsibility for water and sewage collection and disposal, it may eventually have to take over responsibility of the system's operation.

Solid waste (garbage) disposal is handled on an individual basis in Wainwright with reimbursement by the North Slope Borough. The Borough budgets \$17,500 annually for this service. Most garbage is collected in summer and hauled in the winter on sleds and ski-doo's to the dump about 4.8 kilometers (3 miles) outside town although several residents do have vehicles which can haul garbage in summer. The dump is posted with a sign instructing where garbage should be dumped, and a fine of \$15 is theoretically imposed if the instructions are not heeded. The capacity

of the dump is unknown, as is the average annual rate of usage.

Like dumps in other traditional villages of the region, the **Wainwright** facility does not meet EPA standards since permafrost conditions prohibit the development of adequate sanitary **landfills**. Furthermore, **low** temperatures inhibit the decomposition of organic wastes. According to the U.S. Public Health Service, individual communities would need incinerators to meet EPA standards for solid waste disposal, but the cost of these facilities makes their use impractical in the region's villages.

Electric Power

The North Slope Borough owns and operates the electric power system in **Wainwright**. In December 1977 the system consisted of an extremely unreliable 75-kilowatt diesel-powered generator and two inoperative generators. The two largest power consumers in the village, the school and the EPA facility, have separate power sources.

A new power plant and distribution system is scheduled for completion in 1978. Funded with a \$600,000 Energy Development grant and \$156,000 in borough funds, **the** new facility **will** contain two diesel-powered, **160-** kilowatt generators and will be **able** to accommodate a third generator when and if this is required. The new system **will** serve the entire village, plus the school and EPA facility which are not now on the **commu-** nity system, and has the capacity to serve the airstrip runway and local street lighting in the future if this is deemed desirable. The electrical

contractor responsible for installing the plant and distribution system estimated that when completed, the capacity of the new system will be adequate to satisfy **Wainwright's** foreseeable demands for the next 10 years.

Communications

Telephone service, initiated in **Wainwright** in 1976, is provided by RCA **Alascom's** bush communications system. One telephone is located in the city office to serve the entire village. There is a charge of \$.25 per call to Barrow and \$.50 per call beyond Barrow, which must either be collect or by credit card. The **Wainwright** school has its own telephone system, which is hooked into the DEW Line communications system. According to school officials, however, the line is often inoperative.

Transportation

AIR TRANSPORTATION

As with other North Slope **communities**, transportation of people and goods to and from **Wainwright** depends heavily on aviation. The **Wainwright** airstrip, owned by the state and maintained under contract by the Borough, has a 670.56-by 30.48 meter (2,200-foot by 100-foot) **gravel** runway. **Low-intensity** runway lights have been installed by the village, and there is a communications tie-in with the FAA Flight Service Station at Barrow. There are currently no fueling facilities or terminal available to

shelter waiting passengers or freight. The state does not anticipate making any improvements to the **Wainwright** airstrip during the next several years, although village residents **would** like the runway lengthened sufficiently to accommodate Hercules-type aircraft.

The **DEW** Line airstrip, located about 8 kilometers (5 miles) east of **Wainwright**, is available for public use on an emergency basis. Clearance is required in advance, which both Arctic Air Guide and **Jen-Air** have. The strip is gravel, 1,066.8 by 30.48 meters (3,500 feet by 100 feet) and equipped with high-intensity runway lights. Navigational aids include ground-to-air communications, a homer beacon, and wind-measuring equipment. The facility also has two D-8 Cats for maintenance.

Arctic Air Guide provides twice weekly scheduled service to the village from Barrow under contract to Wien Air Alaska. Demand has increased recently, and the operator usually flies the route twice daily, seven days a week with a Cessna 207 capable of accommodating six passengers or 544 kilograms (1,200 pounds) of freight. Other equipment used as required ranges from a five-passenger Cessna 185 to a DeHavilland Twin Otter, either of which can carry 19 passengers or 1,588 kilograms (3,500 pounds) of freight. The round-trip air fare between Barrow and **Wainwright** is **\$52.70**, and a round-trip ticket between **Wainwright** and Fairbanks is \$192.70.

Under an interline agreement with Wien Air Alaska, freight from Anchorage and Fairbanks to **Wainwright** through Barrow can be shipped at a lower

rate between Barrow and **Wainwright** than freight originating in Barrow and destined for **Wainwright**. **Wien** charges **68.2¢** per kilogram (**31¢** per pound) Anchorage to Barrow and **19.84¢** per kilogram (**9¢** per pound) Barrow to **Wainwright**, while Arctic Air Guide charges **26.4¢** per kilogram (**12¢** per pound) for freight originating in Barrow. The postal rate between Anchorage and **Wainwright** for packages under 27.22 kilograms (60 pounds) and within cube specifications is \$2.05 for the first kilogram (**93¢** for the first 2 pounds) and **20¢** per additional kilogram (**9¢** per pound over two pounds).

Charter services to **Wainwright** from Barrow are available from three operators: Arctic Air Guide, **Fel-Air**, and **Jen-Air**. The charter rate for a typical six-passenger Cessna 207 flight to **Wainwright** is \$210 plus tax. According to local residents there are **also** occasional charters from Kotzebue to **Wainwright**.

MARINE TRANSPORTATION

Marine transportation to **Wainwright** is limited by the short navigation season in the Arctic. According to the U.S. Coast Pilot, periodically published by the U.S. Coast and Geodetic Survey, average breakup is the last of June and average freezeup, the first of October. Navigation is difficult from early November to mid-July and usually suspended between early December and early July. The Pilot further cautions that the entrance to **Wainwright** Lagoon, a narrow, winding channel with a controlling depth of 1.83 meters (6 feet), should not be attempted without a **local**

guide. Shoals extend 1.12 kilometers (0.7 miles) off the inlet, and ice may enter during southwest storms.

An aero radio beacon **is** located 4.8 kilometers (**3** miles) southeast **of** the village. However, there are no docking or storage facilities, and cargo must be lightered ashore by barges or small craft. In addition, there are no facilities to house about 34 small locally owned craft.

Wainwright is visited annually **by** the Bureau of Indian Affairs cargo ship North Star **III**. In 1977, according to the North Star **III** purser, the ship delivered approximately 45,360 kilograms (50 tons) of cargo to the village, including school supplies, food, and furniture. An all-terrain vehicle equipped with a forklift offloaded cargo from landing craft to the beach and then to higher ground.

The North Star **III** has a limited fuel capacity; consequently fuel for the the village is purchased from Chevron in Point **Wells**, Washington, barged to Kotzebue by **Crowley** Maritime, and lightered to **Wainwright** by Arctic Lighterage. In 1977 the village purchased 870,550 **liters** (230,000 **gal-**
lons) of No. 1 heating **oil** and 94,625 **liters** (25,000 **gallons**) of gasoline, the latter primarily for snow machines. Current fuel storage capacity in the village is 870,550 liters (230,000 gallons), but the **Olgoonik** Corporation has indicated plans to increase this capacity by another 189,250 liters (50,000 gallons).

LAND TRANSPORTATION

There is no road system connecting **Wainwright** with other North Slope communities so overland transportation is limited to winter travel by snow machine and all-terrain vehicle. Approximately 80 percent of the households in **Wainwright** owned snow machines in 1977, and nearly 35 percent had two or more. An April 1977 survey conducted by Alaska Consultants, Inc. indicated there are several privately owned road vehicles (trucks and four-wheel drive vehicles) in town plus several all-terrain vehicles, a water truck, and a fuel truck. Most travel outside the **community** is for hunting and fishing, but people occasionally travel by trail to Barrow, Point Lay, and Atkasook.

Phase I of the North Slope Borough **community** road program was completed in 1975. At a total cost of \$200,000 (\$50,000 from the Borough, and \$150,000 in State Local Service Roads and Trails funds), approximately 2,590.8 meters (8,500 linear feet) of 3.66 meter (12 foot) wide road on a 5.5 meter (18 foot) wide gravel base were constructed. Phase II of the program scheduled for the 1977 and 1978 construction seasons involves the building of an additional 533.4 meters (1,750 feet) of 3.66 meter (12 foot) wide road to new Borough houses and 304.8 meters (1,000 feet) of 5.5 meter (18 foot) wide road to the new school site at an estimated total cost of \$122,000. Part of the funding for this is from an Economic Development Administration electrical generation grant.

VII. CITY OF NUIQSUT

Population

PAST TRENDS

Nuiqsut was one of three traditional Inupiat villages in the North Slope region which was identified in the Alaska Native Claims Settlement Act as abandoned. Situated at the base of the **Colville** River delta, the locale's abundant hunting and fishing resources historically supported a permanent population of varying numbers. As recently as 1939, the census counted 89 **Nuiqsut** residents but during the ensuing three decades the village was virtually abandoned as residents moved to Barrow in search of wage employment, **school** for their children, and improved social services. The 1950, 1960, and **1970** censuses showed no population for the village. According to the North Slope Borough, however, at least five cabins in the environs of the traditional village site continued to be utilized for hunting and fishing purposes **at** various times during the year by Native people with second residences in Barrow, and one cabin served as a full-time family residence.

The **Nuiqsut** village corporation, with an enrollment of 207, was established in Barrow in the winter of 1972-73. Many of these people had lived in the **Colville** River area 25 or **30 years** earlier or customarily hunted and fished in the area. In April 1973, 27 families moved to the area by snowmobile and established a "tent city" at the present village

site on the **Nechelik** Channel near its confluence with the **Kuukpik** Channel. A year later, in the spring of **1974**, 32 prefabricated buildings were airlifted from Barrow **to Nuiqsut** by Hercules aircraft under the sponsorship of the Arctic Slope Regional Corporation. Thus, **Nuiqsut** was reestablished almost overnight.

In the summer of 1974 **Dr.** Fred Milan, professor of anthropology at the **University** of Alaska, counted 145 **Nuiqsut** residents. A population count undertaken by the North Slope Borough in January of 1977 noted 144 **Native** people, five non-Native school teachers and their families, and one non-Native minister for a **total** of **152** people. A July 1977 borough study estimated the **community's** population at 157.

POPULATION COMPOSITION

According to Milan, there were 85 males and 60 females residing in the village in 1974. The predominance of males over females was especially evident in the **11- to -15** and **16- to -20** age ranges. **Nuiqsut's** ratio of 59 percent males to 41 percent females is nevertheless typical of North **Slope** villages. Males outnumbered females 59 to **41** percent in Kaktovik in 1970, 52 to 48 percent in Barrow in 1970, and 55 to 45 percent in **Wainwright** in 1977. However, the male-to-female discrepancy in **Nuiqsut** is higher than the **1970** statewide ratio of 54 percent males to 46 percent females and quite **unlike** the 1970 national ratio of 51 percent females to 49 percent males.

Dr. Milan further noted that the median age of **Nuiqsut's** 1974 population was 14, an extremely low figure even by rural Alaska standards. However, in the summer of 1977, according to a study undertaken by the North Slope Borough, the median age of **males** in the community was 19 and that of females was 15. **This is** only slightly younger than figures recorded for Barrow Census Division in 1970 where the median age of males was **19.6 and** that of females was 16.4. It is, however, significantly younger than the 1970 norms for both the state and the nation. In 1970 the median age of males **in the** state was 23.3 and in the United States as a whole it was 27.0. For females, the 1970 State median age was 22.9, while that for the nation was a much older 29.6.

Household density figures for **Nuiqsut** are scanty, but a survey of 26 households conducted by Dupere and Associates in 1974 (prior to the construction of **Nuiqsut's** permanent housing) indicated that the number of people per household was relatively high (see **Table 57**). The survey found that 69.3 percent (or 18 out of a **total** sample of 26) of all households had more than four members and that 31 percent had seven or more. Three years later, in the **summer** of 1977, the North Slope Borough found that 56 percent (or 13 of **Nuiqsut's** 23 households) had more than five people. This is similar to the 1970 Barrow Census Division figure of 5.55 people per household but well above the 1970 statewide average of 3.5 persons.

TABLE 57
 HOUSEHOLD DENSITIES
NUIQSUT, ALASKA
 1974

<u>Persons Per Househol d</u>	<u>Number of Housi ng Uni ts</u>	<u>Percent of Popul ati on %</u>
One	4	15.4
2 - 3	4	15.4
4 - 6	10	38.5
7 - 9	6	23.1
10 or more	2	7.7
<u>TOTAL</u>	26	<u>100.0</u>

Source: **Dupere** and Associates, Inc.

GROWTH PROSPECTS

Nuiqsut presently has a very limited economic base. The community **exists** not because of any specific economic activity and attendant employment opportunities but because families who had traditionally lived in the area and thus had close cultural ties to the land wished to return. It is doubtful, however, that this return would have taken place without the impetus of the Alaska Native Claims Settlement Act and the assistance of the Arctic Slope Regional Corporation. Nevertheless, while cultural and family ties **should** ensure **Nuiqsut's** continued existence, opportunities for employment and cash income **will** be the primary factors determining future rates of growth in this community. With few prospects for employment and a reasonable level of income, many young people will leave **Nuiqsut** and the village's population may decline. If, on the other hand, prospects for local employment and income improve, more young people are likely to remain and the **community** can expect steady rates of population increase.

There are several sources of employment in the **Nuiqsut** area with a **potential** for encouraging population growth. Foremost among these is the further expansion of North Slope Borough services. However, investments by the Arctic Slope Regional Corporation and the locally based **Kuukpiik** Corporation are **also** likely to influence future growth, and **Nuiqsut's** proximity to Prudhoe Bay should continue to encourage **some local** residents to work in that area. On the other hand, people seeking entry into professional and technical occupations will continue to leave the community.

Economy

COMPOSITION OF EMPLOYMENT

The Employment Security Division of the **Alaska** Department of Labor does not disclose employment statistics for communities of **Nuiqsut's** small size. Employment data were therefore obtained from a survey conducted by the North **Slope** Borough in the **summer** of 1977 and **from a** count undertaken by Alaska Consultants, Inc. in December 1977.

When converted **to** average annual full-time employment, a total of 42 jobs was identified in **Nuiqsut** by Alaska Consultants, Inc. in December 1977 (see Table 58). Slightly more than two **thirds** of these jobs were in government occupations, almost all of them associated with the North Slope Borough.

The **Nuiqsut school** was the largest **single** employer, accounting for 19.25 full-time job equivalents or about 46 percent of the the average annual employment in the village. However, seven of the eight teaching positions were **held** by whites while one job equivalent counted for the school actually represented nine students employed part time to provide janitorial services, each working about four hours a week at \$5 an hour. Of the remaining 9.25 government jobs, one was associated with the post office and the others were either general borough government positions (village coordinator and personnel involved in the operation of the health clinic and the power plant) or temporary borough construction and

TABLE 58

AVERAGE ANNUAL FULL-TIME EMPLOYMENT
NUIQSUT, ALASKA
 1977

<u>Industry Classification</u>	<u>Number</u>	<u>Percent of Total</u> %
Mining	0	---
Contract Construction	5.0	11.9
Manufacturing	0	---
Transportation, Communications and Public Utilities	0	---
Trade	4.5	10.7
Finance, Insurance and Real Estate	4.0	9.5
Service	0	---
Miscellaneous	0	---
Government	28.5	67.9
Federal	(1.0)	(2.4)
State	(0)	(---)
Local	(27.5)	(65.5)
<u>TOTAL</u>	<u>42.0</u>	<u>100.0</u>

Source: Alaska Consultants, Inc.

maintenance positions. There are no state government employees in **Nuiqsut**.

A number of short-term construction and maintenance jobs are provided by the North Slope Borough in **Nuiqsut**. According to the Borough, such employment accounted for 42 temporary jobs for 20 individuals in the community during the period October 1, 1976 to October 1, 1977. The average duration of these jobs was 19 days, or 110.5 hours. When converted to average annual full-time employment, these activities accounted for an equivalent of 3.25 jobs.

After government, most jobs in **Nuiqsut** in 1977 were in contract construction. All five persons in this sector were employed by Steve Construction under contract to the North Slope Borough to build a road to the new community water source. The trade sector had 4.5 employees, or 10.7 percent of the jobs in the village. All of these people were employed by the Kuukpik Corporation store. Finance, insurance, and real estate accounted for four jobs in the Kuukpik Corporation office.

Aside from jobs counted by Alaska Consultants in 1977, two people from **Nuiqsut** were employed by ARCO at Prudhoe Bay. They returned to the community during their leave periods.

UNEMPLOYMENT AND SEASONALITY OF EMPLOYMENT

No unemployment statistics are available for individual communities within the North Slope Borough. Statistics collected by the Employment

Security **Division** of the Alaska **Department of** Labor are collected on a boroughwide basis and do not necessarily **give** a true picture of conditions in individual communities such as **Nuiqsut**. For example, the Barrow-North Slope labor division had an unemployment rate of 3.7 percent in 1976, the **lowest of** any area in the state and well below the statewide average of 8.2 percent. However, as **of July** 1976, 71.1 percent of the borough's residents lived outside the region's traditional villages, primarily in the **Prudhoe Bay/Deadhorse** area and in pipeline camps. All of these people were employed since housing is provided only for workers. One can assume that unemployment rates within some of the traditional villages **are** therefore higher than indicated by regionwide figures.

Although there are no verifiable statistics available for **Nuiqsut**, it appears that there is a shortage of jobs for men in the community. The population of **Nuiqsut** is predominantly **male**, yet over half the full-time jobs identified here by the North Slope Borough in the summer of 1977 were held by females. The Borough further noted that many of the available jobs required a fairly high level of education and a complete mastery of English. Such a requirement places severe limitations on **Nuiqsut's** adult population which, according to a 1974 survey by **Dupere** and Associates, is the least well educated of any community on the North Slope. At that time, 88 percent of **Nuiqsut's** heads of household had less than an eighth grade education. Thus, men with vocational backgrounds rather than formal educations have difficulty finding steady jobs and rely heavily on seasonal construction projects as a source of employment and income.

In **Nuiqsut**, as in most other **small** North Slope communities, seasonal variations in employment result from the closure of the local school during the **summer** months and from summer construction activities. School-teachers normally leave the region during the long **summer** vacation, and other positions associated with the school except for maintenance jobs also cease temporarily. The number of construction jobs available fluctuates from year to year depending on the projects scheduled, but most activity takes place during the summer because of the harsh winter climate.

RECENT TRENDS AND CHANGES

There is no published information available which indicates trends in **employment** in individual communities of the North Slope region. Such information would not be particularly relevant to **Nuiqsut** anyway since it was reestablished only three years ago. In the absence of documentation of employment trends and historical perspective for **Nuiqsut**, it can only be said that the incorporation of the North Slope Borough and the formation of the local Native village corporation are the key events in **Nuiqsut's** present economic situation. (Both of these events took place, however, before the community was reestablished). **Only** one of the **42** jobs counted in 1977 by Alaska Consultants was not directly derived from the operations of either the Borough or the **Kuukpiik** Corporation.

New employment opportunities outside the community have also been available to **Nuiqsut** residents during the past few years as a result of the development of the **Prudhoe** Bay field and the construction of the trans-

Alaska pipeline. Construction of the proposed natural gas pipeline should offer similar opportunities in the future.

OCCUPATIONAL SKILLS

Comprehensive information on the skills of the **workforce** in the North Slope region is generally lacking, and there are no reliable and current statistics for individual communities. Some general idea of the occupational **skills** of **Nuiqsut** residents can be inferred, however, from information available from the Barrow Manpower Center if one assumes that occupational skills are relatively consistent Boroughwide. A breakdown of skills possessed by Barrow Manpower Center registrants is given on Table 29 of this report.

INCOME LEVELS

Compared with state averages, household incomes in **Nuiqsut** are low. However, the incomes of many local families have risen sharply during the past few years. A survey of 26 households conducted by Dupere and Associates in 1974 found that the median 1973 family income in **Nuiqsut** was only \$3,800 (see Table 59). In March 1976 a survey by the North Slope Borough School District of 89 percent of **Nuiqsut's** households found that the median income had risen to \$11,899, slightly more than three times the 1973 figure (see Table 60). Nevertheless, although household incomes in **Nuiqsut** have risen sharply, they are still low. For example, the median family income in the state in 1969 was \$12,443, well above

TABLE 59

FAMILY INCOME DISTRIBUTION
NUIQSUT, ALASKA
1973

<u>Family Income</u>	<u>Number of Families</u>	<u>Percent of Total</u>
Under \$1,000	3	11.5
\$ 1,000- \$4,999	10	38.5
\$5,000- \$10,999	8	30.8
\$11,000- \$15,999	2	7.7
\$16,000- \$20,999	0	---
\$21,000- \$24,999	0	---
\$25,000 or more	1	3.8
No response	2	7.7
<u>TOTAL</u>	26	<u>100.0</u>

Source: Dupere and Associates.

TABLE 60

HOUSEHOLD INCOME DISTRIBUTION
NUIQSUT, ALASKA
1975

<u>Household Income</u>	<u>Number of Households</u>	<u>Percent of Total</u>
Under \$10,000	7	30.4
\$10,000- \$14,999	3	13.0
\$15,000 - \$19,999	4	17.4
\$20,000 or more	6	26.1
Not available	3	13.0
<u>TOTAL</u>	23	<u>100.0</u>

Source: North Slope Borough.

that found in **Nuiqsut** in 1976 without even considering the increases that occurred in statewide incomes between 1969 and 1976.

Public assistance programs provide supplemental income for some **Nuiqsut** households. During FY 1976 the Bureau of Indian Affairs distributed a total of \$800 in general assistance to one **Nuiqsut** family. This is down sharply from FY 1974 when the BIA paid out \$6,200 in general assistance to 19 **Nuiqsut** recipients. Public assistance payments distributed by the Alaska Department of Health and Social Services also supplement several families' income. During a typical month in 1976, two families were eligible for Aid to Families with Dependent Children (AFDC) funds. In 1976 the average AFDC payment per recipient was \$102 per month (see Table 61). According to Department of Health and Social Services records, no other public assistance payments were made to **Nuiqsut** residents in 1976.

Recent household income data collected by the North Slope Borough are too generalized to compare with U.S. Department of Labor standards for poverty level incomes, but 1973 data collected by **Dupere** and Associates indicate that well over 50 percent of **Nuiqsut's** families had incomes below what was then considered to represent a poverty level income for a nonfarm family of two in Alaska. The Dupere data do not indicate family size (usually larger than two) nor do the federal standards take into account the extremely high living costs of remote Alaskan areas, but one can assume that even with rising incomes, a significant share of **Nuiqsut's** households continue to live in conditions of extreme poverty.

TABLE 61

GENERAL ASSISTANCE PAYMENTS a/
NUIQSUT, ALASKA
 FY 1974 - FY 1976

	<u>FY 1974</u>	<u>FY 1975</u>	<u>FY 1976</u>
Total Payment	\$6,200	\$ 500	\$ 800
Number of Cases	19	2	1
Average Payment:			
Annual	\$ 326	\$ 250	\$ 800
Monthly	\$ 27	\$ 21	\$ 66

a/ Payments made by the Bureau of Indian Affairs.

Source: U. S. Bureau of Indian Affairs.

Land Use

OVERALL PATTERNS

Nuiqsut has a very **simple** and basic land use pattern; however, **it** is not one that is typical of Eskimo communities. **Nuiqsut's** city limits take in nearly **23.31** square kilometer (9 square miles), with the surveyed area (excluding the airport south of town and the new **school/community** center site immediately to the north) covering about 48.56 hectares (120 acres). All of the town's development to date has been concentrated within the northeast portion of the surveyed area (see Figure 25).

The **Nuiqsut townsite** was laid out by the Arctic Slope Regional Corporation on a grid with very large lots for an arctic community (**1,858** square meters or 20,000 square feet). Platted street widths are also extremely wide (30.48 meters or 100 feet) and **15.24** meters (50 feet) wide alleys running 'down the center of each block have **also** been platted. Because of the way the community was laid out, development is much more dispersed than normal in an Eskimo village.

According to a study of land use in **Nuiqsut** carried out by Alaska Consultants, Inc. in December 1977, residential, public/semi public, commercial, and utilities/storage uses occupied about 8.62 hectares (21.3 acres) of land within the townsite. Of this, residential uses (including two houses **built** with borough funds that are about to be occupied) took up 6.6 hectares (16.3 acres). Public/semi public uses (the school, health

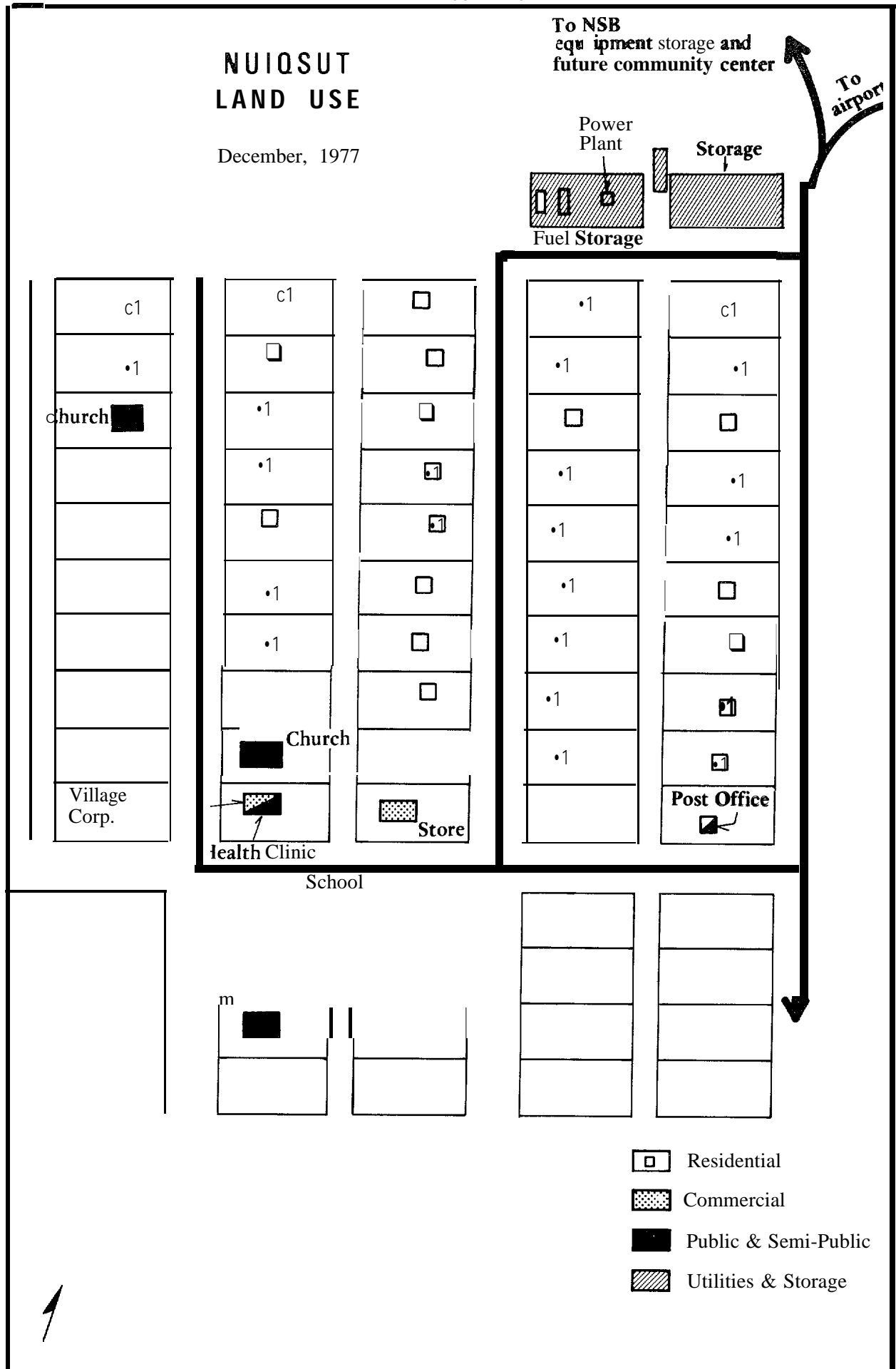
FIGURE 25

NUIQSUT LAND USE

December, 1977

To NSB
equipment storage and
future community center

To
airport



clinic, post office, and two churches)' occupied 1.38 hectares (3.4 acres). Of the remaining 0.65 hectares (**1.6** acres), 0.28 hectare (0.7 acres) was taken up by **commercial** uses represented by a store and the **Kuukpik village** corporation office, and 0.36 hectare (0.9 acres) was occupied by utilities/storage uses (the **community** power plant and a lot used for equipment storage). Taking the platted width of developed streets, another 5.95 hectares (14.7 acres) of land were in use. However, there are no developed streets in the **community** wider than 4.88 meters (16 feet).

In terms of relationships between land uses, **almost** all residences in **Nuiqsut** are within a two block area in the northeast portion of town. A Presbyterian church, the health clinic, village corporation office, post office, and the **school** are located immediately south of the residential area, while the power plant and equipment storage area are located immediately to the north. The Assembly of God is situated **immediately** west of the most of the town's residences.

The only physical development in the **immediate** vicinity of **Nuiqsut** outside the townsite area are the airstrip located east of the village, the water sources to the northeast and south, and the community dump located to the northwest. However, the region around **Nuiqsut** is used heavily by local residents as a source of subsistence supplies.

HOUSING

Residential uses occupied a total of 6.6 hectares (16.3 acres) in **Nuiqsut** in 1977, with all residents living in single-family homes. In December

1977, a total of 34 housing units in the village were occupied; an additional two units **were** scheduled for occupation in the **immediate** future.

Unlike most rural Alaska villages where the housing stock is usually a combination of very old and very new structures, all homes in **Nuiqsut** were built within the past three years. Thirty one of the 36 units were built by the Arctic Slope Regional Corporation in 1974 and 1975 soon after the town was established, while another five units were constructed by the North **Slope** Borough in **1976** and 1977. In addition, because all homes in the community are new, the average house size in **Nuiqsut** is much larger than that found in the older established towns of the region.

All housing in **Nuiqsut** is in acceptable condition. Although these units would not necessarily meet conventional building code standards (for example, none have running water or flush toilets), they are structurally sound, have a modern interior layout, and afford their occupants adequate protection from the severe winter cold.

Land Status

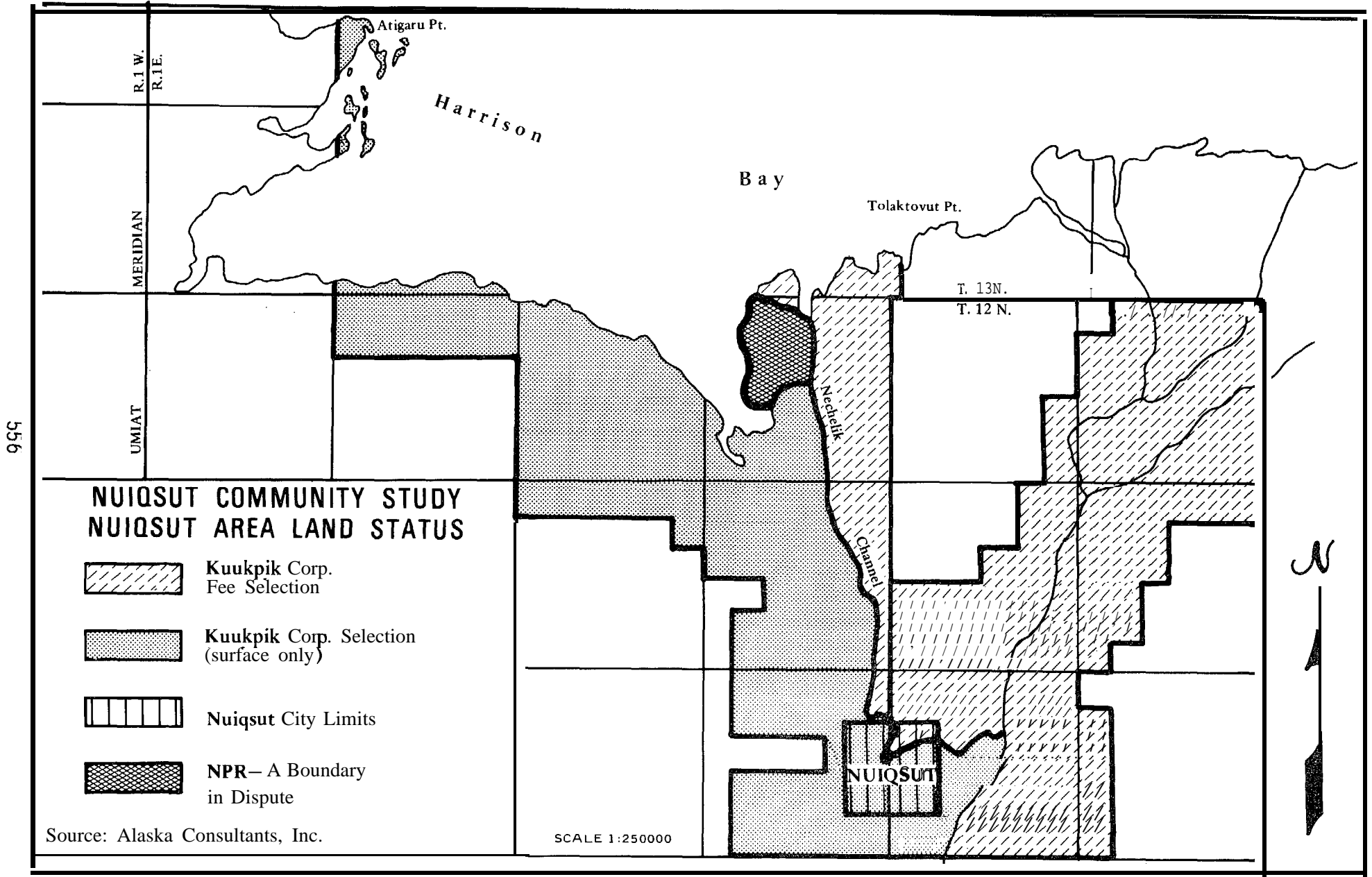
At the present time, **all** land in the **immediate** vicinity of **Nuiqsut** is owned by the federal government. The community is located within the former Naval Petroleum Reserve #4 (**NPR-4**) which was transferred to the Department of the Interior in 1976 and is now known as National Petroleum Reserve-Alaska (**NPR-A**). However, the ownership of land in the **Nuiqsut** area will change in the very near future when the **Kuukpiik** Corporation

receives surface title to lands under terms of the Alaska Native Claims Settlement Act (ANCSA) (see Figure 26).

The Kuukpik Corporation's enrollment of 210 persons entitled it to select surface rights to 46,620.8 hectares (115,200 acres) of land surrounding the **community** under Section 12 (a) of the **ANCSA**. The village corporation is also entitled to receive surface title to lands from the Arctic Slope Regional Corporation under the terms of Section 12 (b) of **ANCSA**. The Arctic Slope Regional Corporation has determined the **Kuukpik** Corporation's entitlement to be 3,360.58 hectares (**8,304** acres). Thus, the **Nuiqsut** village corporation's total land entitlement is 49,981.4 hectares (123,504 acres). Normally, the regional corporation receives title to subsurface estate of lands selected by village corporations in its region. However, since no subsurface rights were selectable from NPR-4, the Arctic Slope Regional Corporation was given alternative **lands** outside the reserve from which to make its selections.

As of January 1, 1978, the **Kuukpik** Corporation had received none of its land entitlement under either Sections 12 (a) or (b) of **ANCSA**. However, according to the Bureau of Land Management, an interim conveyance of 17,410 hectares (43,020 acres) under Section 12 (**a**) and 3,035.2 hectares (7,500 acres) under Section 12 (b) was imminent. Further conveyances will not be made until the status of lands in remaining areas selected by the **Kuukpik** Corporation has been determined. There are two land disputes in the **Nuiqsut** area which are holding up conveyance of the remainder of the **Kuukpik** Corporation's lands. The first of these relates to the

FIGURE 26



956

boundaries of NPR-A, and the second involves a determination of the navigability of the **Colville** River.

The **Colville** River forms the eastern boundary of **NPR-A** in the **Nuiqsut** area, and lands on the eastern side of the river have been selected by the State of Alaska and tentatively approved by the U.S. Department of the **Interior**. However, since the Navy, the Department of the Interior, and the State of **Alaska** cannot agree on the precise location of **NPR-A's** eastern boundary, the issue has been in arbitration for several years. The federal court in Juneau is slated to settle the question soon.

A second dispute relates to the navigability status of the **Colville** River. The Bureau of Land Management has determined the **Colville** River to be non-navigable, but the State disagrees. If the river is determined to be navigable, ownership of the riverbed and water area rests with the State of Alaska and is not included in Native entitlements. If, on the other hand, it is determined nonnavigable, the riverbed and water area will remain in federal ownership, and, therefore, become eligible for selection by the **Kuukpik** Corporation.

Section **14 (c)** (1) of ANCSA requires that after the village corporation received title to its land, it must reconvey surface title to lands occupied by Natives or non-Natives that were a primary place of residence or business or a subsistence campsite at the time of the Act's passage. (This places no legal obligation on the **Kuukpik** Corporation to transfer title to lots within the **Nuiqsut** townsite since the present village was

not established **until** after ANCSA was **passed**). In addition, Section 14 (c) (3) requires that the corporation turn over at least 518 hectares (**1,280** acres) of its land to the City of Nuiqsut for purposes of municipal expansion, rights of way for public use, and other foreseeable community needs. However, none of these transfers of land ownership can take place until the village corporation receives title to its land.

Community Facilities and Services

CITY POWERS AND PROGRAMS

The City of **Nuiqsut** was incorporated as a second-class city on June 24, 1975. State law provides that second-class cities shall have a **seven-**member council elected at large which must meet at least once a month.

As a second-class city within an organized borough, **Nuiqsut** may exercise all municipal powers except those of assessment and collection of taxes, education, and planning and zoning which are mandatory areawide powers granted to boroughs under Alaska law. Although the City could **theoretically** exercise a wide variety of municipal powers, it has transferred all but recreation and fire protection to the Borough. In addition to the three mandatory powers, the **following** municipal powers were transferred to the Borough as the **result** of an election held April 30, 1974:

- sewer and sewage treatment facilities
- watercourse and flood control facilities

- health services and hospital facilities
- telephone systems
- light, power, and heat
- e water
- o transportation systems, including airport and aviation systems
and streets and sidewalks
- libraries
- garbage and solid waste collection and disposal services and
facilities
- housing and urban renewal, rehabilitation, and development
- **preservation**, maintenance and protection of historic sites,
buildings, and monuments

The police power was transferred to the Borough in an election **held** July 1, 1976.

Although it has the power to do so, the City of **Nuiqsut** does not levy either a sales tax or a property tax to pay for municipal services. Any future property tax may not exceed 5 **mills** or half of one percent, and it **would** have to be approved by referendum. The **sales** and use tax **would** also have to be approved by referendum and could not exceed three percent. If **Nuiqsut** chose to exercise this authority, the tax would be assessed and collected by the Borough and then remitted to the City. State revenue-sharing funds are available for both recreation and fire protection but **Nuiqsut** did not apply for these in 1976.

Recreation

Formal recreation facilities in **Nuiqsut** are presently limited to the multipurpose room in the school. Dances and movies sponsored by the student council are held here once a week and the room can be converted for half-court basketball. The facility is open to the community during **nonschool** hours.

Nuiqsut's range of recreation amenities should be significantly enhanced in 1979 with the construction of new school facilities by the North Slope Borough. Alternative plans are for an entirely new school or additions to and renovation of the **old school** building. Both **plans** include a swimming pool, but the "new school" alternative would have a much larger facility as well as a larger amount of multipurpose space.

Fire Protection

No fire-protection service is currently provided in the community, nor is any planned for the near future. According to village spokesmen, there has not yet been a serious fire in **Nuiqsut**. Furthermore, because of the extremely wide separation between structures, there would be little or no chance of a fire destroying more than one building. However, since the village presently has no water storage facility (water must be hauled individually from a freshwater lake outside town during summer months or ice is cut from the lake in winter), once a fire took hold in an individual structure, virtually nothing could be done to save it.

Nuiqsut will have an emergency water source for fire fighting when a planned new high school with a pool is constructed in 1979. In addition, the development of a central community water source is presently being considered by the Borough. If a system requiring the hauling of water is selected, a village water truck could possibly be equipped for fire fighting purposes as well as for delivering water.

LAW ENFORCEMENT

The North Slope Borough is responsible for providing police protection services in Nuiqsut but has no personnel stationed permanently in the community at the present time. When required, borough police travel to Nuiqsut from Barrow or a state trooper is called from Deadhorse or Fairbanks.

There were no jail facilities in Nuiqsut in December 1977, but the Borough plans to construct a simple 6.1-by-12.2-meter (20-by-40-foot) structure for this purpose during 1978 with Law Enforcement Assistance Administration funds, if possible. In addition, the Borough plans to station a senior officer full time in Nuiqsut during 1978 and to hire a local trainee.

HEALTH AND SOCIAL SERVICES

The North Slope Borough operates the Nuiqsut health clinic, which occupies half of the village corporation building in space leased by the

Public Health Service. The clinic is staffed by a primary health aide and an alternate, one of whom is on call at all times. In addition, a Public Health Service doctor and dentist hold clinics in Nuiqsut twice yearly, and the community is periodically visited by a state public health nurse. Patients requiring hospital care or special treatment are flown to Barrow or Fairbanks.

The North Slope Borough is currently developing a boroughwide health program to supplement local services: This will not involve the establishment of additional facilities in Nuiqsut, but it will provide more visits to the community by medical and dental personnel. Furthermore, Nuiqsut residents will have access to planned borough health facilities in Barrow as well as to services already provided by the Public Health Service.

EDUCATION

Education services in Nuiqsut are provided by the North Slope Borough School District. The school district is responsible for hiring teachers and maintaining the school plant, while the Borough is responsible for the construction of new school facilities, as required.

At the present time, most Nuiqsut schoolchildren are housed in two separate buildings connected by a multipurpose room. These buildings are now located immediately south of the town's developed area. The two school buildings were constructed in 1974 and contain six classrooms,

while the multipurpose room, which functions as a gymnasium, auditorium, and lunch room, was added in 1976. The school uses power provided by the village but has its own back-up generating capacity.

Kindergarten through the 12th grade classes are presently taught in five general classrooms, while the sixth classroom houses woodworking classes and two small engine shops. However, because of the lack of space and facilities at the school, cooking and sewing classes are presently taught-in village homes, and some are held in the home of one of the teachers and in the Presbyterian church.

Other programs provided by the school include Head Start, special education, and vocational education. Instruction in the Inupiat language is also offered. Beginning January 1978 a part-time teacher will hold classes in Native arts and crafts.

During the 1977-78 school year, eight full-time teachers and three teacher aides taught a total of 80 students. Class sizes ranged from four and 27 students per room. During the 1976-77 school year, 68 students were enrolled in kindergarten through eighth grade and 18 students were enrolled in grades nine through 12 (see Table 62). In 1975-76, the only previous year for which information is available, 60 students were enrolled in elementary grades (kindergarten through eighth grade) and four students were enrolled in high school classes.

The school plant is reportedly in good condition but has several operating

TABLE 62

ENROLLMENT TRENDS
 FINAL ENROLLMENT, NUIQSUT, ALASKA
 1972-73 - 1976-77 a/

<u>Year</u>	<u>Grades K - 8</u>		<u>Grades 9 - 12</u>		<u>Total</u>
	Number	% of Total	Number	% of Total	
1972-73 <u>b/</u>					
1973-74 <u>b/</u>					
1974-75 <u>b/</u>					
1975-76	60	93.8	4	6.2	64
1976-77	68	79.1	18	20.9	86

a/ School not operating prior to 1972-73.

b/ Information not available.

Source: Alaska Department of Education.

problems. There is no running water, storage space is limited to an unheated shed, and the lack of space requires that a number of classes be held outside the main school plant. However, these problems should be surmounted in 1979 when the Borough plans to **build** a new school in the **community**.

Two alternatives for the new **school** have thus far been proposed. The first involves moving of the present school and adding about 789.65 square meters (8,500 square feet) of **floor** space. The second proposes construction of a completely new facility with 3,352.58 square meters (36,088 square feet) of floor area. Under the second alternative the present **school** buildings **would** be retained for general community use. However, a completely new **shcool** will probably have to be substantially redesigned as it greatly exceeds space criteria established by the Department of Education.

UTILITIES

Water, Sewer, and Solid Waste Disposal

Until very recently, **Nuiqsut's** summer water source was a creek which originates in a lake about 2.4 kilometers (1.5 miles) south of the village and passes between the village and the airstrip before flowing into the **Colville** River. In August, the creek is only a few meters wide near its source, while the average depth of the lake is about 3.66 meters (12 feet). However, the village dump was located too close to the slough to

ensure a continued safe water supply, and a new source has now been developed further away from town. A road to the new source is scheduled to be completed in the spring of 1978. In winter villagers cut ice from a 6.1 meter (20 foot) deep lake about 5 kilometers (3 miles) away across the Colville River. Water from both sources is hand carried individually.

According to a 1977 study by Johnson and Dryer, the water supply appears adequate for present use and the quality meets most U.S. Public Health Service standards except recommended limits for iron, turbidity, and color. Per capita consumption of water is very low, about 3.785 liters (1 gallon) per day, probably because of the difficulties involved in obtaining it. According to Johnson and Dryer study, the resulting draw-down in the lake south of the village is negligible. Additional information on the capacity of Nuiqsut's water sources is not available.

In 1976 the Public Health Service and the North Slope Borough funded CH₂M-Hill to conduct a water and waste water feasibility study for Nuiqsut. The study has been completed and transmitted to the Borough but, as of December 1977 no action had been taken on its findings.

The report proposed three alternatives for the village based on a present population of 200 people and 50 homes and a projected population of 400 people, 122 homes, and a school. (According to Borough estimates, Nuiqsut had a population of 157 in July 1977. Alaska Consultants, Inc. counted only 34 occupied housing units in the community in December 1977 plus two more about to be occupied).

- Full Service System. This would provide running water at each house and vacuum toilets flushed with a minimum of water and water for fire fighting available at adjacent homes. Average per capita consumption was estimated at 170.32 liters (45 gallons) per day. Monthly operation and maintenance costs could run as high as \$300 per household (based on service to 50 homes). Initial capital costs would be approximately \$4.5 million.
- Community Haul System. Per capita consumption and costs with this system would be considerably lower than with the full service system. (Daily per capita consumption rates were estimated at 113.55 liters (30 gallons) per day.) A village truck would replenish individual water tanks from water piped to a central location, carry waste water away, and could be regulated to eliminate the need for full service waste disposal. The truck could also be used for fire fighting. Honey buckets or humus toilets would be used for human waste disposal.
- Individual Haul System. With the individual haul system, per capita consumption was estimated at only 18.92 liters (5 gallons) per day, not much higher than current rates of use. Water for general household use and fire fighting would be hand carried from a central point in buckets, and humus toilets or honey buckets would be used for human waste disposal. This alternative assumes provision of public shower and laundry facilities in the school. Operation and maintenance costs were projected at between \$70 and \$80 per month per family. Initial capital outlay would be about \$2.27 million.

Sewage and solid waste collection and disposal services in Nuiqsut are provided by the North Slope Borough. Funds for the service are funneled through the borough coordinator to the village corporation director who hires local residents to collect the 55-gallon drums used as trash cans and haul them by snow machine or truck to a dump site about 2.4 kilometers (1.5 miles) west of the village. Haulers are paid \$7.50 per drum. Dump capacity is unknown.

Village officials reported to Alaska Consultants, Inc. in December 1977 that the city dump was located too close to a slough running into the community water source. Because of a resulting danger of contamination, a new water source further removed from the village is now used. Another problem is year-round access to the dump. Transportation outside the townsite is difficult in the summer when the ground thaws as the road does not have a gravel base and occasionally becomes impassable. In turn, this situation results in trash and sewage accumulating in the village.

Like dumps in other traditional villages of the region, the Nuiqsut facility does not meet EPA standards since permafrost conditions prohibit the development of adequate sanitary landfills. Furthermore, low temperatures inhibit the decomposition of organic wastes. According to the U.S. Public Health Service, individual communities would need incinerators to meet EPA standards for solid waste disposal, but the cost of these facilities makes their use impractical in the region's villages.

Electric Power and Heat

The North **Slope** Borough owns and operates the electric power system in **Nuiqsut**. All houses and public buildings in the village are hooked into the system. In December **1977** the system consisted of an 18-month-old, diesel-powered, 100-kilowatt generator and an older, nonoperational **75-**kilowatt generator. The **Nuiqsut** school has a third generator for back-up in case the main generator breaks down. Currently, the Borough charges consumers \$.25 per kilowatt hour.

Normal usage consumes three quarters of **Nuiqsut's** present **firm** generating capacity. Peak power consumption overburdens the system. Furthermore, the generator is subject to intermittent breakdowns, and there is extreme voltage variance along the distribution system. **All** of these problems should be eliminated when the Borough installs an insulated generator structure, three new diesel generators (two 100-kilowatt and one 50-kilowatt), a new distribution system and streetlights in the summer of 1978. Total cost of the project is estimated by the Borough to be between \$600,000 and \$700,000.

The new power system will **enable** a doubling of **Nuiqsut's** firm power demand (from the present 75 kilowatts to 150 kilowatts). However, a major portion of this added capacity may be utilized by the new school, especially if the more elaborate of the two alternatives is selected.

Communications

Telephone service in **Nuiqsut** was initiated in 1976 and is provided by RCA **Alascom's** bush communications system. One telephone located in the village corporation office serves the entire village. A "radio patch" connects the **Nuiqsut** school with the North Slope Borough School District offices in Barrow and is available to village residents in emergencies.

Transportation

AIR TRANSPORTATION

Because the extremely short ice-free season limits marine transport throughout the Arctic coastal region and because there is no regional highway system, both freight and passenger traffic to **Nuiqsut** is almost exclusively by air.

The **Nuiqsut** airport is owned by the village but is operated and maintained by the State. It is a sand strip of 304.8 by 22.86 meters (1,000 by 75 feet) and is capable of handling only small aircraft. There are currently no navigational aids or runway lighting, which limits service in bad weather. Service is further impaired during breakup when flooding sometimes closes the strip for as much as three-weeks, a major problem since the community **relies** entirely on air transportation.

Village residents **would** like to have a longer airstrip built on higher

ground south of town. The North Slope Borough has requested that the State fund the project under the Federal Aviation Administration's Airport Development Assistance Program, but it has not been included in the current State of Alaska six-year capital improvement program, nor does the State Division of Aviation **feel** that it will be in the near future. Total estimated cost of the project is \$1.84 million, \$43,000 in North Slope Borough general obligation bond funds is available for the required "local match" (North Slope Borough 1977 Capital Improvements Program Amendments).

As of December 1977, scheduled air service from Barrow was provided three times weekly (Monday, Wednesday, Friday) by Arctic Air Guide under a postal agreement. Traffic is generally light, and the operator normally utilizes a Cessna 185, which can carry five passengers or 408 kilograms (900 pounds) of freight or a **Dornier**, which can carry seven passengers or 816 kilograms (1,800 pounds) of freight. The round-trip air fare between Barrow and **Nuiqsut** is \$97.20. Packages under 27.22 kilograms (60 pounds) and within the required cube specifications can be shipped at postal rates which are significantly lower than the 46.3¢ per kilogram (21¢ per pound) charged by Arctic Air Guide.

In addition to its scheduled service, Arctic Air Guide provides charter service from Barrow to **Nuiqsut**. Available aircraft range from the company's five-passenger Cessna 185 to a DeHavilland Twin Otter, which can accommodate 19 passengers or 1,588 kilograms (3,500 pounds) of freight. Two other operators, **Fel-Air** and **Jen-Air**, provide charter service to

Nuiqsut with similar aircraft. The current cost for chartering a Cessna 185 from Barrow to Nuiqsut, for example, is \$320 one way or \$640 round trip if a layover of more than several hours is required.

Sea-Airmotive and ERA Helicopters, Inc. currently provide charter service from Deadhorse to Nuiqsut with a variety of aircraft. A typical rate for an eight-passenger Turbo Beaver is \$560 per hour plus fuel. In November 1977 Sea-Airmotive initiated twice weekly scheduled air service from Deadhorse to Nuiqsut on a trial basis using its Turbo Beaver or Twin Otter, depending upon demand. One-way passenger fare from Deadhorse to Nuiqsut is \$45.00, with a rate of .55¢ per kilogram (25¢ per pound) charged for freight. According to Sea-Airmotive, this service will be continued if demand is sufficient.

MARINE TRANSPORTATION

There is presently no marine transportation service to Nuiqsut, but one could be initiated if traffic ever warranted. According to the U.S. Coast Pilot, a periodic publication of the U.S. Coast and Geodetic Survey, the Colville River is probably navigable by vessels with a draft of .91 meters (3 feet) approximately 120 kilometers (75 miles) upriver to its confluence with the Anaktuvuk River. Since Nuiqsut is 24.14 to 32.19 kilometers (15 to 20 miles) upstream from the mouth of the Colville, however, any river barge operation to Nuiqsut would require lightening from oceangoing barges anchored offshore in Harrison Bay.

LAND TRANSPORTATION

Although there is no conventional road system connecting **Nuiqsut** to any other **community**, a system of winter trails permits some overland **travel** by snow machine and other tracked vehicles when the ground is frozen and snow covered. An occasional trip is made this way to Barrow, but most are for hunting and fishing.

A local road construction program, for an estimated **total** cost of \$815,000 to the Borough and scheduled for completion in 1978, will provide access to all existing homes, the new community service center site, and the equipment storage facility. Funded under the State Local Service Roads and Trails program, 914.4 meters (3,000 linear feet) of 4.88 meter (16 foot) wide road were constructed in 1976, including the road to the airport, 365.8 meters (1,200 feet) of Anaktuvuk Street, 183 meters (600 feet) along Second Avenue, and 122 meters (400 feet) of access to the new school site. The 1977 program added 1,067 meters (3,500 linear feet) of road with \$216,000 in Local Service Roads and Trails funds. An additional \$233,000 has gone into the construction of two bridges, one the route to the present airstrip and the other on that to the proposed airstrip and water source (North Slope Borough 1977 Capital Improvements Program Amendments).

The 1977 North Slope Borough Capital Improvements Program, as amended, includes three future road projects in **Nuiqsut**. A road to the proposed new airport would also widen the existing 3.4 meter (11 foot) wide road

to the water source to 6.7 meters (22 feet) for about .8 kilometers (1/2 mile). (Estimated at a total cost of \$280,000, this project assumes construction of the new airport.) A second project would build a road to the new water source for an estimated cost of \$550,000 but only if a water transmission line is not constructed. A low-priority third road would provide improved access to the dump at an estimated cost of \$435,000.

VIII. NATURAL PHYSICAL ENVIRONMENT

The purpose of this chapter is to provide **critical** natural physical **information** in mapped and narrative form for the **Beaufort** Sea Region. The information will be used to form the basis for the projection of natural physical environmental impacts and resource conflicts. To assess the socioeconomic impacts of Beaufort Sea OCS petroleum development, an environmental baseline has to be established. Included in such a baseline are those aspects of the natural physical and biotic environment that may be related indirectly or directly to the economic and cultural infrastructure of the resident population.

The first step in establishing such a baseline is the identification of the significant interrelated or interdependent components of the environmental and cultural infrastructure. This was accomplished as a series of multi-disciplinary meetings using **delphi** techniques. (The delphi technique involves the identification, ranking and weighing of issues of concern or environmental factors through aggregation of opinions of a multi-disciplinary group in a series of discussion sessions. Several iterations are required to resolve conflicts and arrive at a group consensus of opinion on key issues and ranking/weighing of factors.)

The principal environmental components such as wildlife and fish distribution identified were related to subsistence activities. Water resources were considered critical due to the scarcity of the resources and because they could be affected significantly by petroleum development. Likewise, gravel and sand resources were judged economically important because

they are scarce in some areas of the North Slope. The extraction of sand and gravel, in turn, may have potential for significant impact on water resources and fish distributions. Terrain conditions were a necessary consideration in the identification of surface water potential. Although it is recognized that many complex linkages exist in the natural physical and biotic environments, environmental components such as rare and endangered species were not considered for evaluation unless they are a subsistence food resource. Environmental components such as tundra, which could be affected by petroleum activities, were not considered when linkages to the socioeconomic infrastructure were found to be unclear or unimportant. If, however, disturbance of terrain from petroleum development was envisaged to have the potential to result in significant loss of habitat, then that component was considered in the analysis.

Baseline environmental factors are most appropriately evaluated and presented on a series of figures; the components need to be vocationally compared with existing communities, industrial infrastructure, Native activities, political jurisdictions and future offshore petroleum development. A scale of 1:350,000 reflects the study area requirements including representation of the North Slope and nearshore waters of the Beaufort and Chukchi Seas, Native villages, and the detail of the available data and presentation requirements. The base figures comprise two modules (east and west halves of the North Slope/Beaufort Sea) and were taken from U.S.G.S. 1:250,000 quadrangle topographic sheets. The figures appear in the Appendix envelope accompanying this volume.

The figures are source data figures for subsequent impact analysis; they are compiled from existing literature and professional experience in the study area. Due to variations in input data reliability and detail, some of the figures have been generalized to accommodate these variations.

The compilation, data content and use of the five source data figures are described in the following narrative. The narrative is designed to supplement and explain the data presented in the figures and is not intended to be a definitive statement on each environmental component.

Source Data Maps

WATER RESOURCES

Figure Compilation and Purpose: Appendix Figure 1

The water resources of the North Slope display wide annual variations in quantity and **quality**, particularly during the eight-month long winter when most of the water is locked up as ice or snow. The water resource figures document the locations of most water bodies on the North Slope. These figures were compiled using U.S. Geological Survey maps and existing literature and Dames & Moore knowledge of the area.

A major concern during the mapping process was to locate all known water bodies having winter water depths of at least eight feet; water commonly freezes to depths of six to seven feet during winter. Therefore, water

greater than eight feet deep is considered to have potential for winter water withdrawal. Moreover, **groundwater** availability in winter is in part dependent upon the surrounding soil remaining unfrozen. Therefore, areas beneath unfrozen surface water provide conditions favorable for groundwater withdrawal.

The water resource figure may be used to identify water availability and sensitivity of water withdrawal in addition to predicting the impact of petroleum development on the water resources. By first superimposing information about sand and gravel locations and permafrost, the potentially available surface and groundwater resources having high domestic use quality can be located. Then, by superimposing information on fish distribution over this, the sensitivity of each water body with respect to water withdrawal can be predicted.

If petroleum development occurs, fresh water will have to be obtained for domestic and various industrial uses (e.g. drilling, river crossing over thickened ice, and secondary petroleum recovery by injection). The potential impact of these uses can be estimated by using the water resource figures and following the process described above to delineate water withdrawal sensitivity. It should be kept in mind that unfrozen sands and gravels (used for various construction purposes) are almost exclusively found in river floodplain alluvium. Hence, their extraction will have a direct impact on water quality by increasing suspended solids and turbidity. Additionally, consideration has to be given to overwintering fish distribution since regulatory agencies do not allow water withdrawal at known overwintering sites.

Regional Water Availability, Quality, and Use

The Arctic slope, bounded on the north by the Beaufort Sea, is dominated by thousands of shallow ponds, small coastal meandering streams, and a number of wide braided rivers that originate in the mountains to the south .

Lakes and ponds constitute major features of the coastal plain and generally range from two to twenty feet in depth. They act as catchments during spring breakup and often flood beyond their normal shorelines but water levels normally decrease during the summer. Water levels may drop below the outlet elevation and many lakes and ponds become stagnant by the end of summer.

Water is abundant during spring and summer. Breakup usually begins in early to mid-May and continues through June. The magnitude of spring flow depends to a large extent on the amount and timing of snow melt. Water commonly covers as much as 80 percent of the coastal plain during spring breakup. Flows decline throughout the summer but fluctuate somewhat in response to infrequent rainstorms. Springs are found in the foothills to the south of the coastal plain. These contribute year-round flow to many rivers, but discharge from the springs varies widely.

Groundwater is present on the Arctic slope, but because of permafrost it is difficult to predict groundwater location, quantity, and quality; however, groundwater commonly exists in alluvium beneath the major

rivers and in soils beneath the larger lakes. Groundwater may be found above, below, and within permafrost. In the latter two cases, **ground-**water is normally brackish to saline. Groundwater found above permafrost usually freezes during the winter making it invariable for use eight or nine months of the year.

Fresh water temperatures range from a **low of** 0° C (32° F) during winter to as high as 18° C (64° F). Shallow tundra lakes may reach 15° C (59° F), and ponds may reach 18° C (64° F), but most deep lakes will only warm to 6 to 8° C (43° to 46° F). The rivers will usually warm to 15° C (59° F) and may warm slightly above this temperature.

Freeze-up begins no later than September and by mid-winter ice and snow have frozen almost **all** the water on the Arctic slope. The **only** free water will be found in deep water areas (greater than six to seven feet deep) in streams and lakes and in the spring areas.

In general, the water quality of the streams, lakes, and ponds on the Arctic slope is high. Principal characteristics of water quality include temperature, pH, dissolved oxygen, nutrients, suspended solids, turbidity, and color. These are discussed below.

In ponds, lakes, and streams, **pH** generally ranges from slightly below neutral to about 8.0. This range is sufficient to support a diverse flora and fauna.

Arctic coastal lakes, ponds, and streams are normally near complete saturation of dissolved oxygen during the open water season and at freeze-up in the **fall**. Low **levels** of biological activity and atmospheric **reaeration** maintain the relatively high levels of dissolved oxygen. During late winter, however, severe deoxygenation may take place under ice, particularly in **lakes** and ponds, so that some water will become anaerobic.

Nutrients are present in low concentrations in waters of the Arctic coast. Phosphate levels are low in ponds, lakes, and streams, whereas nitrate **levels** are usually low in lakes but high in ponds and streams. The levels of nutrients in these Arctic waters are similar to **levels** found in uncontaminated surface waters of temperate regions.

Shallow lakes and ponds are usually turbid owing to wind mixing which keeps the particulate material in suspension. Streams are turbid during spring breakup when high suspended solids loads are carried. **Non-glacial** streams will clear after breakup. Some streams in the eastern portion of the North Slope have a glacial influence and remain turbid due to the presence of silt and clay-sized rock flour.

Tundra ponds are normally high in color, which results from the leaching of organic material. This leaching process is enhanced by poor drainage in the coastal plain. Lakes are usually slightly less colored than ponds, and the major rivers show little color influence.

As stated above, water quality in streams, lakes, and ponds of the North Slope is generally good. Coastal lakes and ponds, however, may exhibit relatively high salinity values for fresh water. Additionally, streams run temporarily high and turbid during spring runoff and after **summer** storms. Deep lakes that do not freeze to the bottom during winter normally display their lowest oxygen content prior to spring breakup. Salty coastal waters become diluted by fresh water during the spring thaw, but by midsummer **low** fresh water runoff and tidal fluctuations cause salinity to increase in the estuaries.

The quality of groundwater in the Arctic coast is probably best in alluvium beneath rivers. Shallow groundwater in these areas is of the calcium bicarbonate type and contains relatively low concentrations of dissolved solids. Dissolved solids likely become more concentrated with depth and the sodium chloride type predominates.

Prior to the discovery of oil and gas at Prudhoe Bay, water usage and waste disposal along the Arctic coast were limited to scattered villages and small scientific and geological exploratory teams. Lakes and streams during **summer** and snow and ice during winter were relied upon for water, and wastes were discarded on the surface. These practices continue in the villages of Barrow, Kaktovik, and **Nuiqsut**.

It **shouId** be noted that some houses in Barrow and Kaktovik have piped water systems and flush toilets. Even in these houses, however, water has to be hauled to **fill** the central storage tanks and wastes are collected

in plastic bags or 55 gallon drums and transported to a community dump. Winter water supplies in Barrow are in the form of lake ice, cut into blocks, and melted in the storage area. A water distribution and sewerage system is currently under construction.

The village of **Wainwright** has a community facility that houses a water treatment plant and storage tank, sewage treatment plant, laundry, and incinerator for solid waste. The petroleum companies at Prudhoe Bay have constructed piped water systems and use package plants for water and sewage treatment to meet their needs.

As would be expected, water use on the North Slope correlates with the ease with which water is obtained. On a per capita basis, water usage ranges between 2.0 and 10 gallons per day in the villages and approximately 70 gallons per day at **Prudhoe Bay**.

Summary of Current Use Problems

Water resources are currently being used in the villages of Barrow, Kaktovik, **Wainwright**, and **Nuiqsut** and at the Prudhoe Bay complex. Water use problems in the villages are primarily related to sanitary concerns. That is, water used for washing, cleaning, and cooking is dumped on the ground outside the housing unit. Human wastes are normally collected in "honey buckets" and transported to community dumps, which may or may not be covered. Barrow and **Wainwright**, however, have incinerator facilities for disposing of human wastes. The overriding concern is that surface

waters and snow near the villages becomes contaminated and promotes various illnesses. Consequently, most village residents haul water or ice from nearby lakes. Because villagers haul their own water, consumption remains rather low. Estimates of water use vary from 2.0 to 10 gallons per capita per day in most of the villages and may be as high as 35 gallons per capita per day for some Barrow residents. Current water use in the villages does not significantly conflict with other water requirements such as fish and wildlife.

Water use at Prudhoe Bay has increased throughout the years as **living** facilities improve. Water use was estimated at 35 to 50 gallons per capita per day in 1972, and in 1977 it had increased to 70 gallons per capita per **day**. Additional water use is required for industrial purposes.

Purported winter water use conflicts arose in the spring of 1974 at Prudhoe Bay. It has been postulated that water withdrawal from the Sagavanirktok River was **dewatering** fish **overwintering** holes and killing **fish**. Consequently, state and federal agencies have increased their surveillance of the situation in the past few years and petroleum companies have improved their water storage facilities to meet current winter demand. A significant increase in water requirements, such as the building and maintenance of ice roads, and meeting new drilling demands or flooding for secondary recovery could easily stress winter water resource.

GRAVEL AND SAND RESOURCES

Figure Compilation and Purpose: Appendix Figure 2

Gravel and coarse sand are among the Arctic's most valuable resources because these scarce aggregates are required to construct roads, air-strips, work pads, foundations, causeways and, in the event of offshore drilling, artificial soil islands. Gravel is required to provide a stable and **trafficable** working surface and to provide insulation to the underlying permafrost. On the North Slope minimum gravel thickness for these purposes is about 1.5 meters (5 feet) where no artificial insulation is used.

The cost of gravel, specifically its haulage, is an important economic consideration of North Slope construction. The extraction of gravel is also a significant environmental concern. Thus the location and availability of gravel can be compared to the location and magnitude (demand for the resource) of petroleum development. Such a comparison will identify possible borrow sites which, in turn, can be evaluated for environmental sensitivity.

Since many of the available sand and gravel resources are alluvial deposits in floodplains and river terraces, the resource location often coincides with water and fish resources. Offshore sand and **gravel** resources also may occur in sensitive locations such as the **summer** habitats or migration routes of bowhead and **belukha** whales. Beach and barrier

island resources occur where coastal erosion and sediment transport processes are often in delicate balance.

A map of North Slope and Beaufort Sea gravel and sand resources is an important tool in the assessment of impacts from offshore petroleum development. The gravel and sand resource figure was compiled from existing literature and data. The figure should be compared with those showing water resources, wildlife and fish, and petroleum development scenarios to identify areas of potential resource use conflict and environmental impact.

Regional Availability and Use

Quantitative and qualitative data on North Slope and Beaufort Sea gravel and sand resources are limited. In National Petroleum Reserve - Alaska (NPR-A), gravel and sand resources have been mapped and estimated by La Belle (1973, 1974, 1976). More recently, **surficial** deposits, including sand and gravel, have been mapped by Williams and others in the reserve. Elsewhere on the North Slope, gravel and sand resources have not been mapped or evaluated specifically; they generally have been mapped along with other geologic units. In the central-eastern North Slope such maps have been compiled by **Ferrians** (1971) for the **trans-Alaska** pipeline corridor, by **Yeend** (1973) in part of the Beechy Point and **Sagavanirktok** quadrangles, and by **Reiser** et al. (1974) in the Demarcation Point quadrangle.

Few data are available on offshore sea floor and subsurface gravel and sand deposits. Data on these resources have generally been collected incidentally as part of investigations on such problems as coastal processes, subsea permafrost and sediment transport rather than as specific resource evaluations. Such investigations include studies on coastal processes by **Wiseman** et al. (1973) and Cannon (1977), on coastal and permafrost erosion by **Lewellen** (1970, 1977), on subsea permafrost by Osterkamp and Harrison (1976), **Sellmann** (1977) and Hopkins et al. (1977a), and on the offshore **stratigraphy** by Reimnitz, Wolf and Rodeick (1972). Some of these studies have involved shallow soil borings (**Osterkamp** and Harrison, 1976; **Sellmann, 1977**) and shallow seismic surveys (**Reimnitz, Wolf and Rodeick, 1972; Rogers et al., 1975**).

The classification of sand and gravel resources shown on Figure No. 2 has been kept general because of the highly variable data base. In NPR-A, for example, **Labelle** (1973, 1974, 1976) has mapped sand and gravel resources at a scale of 1:63,360 and has used classifications according to morphology and origin (alluvial, **eolian**, beach, etc.). The limited areas investigated in detail south and east of **Prudhoe** Bay have been mapped at a scale of 1:125,000 and 1:200,000; the unconsolidated **surficial** geologic units have been classified according to age, morphology and origin. Elsewhere on the North Slope and offshore the available data is at a most general reconnaissance level or totally lacking.

Onshore Deposits. North and west of the **Colville** River, and within NPR-A, gravel and coarse sand deposits are limited, primarily because the **Colville** River intercepts much of the north-flowing drainage and coarse

detritus originating in the western Brooks Range. Streams from the Utukok River east to the **Colville** contain predominately fine sand and silt, and gravel beaches are rare along the coast between the **Colville** River **delta** and Point Barrow. Inland, the lakes of the coastal **plain** are devoid of gravel deposits with the exception **of** the northwestern shore of **Teshkepuk** Lake, which an estimated reserve of 688,000 cubic meters (900,000 cubic yards) (**Labelle**, 1974).

Within 40 kilometers (25 miles) of Barrow, gravel and coarse sand resources are estimated to be 79 (103 million cubic yards) million cubic meters of which 2.0 **to** 3.0 million cubic meters (3.0 to 4.0 million cubic yards) are regarded as exploitable (**Labelle**, 1973). The Beaufort Sea **shores** of NPR-A, which are actively eroding by thaw action, have some sand and gravel resources, notably in the spit and barrier island complex that commences at **Eluitak** Spit and runs nearly as far east as Cape Simpson. **Labelle** (1976) estimates that this complex contains nearly 3.0 million cubic meters (4.0 million cubic yards) of fill material. Cooper Island, for example, located about 40 kilometers (25 miles) east of Barrow, contains over 1.5 million cubic meters (2.0 million cubic yards) of coarse material, **while** the remainder of the Plover Island chain contains only 520,000 cubic meters (700,000 cubic yards) of sandy gravel and gravelly sand.

Only **small** sporadic accumulations of coarse materials are found on the mainland shore. East of the spit/barrier island complex, between Cape **Halkett** and Drew Point, 1.2 million cubic meters (1.6 million cubic

yards) of gravel and coarse sand exist along coastal beaches. In Smith Bay, the beaches are composed only of fine sand and mud, as are the few beaches in Harrison Bay. The **Colville** delta consists **only** of fine sand and mud.

The principal source of coastal sand and gravel is believed to be the Pleistocene **Gubik** formation, which is a mixed marine and **alluvial** deposit comprised of silt, sand and gravel that underlies most of the coastal plain. Coastal erosion and bluff collapse provide the sediment which is winnowed by currents and wave action, leaving behind the coarser sand and gravel fractions as lag deposits. These **in** turn are transported along the coast by **longshore** drift forming beaches, spits, bars and barrier islands. Shoreline deposition by ice-push and ice-melt contribute minor amounts of the sediments deposited above sea level.

Extensive areas of fine to medium sand occur in stabilized and active dunes from the **Colville** River west to the Meade River and south to the foothills of the Brooks Range. The **Colville** River, as far north as the delta, is estimated to contain 27 million cubic meters (35 million cubic yards) of gravel, but the delta is composed of silt and fine sand (**Labelle**, 1974).

The above estimates of gravel and sand resources of NPR-A should be treated with caution since they are based upon aerial or surface observations and not depth/volume measurements obtained from **borehole** data. Less is known about the gravel resources east of the **Colville** River. Most

of the major streams that head in the Brooks Range contain sand and gravel. Coastal resources east of the Colville are available in beaches, spits and barrier islands. Significant gravel deposits occur in a series of coalesced alluvial fans along the flanks of the Brooks Range east of the Canning River. The major rivers east of the Colville are generally braided gravel streams which have their headwaters in the Brooks Range.

In the Beechy Point and Sagavanirktok quadrangles south and southeast of Prudhoe the most suitable borrow materials are floodplain gravels, low terrace gravels and outwash gravels (Ferrians, 1971; Yeend, 1973). Extensive floodplain and terrace gravels occur in the major rivers such as the Sagavanirktok, Shaviovik and Kavik Rivers. In the foothills of the Brooks Range outwash gravels occur in high terraces bordering the main river valleys such as the Kavik and Canning. These were deposited during the Pleistocene when glaciation was extensive in the Brooks Range. As the Brooks Range approaches the Beaufort Sea coast east of Prudhoe Bay gravel and sand deposits of alluvial (floodplains, terraces, fans) and glacial-fluvial (outwash plains, terraces and fans) become more extensive. North of the Brooks Range in the Demarcation quadrangle, for example, the major surficial unit is alluvial fans composed predominately of coarse sand and gravel.

A recent geologic investigation of the Beaufort Sea coast and barrier islands has provided new data on coastal gravel resources (Hopkins, 1977b). This investigation revealed that the barrier islands originated from multiple sediment sources and derive mainly from hillocks of Pleistocene sediments that have been partially drowned and left as tundra-covered

islands. The source hillocks have been completely removed by erosion, and the present, **residual** islands are gradually migrating westward and **landward** from the original source areas. Hopkins (1977b) concludes that if the islands were quarried for gravel, they would not be replaced by natural processes.

There are, however, areas along the mainland coast where gravel is accumulating in spits and **accretionary** bars from which borrow could be removed with minimum adverse effects. From the **Kuparuk** River to the Canning River on the Beaufort Sea coastal plain, subsurface gravel deposits are ubiquitous at depths of 10 meters (33 feet) or less. Development of upland borrow sites in these deposits or be deepening thermokarst lakes may be an alternative to extraction from river bars and channels. Additional information on coastal gravel and sand deposits has been gathered in recent coastal **geomorphology** studies (Cannon, 1977; Lewellen, 1977).

Offshore Deposits. Few data are available on offshore sea floor and subsurface gravel and sand deposits. These possible deposits are particularly important with respect to potential demand for offshore aggregate for artificial island construction. On a regional scale, from the shoreline to the 20-meter (66-foot) isobath, east of the **Colville** River delta, the bottom sediments consist mainly of sands and gravels. West of the delta, sediments are silts and clays (National Oceanographic and Atmospheric Administration, 1977).

The **stratigraphy** and thickness of offshore sediments in the inner shelf of the Beaufort Sea between the **Colville** River and **Tigvariak** Island have

been mapped by the U.S. Geological Survey (Reimnitz, Wolf and Rodeick, 1972), using shallow seismic techniques. Holocene marine deposits, consisting predominantly of muddy sand, range in thickness from 25 meters (83 feet) in the eastern part of the area to five meters (16 feet) or less near the Colville River delta. A series of borings in Prudhoe Bay extending from the North Prudhoe Bay State No. 1 well to Reindeer Island indicated that the subsea soils are sandy gravel with some silt overlain by a thin layer of silty sand (Osterkamp and Harrison, 1976). This layer increases in thickness from a few meters nearshore to about 14 meters (46 feet) at 3.4 kilometers (2.1 miles) offshore. Seaward of the barrier islands bordering Simpson Lagoon, the sediments are generally less than five meters (17 feet) thick. Four borings in the Prudhoe Bay area have provided additional data on the marine geology, stratigraphy and permafrost conditions. Three major groups of sediment were recognized (Hopkins et al. 1977): a) an upper sequence of Holocene marine mud, clay, sand, 5.0 to 10 meters (33 feet) thick, and beach sediments (well-rounded gravel and coarse sand) one to two meters (3 to 7 feet) thick; b) a middle sequence of angular sand and gravel 5.0 to 20 meters (16 to 66 feet) thick interpreted as glacial outwash deposited by the Sagavanirktok River during the last major glaciation in the Brooks Range; and c) an ancient alluvial deposit of the Sagavanirktok River consisting of pebbly sand, well-sorted sand, and gravel.

A summary of current knowledge of Beaufort Sea sediments is contained in Arctic Project Bulletin No. 15 (OCS Environmental Assessment Program, 1977). Sandy bottom sediments are generally confined to the shelf area

east of Cape **Halkett**. Local areas of gravel, much of which is derived from erosion of coastal bluffs, occur with increasing abundance east of the **Colville** River delta. West of Cape **Halkett** clayey sediments predominate.

Summary of Current Use Problems

The availability of gravel on the North Slope shows a regional pattern of scarcity west of the **Colville** River and increasing supplies east of the **Colville** River to the Canadian border. This pattern may be repeated offshore.

River gravel resources in the Arctic are further limited by problems associated with extraction. The Alaska Departments of Fish and Game and Environmental Conservation prohibit gravel removal from the **Colville** River delta and from other rivers, such as the **Sagavanirktok** and **Kuparuk**, without prior approval of a plan showing pit location and specific quantities of gravel required. Data on the total amounts of gravel which have been extracted to date from the **Sagavanirktok** River for construction of the **Prudhoe** Bay facilities and **Alyeska** pipeline are not available, but estimates for **Prudhoe** Bay indicate more than 76 million cubic meters (100 million cubic yards) had been used by 1974 (Arctic Institute of North America, 1974).

The El Paso **trans-Alaska** gas pipeline proposal indicated gravel requirements of 12.5 million cubic meters (16.4 million cubic yards) of gravel and sand (**Woodward-Clyde**, 1976). That portion of the Arctic Gas pipeline

to be constructed in Alaska would have required an estimated 2.4 million cubic meters (3.1 million cubic yards) of gravel and sand. Offshore development, unlike onshore development, will require borrow materials from both onshore and offshore sources, thus impacting both the marine and terrestrial environment. Principal concerns relating to offshore and onshore borrow extraction are:

- e Acceleration of coastal erosion (see MacCarthy, 1953, for a discussion of accelerated coastal erosion at Barrow resulting from borrowing beach material)
- Disturbance of marine sediment transport system affecting stability of barrier islands
- Increase in marine turbidity levels affecting plankton, benthic organisms and fish
- Disturbance to whales by marine traffic and dredging activities
- Floodplain excavation with impacts on hydrologic regime, water quality and aquatic biota, especially disturbance to fish spawning, fish overwintering, and entrapment of fish (Woodward-Clyde Consultants, 1976).

Although a map of sand and gravel resources of the North Slope and Beaufort Sea is a valuable tool in impact analysis, it is only a first step in such an evaluation. More site specific and project specific

data are required to **fully** access the problem. In addition to potential environmental impacts and their mitigation, other considerations include:

- the identification and assessment of potential borrow sites;
 - the **geotechnical** suitability of gravel and sand deposits with respect to their intended use;
 - the **geotechnical** problems of **gravel** and sand extraction including groundwater conditions, permafrost conditions (especially ice content of frozen materials), slope stability and erosion, and site rehabilitation;
 - the economics of gravel extraction and haulage;
- e the facilities and equipment requirements of gravel extraction, processing and transportation.

TERRAIN FEATURES

Figure Compilation and Purpose: Appendix Figure 3

The figure showing terrain features of the North Slope was designed to provide physiographic information applicable to an assessment of water availability and quality. Terrain features generally correlate with available fresh water resources. The combination of maps showing terrain

features and water resources results in the identification of surface water potential. An additional step in such an analysis is the assessment of water availability to identify sites where water can be withdrawn for any use. This involves consideration of surface water potential, permafrost conditions and the location of sand and gravel resources. The terrain units identified on Figure No. 3 are therefore classified primarily according to hydrologic and hydrographic parameters.

Regional Terrain Features

The Arctic coastal plain can be subdivided into two sections: the **Teshkepuk** section, which is a **flat-lying** lake-dotted plain, and the **White Hills** section, east of the **Itkillik** River, which is characterized by scattered groups of low hills. The coastal plain is at its narrowest (about 18 kilometers or 11 miles) near the Canadian border. It widens significantly to the west; **at** Point Barrow it is about 180 kilometers (110 miles) across. Most of the coastal plain is underlain by **unconsolidated** silts and sands, with some clays and gravels, which comprise the predominantly marine Gubi k Formation of Quaternary Age (Black, 1964). These deposits, which are up to 45 meters (149 feet) thick, unconformably overlie Mesozoic sediments (shales, **mudstones**, and sandstones) west of the **Colville** River and Tertiary rocks east of the river.

The coastal plain is underlain by continuous permafrost up to 610 meters (2,001 feet) thick. This permafrost, coupled with the low relief, result in generally poor drainage and the development of patterned ground,

thermokarst features, and ice-cored mounds such as **pingos**. One of the most unique features of the plain is the thousands of **lakes** which cover an area of approximately 435,000 square kilometers (168,000 square miles); many of these lakes are oriented with their long axes a few degrees west of north.

Drainage on the coastal **plain** is predominantly north to the Arctic Ocean. The major rivers have headwaters in the Brooks Range. The **Colville** is the largest of these rivers; **it** is over 690 kilometers (430 miles) long and drains about 30 percent of the Arctic slope, intercepting much of the drainage and coarse sediments from the Brooks Range. East of the **Colville** many rivers also originate in the Brooks Range and transport coarse sediment. These rivers generally exhibit braided patterns and have numerous gravel and sand bars interspersed with continuously shifting channels. **West** of the **Colville**, the rivers on the coastal plain are generally shallow, poorly-integrated and have meandering channels. The most significant hydrologic characteristics of the coastal plain are the virtual cessation of flow during the winter, the concentration of most of the season's flow in a short period of time, and the inclusion of large amounts of ice in river flow, usually during peak discharge (Walker, 1973).

Several studies have provided physiographic or geomorphic classifications of the Arctic slope. **Sellmann** et al. (1975) have classified thaw lakes on the Arctic coastal plain according to basin morphology and distribution patterns. Lake classification parameters included size, development of elongate axis, orientation of elongate axis, and lake density (percentage water coverage).

The **Beaufort** Sea coastline is varied, including such features as beaches, barrier islands, barrier bars, spits, lagoons, dunes and river deltas (Hartwell, 1973). Low but steep sea bluffs in many places are under active retreat as a result of a combination of thermal and wave erosion during the short **summer** open-water season.

The coastline of the Beaufort Sea and **Chukchi** Sea coasts has been classified on the basis of predominant coastal processes or genesis (land erosion, river deposition, wave erosion and marine deposition) and relief characteristics (low - less than two meters, moderate - two to five meters, high - five to eight meters, very high - more than eight meters) (Hartwell, 1973). Summaries of North Slope **geomorphology** and **surficial** processes are provided by Black (1969) and Walker (1973).

Relationship to Water Resources

The terrain features figure was designed to provide **physiographic** information applicable to an assessment of water availability and quality since terrain features generally correlate with available fresh water resources. The combination of figures showing terrain features and water resources results in the identification of surface water potential; the classification of **lakes**, streams and coastal areas given On Figure No. 1, Water Resources, will provide realistic information on surface water potential only if the **physiographic** setting of these water bodies is considered. For example, large deep lakes at the coast may have less water potential because of possible salt water intrusion than lakes farther

inland. Such an approach is further refined by comparing or combining a surface water potential figure with figures showing permafrost conditions and the location of sand and gravel **resources**. This results in a figure showing water availability by identifying sites where water can be **with-** drawn for any use.

WILDLIFE AND FISH DISTRIBUTION

The socioeconomic emphasis of this project suggests that the evaluation of components of the natural environment be directed to those most directly related to the needs of regional residents and visitors. Animals have been identified which are important for human subsistence, commercial or recreational **value** that could be influenced by outer continental shelf petroleum development.

The zone of greatest impact on fish and wildlife resources was assumed to lie between the edge of the pack ice and a line roughly 50 **miles** inland from the Beaufort Sea coast. This area not only includes the greatest biological diversity, but it also is the zone most heavily utilized by hunters, fishermen, and commercial operators.

Wildlife Distribution: Appendix Figures 4 and 5

Terrestrial. The truly resident wildlife along the Arctic coast are few in number. Only the caribou, musk oxen, polar bear, Arctic fox, raven, snowy owl, Arctic hare, ground squirrel, vole, and lemming remain

through the winter period. However, from May through September the **coastal** fringe is invaded by hundreds of thousands of migrating waterfowl, shorebirds and terrestrial birds, including more than 150 species. Figures 4 and 5 show the major fish and wildlife patterns in the study area.

Birds from all four continental flyways nest on the shores of the **Beaufort** Sea. The most concentrated waterfowl use occurs in the rich estuarine waters, while shorebirds frequent gravel bars, ponds, and sedge-grass marshes. The sandpipers and **phalaropes** are the most abundant shorebirds (Bergman, 1974). Arctic loons, red-throated loons, **oldsquaws**, eiders, **pintails**, white-fronted geese, lesser Canada geese, and black **brant** are **the most common** waterfowl (Bergman, 1974; Gavin, 1974). There are **also** glaucous gulls, Ross gulls, **Sabine's** gulls, Thayers gulls, Arctic terns, and all three types of **jaegers**.

Raptors include snowy owls, rough-legged hawks, golden eagles, gyrfalcons and peregrine falcons. Willow ptarmigan are present through the summer. Lapland longspur and snow bunting are the most common passerine species between Point Barrow and the Canning River (Bailey, 1948).

Terrestrial mammals found near the beach include caribou, Arctic fox, musk oxen, wolves, Arctic ground squirrels and occasional grizzly bears.

There are four caribou herds: the Arctic herd in the west, the Central Arctic herd near the Sagavani rktok River, the Porcupine herd in the east,

and a **small** resident herd between Teshekpuk Lake and the **Colville** River (Alaska Department of Fish and Game, 1976a; Cameron and **Whitten**, 1976; 1977; Davis and **Valkenburg**, 1977; **Hemming**, 1971; White et al., 1975). At times each of these herds overlap in the vicinity of **Prudhoe** Bay.

Major caribou activity on the coast begins in May and June when the Porcupine, Central Arctic, and **Teshekpuk** herds move to traditional calving grounds near the beach. The Arctic herd calving area is well away from the coast at the headwaters of the **Colville**, Utukok and Ketik Rivers. The calving ground of the Central Arctic herd extends from **Oliktok** eastward to **Bullen** Point. The Alaska Department of Fish and Game has concluded that essentially all of the Prudhoe Bay oil field has been abandoned as a caribou calving area since about 1974 (Cameron and Whitten, 1976; 1977). The Porcupine herd also calves along the coast between the Katakaturuk and Kongakut Rivers. In late summer, when biting insects increase in abundance, many caribou move onto river deltas where lower temperatures and nearly constant winds offer some relief from insect harassment.

Wolves are not **common** along the beach fringe, but they do follow caribou herds, particularly during the winter. Occasionally small numbers of caribou winter along the coast between the **Colville** and **Sagavanirktok** Rivers. Musk oxen range in the western portion of the Arctic National Wildlife Range from Barter Island on the east to the Canning River on the west.

The coastal inshore zone is an important **denning** area for Arctic foxes. Beach ridges, **river** deltas and **pingos** are good **denning** habitat. Once dens are established, they tend to be used again each year.

Polar bears are known to den between the Sagavanirktok and Canning Rivers, but no traditional sites have been identified. The bears usually range beyond the **shorefast** ice.

Howe Island, at the mouth of the **Sagavanirktok** River, supports the only snow goose **colony** on the Arctic coast of Alaska. This small colony includes about 60 nesting pairs. In late **summer** the area of the coastal plain between **Sadlerochit** and **Aichilik** Rivers is used as a migration staging area for snow geese from Canada and Alaska.

The Plover Islands area is an extremely important shorebird staging area from mid-July to August. Red **phalaropes** are the most abundant species. From Pitt Point to Cape Halkett, shorebirds and molting **oldsquaws** form dense aggregations in mid-summer (Weller et al., 1977). Eiders, glaucous gulls, and Arctic terns make extensive use of **Niakuk**, Gull, Cross, and Stenup Islands.

Marine. The bowhead whale is an endangered species, numbering **1,500** to 3,000 animals. Each spring in April and May these large cetaceans migrate northward from the Bering Sea through the flaw zone to the Beaufort Sea and **Amundsen Gulf** (**Fiscus**, Marquette, and **Braham**, 1976; Alaska Department of Fish and Game, 1977). They pass very close to shore off Point

Barrow. In September they return to their wintering grounds, passing near shore from Cape Simpson to Point Barrow (Braham, et al., 1977). These large mammals feed on marine invertebrates. Recent sampling indicates that euphausiids are a primary food item in the vicinity of Point Barrow.

The belukha whale population off the Bering and Beaufort Seas is estimated to contain at least 5,000 individuals. They are gregarious mammals and occur in nearshore waters, including large rivers and areas above the tidal influence. Herds of 100 to 1,000 animals have been observed during migration, but small groups of 2 to 15 whales are most common. Timing of migration is dependent on ice conditions, but belukhas usually arrive in the Arctic during April. Some groups return to the same ice-free area each summer. Young are born from May through July. As ice begins to form in the fall, the whales migrate south where leads are abundant or the area is ice-free. Belukhas feed on fish and often concentrate in estuaries when species such as smelt or salmon smelt are abundant (Alaska Department of Fish and Game, 1977).

Three species of ice-inhabiting hair seals occur regularly in the Beaufort Sea. Within nearshore waters, the ringed seal is the most abundant, followed by the spotted seal and bearded seal. Only limited information exists about these populations due to inadequate census technology and minimal research emphasis in the past (Alaska Department of Fish and Game, 1977).

Species distribution **commonly** overlaps, but each seal species is usually found in distinct geographical areas. Adult ringed seals are found predominantly in areas of land fast ice in the winter and in broken floating ice during the summer. Spotted seals inhabit the outer edge of the pack ice in winter and remain near coastal areas or islands during the summer. Bearded **seals** prefer moving ice in the winter and broken floes of polar ice (over shallow water) in the **summer**.

Food requirements between seal species are quite different. Spotted seals are fish eaters favoring nearshore species. Ringed seals forage on **zooplankton**, shrimp, **copepods**, and other small marine organisms. Bearded seals are bottom feeders, relying mostly on crabs, mollusks, and **small** bottom fish.

Polar bears occur throughout Arctic waters and onshore areas of the Beaufort Sea. Pregnant females excavate dens in river banks, or on the ice where there is sufficient snow accumulation. Dens may be used from December until April. Present information indicates that some of the most important **denn**ing habitat on the Alaskan coast extends from the **Colville** River east to the Canadian border. This zone is about 80 kilometers (**50 miles**) **w**ide and includes a corridor of land extending about 40 kilometers (**25 miles**) from the coast and the strip of adjoining **shore-**fast ice (Weller **et al.**, 1977}. Males and nonpregnant females remain active year round on moving pack ice.

North of Point Barrow polar bears move east toward Barter Island where ice is more stable. The southern edge of the ice pack varies in position

during summer, depending upon the winds. It can be lodged against the shore or can be as far as 160 kilometers (100 miles) offshore. Polar bears generally stay with the moving ice during the summer and concentrate on its southern edge where seals are abundant.

Lagoons are nesting and molting sites for waterfowl, resting areas for migratory geese, nurseries for young waterfowl, and feeding grounds for many shorebirds. Estuaries formed at river deltas are low salinity environments which provide good habitat for waterfowl.

Aquatic. More than 30 species of fish have been recorded in near-shore habitats of the Beaufort Sea (Weller et al., 1977). Arctic char and Arctic cisco are the most abundant and widespread (Bendock, 1976). Adult whitefish have been found only within the river systems, but shallow bays and lagoons are important feeding and migration areas for immature whitefish. Arctic cod ("Tom cod") are seasonally abundant.

Among the nearshore fishes, species diversity is low. Anadromous species migrate and concentrate along shallow coastal estuaries. Freshwater fishes are found in the rivers and occasionally in the estuaries when salinities are low. Most of the coastal streams freeze up each winter leaving only occasional unfrozen pools under the ice. These nonfrozen pockets are critical habitat for overwintering **anadromous** and resident fishes such as Arctic char, Arctic **cisco**, least **cisco**, **grayling** and round whitefish.

Marine fish species such as the fourhorn **sculpin**, Arctic flounder and Arctic cod are found in brackish waters during the ice-free summer season, but apparently move farther offshore in winter (Weller et al., 1977). The waters surrounding nutrient-rich river deltas are critical habitat for larval and juvenile fish.

Hunting and Fishing

Residents of the Arctic coast harvest caribou, **small** game such as ptarmigan and owls, bird eggs, whales, seal and fish as part of their food resource. Spawning areas, overwintering fish sites, calving grounds, and nesting sites require special protection to assure long-term viability for food production.

Fish and wildlife resources within a day's access **of** communities are used intensively. In the nearshore areas, spotted seals, ringed seals, and bowhead and **belukha** whales are taken. Ringed seals are the most common species taken by local village residents. Traditionally seals were used by coastal residents for food, oil, dog food, boat coverings, clothing and other practical items. Natives **still** depend on seals for some products, but a continuing shift to a cash economy has reduced this dependence.

In the 1960's, harvests of the four species of hair seals in **all** Alaskan waters averaged about 18,000 per year. Declines in utilization from cultural changes and control imposed by the Marine Mammal Protection Act have

resulted in harvests of 7,000 to 9,000 animals per year since 1972 (Alaska Department of Fish and Game, 1977). Seals are usually hunted on foot, by boat, or a combination of both. Foot hunters usually walk to a suitable lead and wait for seals to surface, while boat hunters may pursue seals in open water or locate seals resting on ice or **land**. Although winter hunting has been popular, the majority of seals are presently killed in the spring during break-up or in the fall before freeze-up. Restrictions of the Marine **Mammal** Protection Act have totally eliminated sport hunting for marine mammals.

Harrison Bay is an important **belukha** whale hunting area. Although whales provide large amounts of meat and fat, seals are the staple of the Eskimo diet (Selkregg, 1975). A small commercial fishery has operated in the Colville River delta since 1950, harvesting **cisco** and whiti fish. The largest subsistence fisheries in the Arctic are conducted at Point Barrow, Kaktovik and Point Hope, mainly taking whiti fish, **cisco** and Arctic cod (Selkregg, 1975). In addition, residents at Point Hope and Kaktovik harvest char for personal use.

Caribou have always been an important food source in the Arctic. Today, caribou are **still** taken in **large** numbers, but the Alaska Department of Fish and Game has instituted a permit system which establishes seasonal limits. Most caribou hunting is done when the ground is frozen and snow machines can be used for transportation. Most of the migrating caribou herds leave the Arctic Coastal Plain by early fall, but some remain longer and can be hunted in the winter.

The constantly increasing demand for sport hunting and fishing throughout Alaska **has** resulted in increased use of the Arctic Slope by guides and sportsmen. Because **of** limited supply points coastal villages are important staging areas for hunting and fishing operations. Moose, caribou, Dan sheep, **grizzly** bear, Arctic char, **grayling**, and lake trout are the most important recreational species.

Other animals are sought primarily for their pelts to make clothing for residents and to sell on the open fur market. Wolves, polar bears, Arctic foxes and other fur-bearing animals are sought for their commercially-marketable fur. Marine **mammals**, with the exception **of** the polar bear and walrus (which occur only rarely in the area), may be used for subsistence or **commercial** handicrafts only by Natives, as stipulated by the Marine Mammal Protection Act of 1972.

Critical Areas

Based on species that are important for both sport and subsistence hunting and fishing near the Arctic coast, critical areas have been identified in Table 63.

Conclusions

The evaluation of baseline environmental conditions of the North **Slope** and Beaufort Sea has identified five important components related potential impacts or conflicts to the existing socioeconomic and cultural

TABLE 63

CRITICAL HUNTING AND FISHING AREAS

SPECIES	LOCATION	REMARKS	USER GROUP
Bowhead and Belukha Whales	Point Barrow-Pitt Point	Seaward to about 15 miles	Barrow
Ringed Seals	Wainwright-Barrow Cape Simpson-Pitt Point Cross Island-McClure Island Maguire Island-Camden Bay	Landfast ice and grounded pack ice Landfast ice and grounded pack ice Landfast ice and grounded pack ice Landfast ice and grounded pack ice	Wainwright and Barrow Barrow None Kaktovik
Waterfowl and Shorebirds	Plover Islands Pitt Pt.-Cape Halkett-Teshekpuk Lake Colville River Delta Jones islands Howe Island Kaparuk River Delta McClure Islands Canning River Delta Sadlerochit River-Aichilik River	Staging and molting Staging and molting Nesting Nesting Only snow goose nesting colony in Alaska Nesting Nesting Nesting Snow goose staging area	Barrow Barrow and Nuiqsut Nuiqsut Nuiqsut Nuiqsut Nuiqsut Nuiqsut Kaktovik Kaktovik
Musk Oxen	Canning River-Okpilak River	Resident	Tourists in Arctic Wildlife Range
Caribou	Teshekpuk Lake-Cape Halkett Olikto Point-Bullen Point Katakaturuk-Kongakut River	Calving and resident caribou herd Calving and summer range Calving	Nuiqsut and Barrow Tourists at Prudhoe Bay Kaktovik
Fish	Lower Meade River Teshekpuk Lake Lower Colville River Lower Kuparuk Lower Sagavanirktok River Lower Canning River	Overwintering Overwintering Overwintering Overwintering Overwintering Overwintering	Barrow-Atkasook Barrow-Nuiqsut Nuiqsut Nuiqsut Nuiqsut Kaktovik

References: Alaska Department of Fish and Game, 1977; Bergman, 1974; Burns et al., 1976; Cameron and Whitten, 1976, 1977; Craig and McCart, 1976; Davis and Valkenburg, 1977; Gavin, 1974; Hemming, 1971; Selkregg, 1975; Ward and Craig, 1974; Weller, 1977; Yoshihara, 1973.

infrastructure from offshore petroleum development. These are:

WATER RESOURCES (APPENDIX FIGURE NO. 1)

Fresh water is a key resource for both domestic and industrial (petroleum) use. **Water** resources are important **socioeconomically** for three principal reasons. The possibility of use conflicts over water resources between domestic and industrial users may exist in future offshore petroleum activities. Petroleum development may also adversely affect water quality and availability through activities such as **gravel** extraction. Water extraction for industrial use **and** changes in water quality may in turn impact fish populations which are important subsistence food resources.

GRAVEL AND SAND RESOURCES (APPENDIX FIGURE NO. 2)

Gravel and sand resources are important construction materials which will be required in large quantities for offshore petroleum development. They have been evaluated for three principal reasons: 1) as valuable, and locally scarce, resources, gravel and sand owned by Natives has important economic implications; 2) to a lesser degree, gravel and sand are important because conflicts in resource use could occur locally; and 3) environmental impacts of gravel extraction could affect water quality, water availability and fish populations.

TERRAIN FEATURES (APPENDIX FIGURE NO. 3)

Terrain features are an important input to the evaluation of water availability since there is a close correlation between the two.

WILDLIFE AND FISH DISTRIBUTION (APPENDIX FIGURE NOS. 4 AND 5)

In addition to a general environmental concern with species degradation, wildlife and fish populations were selected for analysis because they are important both **socioeconomically** and culturally as subsistence resource base. The mapping of species distribution and critical habitats for such subsistence food resources as the bowhead whale, ringed seal, Arctic char and caribou is essential in the analysis of potential impacts of offshore petroleum development.

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GLOSSARY

Accretionary bars

Bars formed or increased by external addition or accumulation.

Alluvial fan

A mass of sediment deposited at a point along a river where there is a decrease in gradient.

Anadromous species

Species which travel up rivers or streams from the sea for the purpose of breeding.

Barrier island

An island roughly parallel to a shore and separated by a lagoon type area.

Borrow, borrow sites

An excavated area where material has been dug for use as fill in another location.

Braided rivers

A river consisting of interwoven channels constantly shifting through islands of alluvium and sandbanks.

Cetaceans

An order of marine mammals including whales, dolphins, porpoises and related forms with barge heads, fishlike hairless bodies and paddle shaped forelimbs.

Delphi techniques

Identification, ranking and weighing of issues of concern or environmental factors through aggregation of opinions of a multidisciplinary group in a series of discussion sessions.

Deoxygenation

To remove oxygen or air from water.

Detritus

Loose material that results from disintegration or wearing away.

Eolian

Deposited, produced, or eroded by the wind.

Euphausiids

Small luminescent crustaceans that resemble shrimp and form an important element in marine plankton.

Fauna

The animals or animal life of a region, period or special environment.

Flora

The plant life characteristics of a region, period, or special environment.

Glacial fluvial

Glacial stream, relating to or produced by a glacial stream.

Groundwater

Water in the part of the ground that is wholly saturated.

Hillocks

A small **hill**.

Inuit

People, **commonly** used in Canada and Greenland. Term currently used to designate the entire **circumpolar** population of Inupiat-Yupik Eskimo.

Inupiat

Real person; term by which the indigenous population designate themselves; Eskimo.

Kaktovik

Barter Island.

Karigi

Communal or ceremonial house.

Leaching process

To dissolve out by the action of a percolating liquid.

---miu (miut)

Post base stem added to a specific geographical region meaning inhabitant of i.e., **Nuvugmiut** = Nuvuk villager.

Morphology

The external structure of rocks in relation to the development of erosional forms.

Muktuk

Whale skin with blubber.

Nalukataq

Blanket toss. Generally refers to Captain's Feast held in the summer sponsored by whaling captains who caught whales.

Neqlik (Neglik, Nirlik)

Aboriginal trading center at the mouth of the **Colville** River.

Nunamiut (Nunatarmiut)

Inhabitants of land; inland people. Term by which **Nunamiut** designate themselves.

Nuvuk

Point Barrow

Passerine species

Of or relating to the largest order of birds which includes more than half of all living birds and consists chiefly of altricial song birds of perching habits.

Permafrost

Permanently frozen ground.

pH

A measure of the acidity or alkalinity of liquid on a scale of 0 - 14 with 7 representing neutrality. Numbers from 0 - 6 represent acidity and numbers from 8 - 14 represent alkalinity.

Phosphate level

The amount or level of phosphoric acid found in a substance.

Pingos

A low hill or mound forced up by hydrostatic pressure in an area underlain by permafrost.

Reaeration

Resupplying or recharging water with oxygen or air.

Salinity

The amount of percentage of salt present in water.

Seismic surveys

Study of sub-terranean structure using acoustic penetration techniques.

Surficial deposits

A deposit of or relating to the ground surface.

Tagiugmiut (Tareumiut)

Inhabitants of the sea; coastal people.

Thermokarst

Unusual topography caused by percolating hot ground waters and underground streams.

Tikigaaq (Tigara)

Point Hope.

Turbidity

A condition which sometimes occurs to water which is so stirred up or disturbed as to become opaque or obscured.

Ugruk

Bearded seal.

Umeali k

(Literally having an umiak). A rich person; whaling captain.

Umiak (umiaq)

Large skin boat.

Umialgich

Rich people. Whaling captains.

Utqkeavik

Barrow.

Uuliktaq

Uktok. Aboriginal trading site.

---vik

Post base stem meaning place, i.e., Kaktovik = sealing place.

Winnowed

To remove by a current of air, to treat by exposure to a current of air so that waste matter is eliminated.

Yupik

Southern group speaking a distinctive language from Inupiat; collectively classified with Inupiat in English as Eskimo.