

COMMUNITY PLANNING
IN THE ARCTIC ENVIRONMENT

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by
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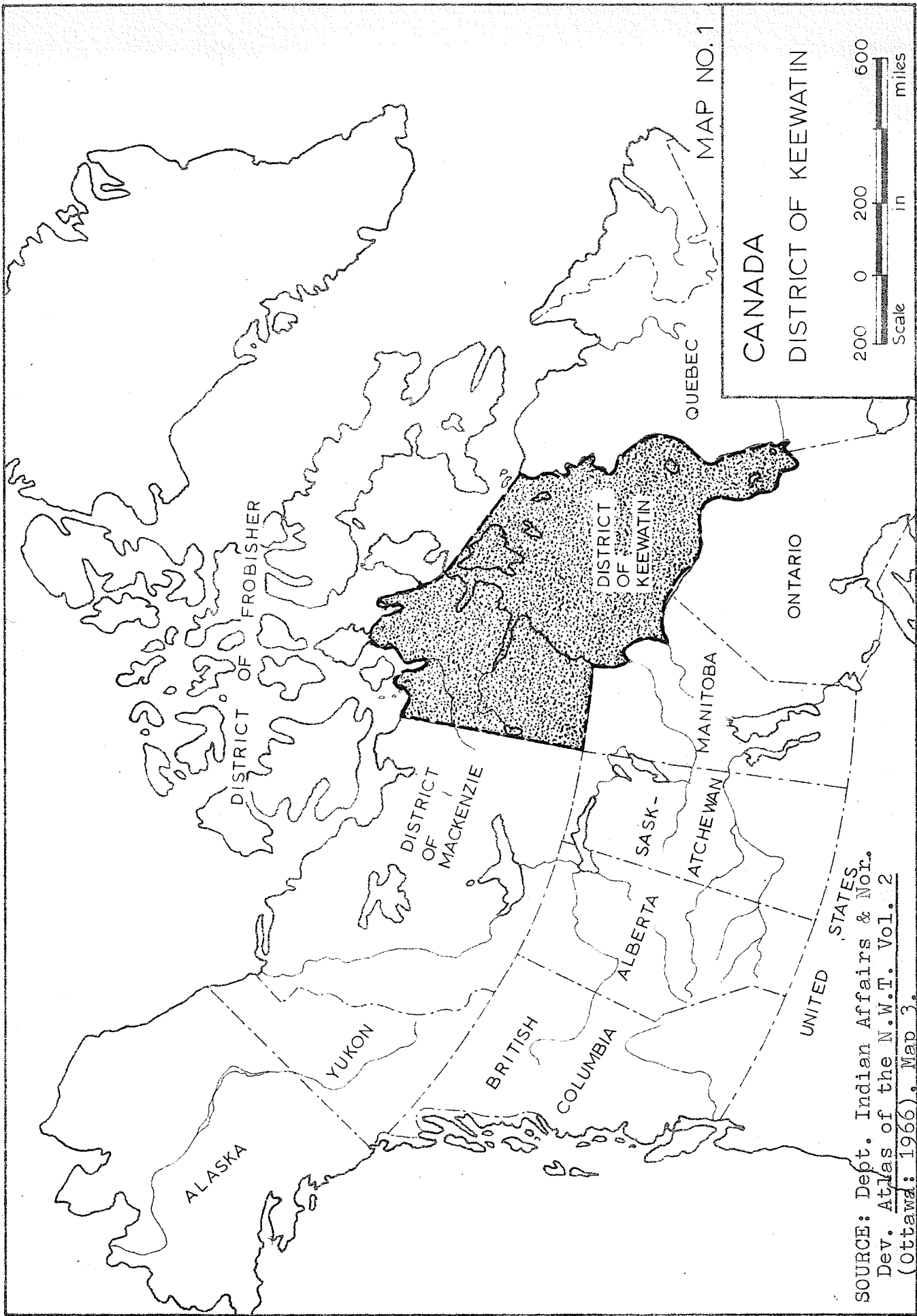
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CHAPTER I

INTRODUCTION

In contrast to the southern half of Canada, the northern portion is lightly populated and poor. With increasing interest in underdeveloped areas in all parts of the world it seems equally important that the Canadian north should be understood in a realistic and properly documented way. This study is therefore concerned with the living conditions and way of life which exists in present day Arctic communities located within the Keewatin District of the Northwest Territories. Keewatin is that part of the Canadian mainland lying to the north of 60 degrees latitude and to the east of 102 degrees longitude, but excluding Boothia and Melville Peninsulas. Also included are all of the islands in Hudson Bay. Map 1 indicates the extent of the District of Keewatin in relation to the other Districts of the Northwest Territories and to the Provinces.

Within Keewatin there is a population of about 2,900 people, the majority of whom are of Eskimo decent. These people live in eight communities which range in size from 150 to 600 persons. Map 5, page 71, indicates the spatial



SOURCE: Dept. Indian Affairs & Nor.
Dev. Atlas of the N.W.T. Vol. 2
(Ottawa: 1966), Map 3.

location of the communities in the area under consideration.¹

I. SCOPE OF THE THESIS

The Arctic region of Canada's north is a land of extremes.² The problems which face the people who live there are as varied as the land they live in and are due, in a large part, to environmental factors.

The harsh climatic conditions which prevail, the degree of isolation under which the people live, the underpopulation of the land and the rapid changes which have occurred due to settlement growth are but a few of the features indicative of the extreme conditions to be found in the area. The changes affecting the Eskimo people as they adapt to a community way of life from their previous family based unit are of importance. With recently increased interest in the north by both governmental and private organizations, the Eskimo residents continue to be faced with an increasing number of economic and social problems as

¹Although Repulse Bay is geographically located outside of the District of Keewatin, it is included within the region for government administration purpose and will therefore be included within Keewatin for purposes of this study.

²The Arctic region has been defined as the area to the north of the tree line. The location of the Arctic is further considered in Chapter III.

they attempt to adapt their stone age culture to more modern ways and to the use of physical facilities which the majority of Canadian people take for granted. It therefore seems useful to review this changing situation in an attempt to obtain a comprehensive understanding of the overall situation and determine how improvements can be achieved.

The Eskimo people had, for centuries, existed under a subsistence way of life in which the dictates of survival forced them into a nomadic life in continuous pursuit of game. The coming of the white man introduced trapping and trading as a means of livelihood. Even now the way of life is changing from a dependence upon the animal resources of the land and sea to a dependence upon wage employment within the settlements. The arrival of the white man altered the Eskimo's technology, resource base, hunting pattern and seasonal life. It has influenced where the Eskimo lives and also the nature of their homes and communities. It has changed the entire nature of the occupancy and utilization of their environment.

Prior to the past decade there was limited concern with the physical organization of the Arctic communities and with the conditions under which the majority of residents lived. Government employees, trading post managers and

missionaries were supplied with facilities which provided a level of living closely approximating that existing in southern Canada. However, the native people lived in igloos and skin tents as they had done for countless years previously, or attempted to imitate the white man by constructing shacks of scrap lumber, packing crates and cardboard.

Such was the situation within the District of Keewatin until successive epidemics of influenza, tuberculosis, poliomyelitis and measles dictated that, at least from a health standpoint, improvements were required and indeed were long overdue. The national expansion of social welfare policies and a decision to increase educational opportunities for all persons provided additional incentive for a comprehensive investigation of the living conditions throughout the Northwest Territories. As a consequence, since 1960, there have been several government sponsored programs to improve the situation, in particular for the indigenous people in the Arctic communities.

This thesis is concerned with the reasons which have brought about the form and pattern of the existing settlements and is directed towards an analysis of the physical and human problems which should be solved in order to provide

efficient and functional communities in the Arctic.³ It is the purpose of this thesis to attempt to accomplish two things. First to indicate the existing state of the conditions under which the residents of the Arctic live, as exemplified by three Keewatin communities: Chesterfield Inlet, Repulse Bay and Pelly Bay; second, to suggest ways in which community planning can assist in providing an improved living and working environment for residents of the Canadian Arctic regions.

Due to the breadth of the subject under consideration, it is difficult to treat more than a few of the problems other than in a summary fashion. It is therefore necessary to be simply descriptive in much of the report. A major emphasis is placed on prescriptive planning recommendations. Because of the basic nature of the needs of the majority of the inhabitants, it is difficult to produce any particularly original suggestions. It is hoped that a comprehensive description of the situation and some recommendations for principles which need greater consideration in order to lead

³The isolated Distant Early Warning Line Stations and the Department of Transport Weather Stations are not considered in this study. They have been constructed and maintained for specific purposes and provide for the needs of their workers, the majority of which are brought in from the south. Map 5, page 71, shows the general location of these stations.

to improvements may form a starting point and provide incentive for other more comprehensive works.

II. STUDY METHOD

The basic information concerning the Arctic communities of Chesterfield Inlet, Repulse Bay and Pelly Bay is from data obtained during on-site studies made in the summer of 1967. These communities were chosen for investigation because of an opportunity provided the author to visit each and obtain firsthand information concerning the existing situation.⁴

In addition to the study of specific communities, an attempt was made to examine the Canadian Northland on a broad regional basis and obtain knowledge of its pertinent aspects through personal experience. This opportunity was provided by the route of travel into the area which, mainly because of the dictates of climatic conditions and aircraft transportation, was through such widely spaced centers as Churchill, Manitoba and Yellowknife, Northwest Territories.

⁴The author was a member of a Planning Consultant Firm which had entered into contract with the Department of Indian Affairs and Northern Development for the specific purpose of preparing development plans for the three communities.

In addition, short stops were made in several other Arctic communities and provided an opportunity for cursory examination of their facilities.

On-site investigations were concerned with social characteristics of the population, family formations, labour forces and available economic opportunities. The physical facilities of the settlement, such as water supply, sewage disposal facilities, housing and electricity supply, were also investigated. In addition, topographical surveys were carried out to up-date available maps and ensure that their accuracy was within limits suitable for the requirements of the project. Library research during the early months of 1968 complemented the basic studies and assisted in giving a proper perspective to the existing situation.

III. FORMAT OF THE THESIS

For clarity in presentation of the many diverse factors which influence life in the Arctic, this thesis is divided into three major parts. Part A contains an outline of the basic concept of community planning. It is designed to provide a framework within which to consider the characteristics of the Arctic which pertain to community development. Part B provides a systematic description of

The Arctic environment. In order to orient the reader with reference to the general subject of the Arctic, the first three Chapters of this part are of an introductory nature concerning the physical and historical aspects of the region and an outline of the settlement pattern of the District of Keewatin. The next three Chapters set down, in considerable detail, the conditions which exist in the communities of Chesterfield Inlet, Repulse Bay and Pelly Bay.

Part C is an analysis of the main difficulties which face the Arctic communities. The analysis is made in the light of present day community planning theory in an attempt to determine how the situation might best be improved and how community planning can help. Chapter XI forms the conclusion and summarizes the more important points which have been raised throughout the entire thesis.

PART A

THE CONCEPT OF COMMUNITY PLANNING

CHAPTER II

THE CONCEPT OF COMMUNITY PLANNING

Prior to investigating particular aspects of the Arctic environment and attempting to determine the role which community planning can play in improving conditions, it is important to have a clear understanding of the concept of community planning. It is important to establish what is meant by the term in order that the purpose of community planning does not become confused with the information gathering activities of the planning process. This Chapter will therefore set out the meaning of community planning as employed throughout this thesis.

I. COMMUNITY PLANNING

Basic Concept

In any community, change is always occurring. Planning is a way of guiding change that is going on anyway and which may not otherwise be directed toward special goals. That is, the community could continue to exist and the things with which planning is concerned could go on even if conscious guidance were not undertaken. The purpose of community

planning is to make these activities easier, better and more equitable for the maximum number of people.

The meaning of community planning is further clarified by G. A. P. Carrothers who recognizes two aspects.

The first is concerned with the physical surroundings of the community; the organization of land use, streets, buildings, recreation areas and the like. In this sense community planning seeks to achieve that physical environment that will best promote the economic, social and moral welfare of those persons living in the community. Essential to such an environment are both beauty and utility. The second aspect of community planning emphasizes the social relationships and characteristics of the community; family life, recreational, cultural, political, and other group activities. In this sense, community planning attempts to make possible the accomplishment of such activities with most convenience and efficiency. Closely related to these basic concepts and, in fact, forming an essential part of them, are the administrative activities through which they are brought into reality - the day-to-day decisions which so often determine the success or failure of community planning.¹

In the absence of conscious planning in which the inter-relationships between physical, social, economic and political aspects are not understood, the problems confronting a community may be considered on an individual basis only. The relationship of these various aspects in development activities are not fully recognized. Consequently the

¹Gerald A. P. Carrothers, Planning in Manitoba (Winnipeg: University of Manitoba, 1953), p. 29.

resulting haphazard development causes other serious problems. Planning of the physical environment should therefore be considered as an integrative activity. The need for an understanding of these relationships is noted by Melville Branch who reports that:

Not so long ago city planning overemphasized physical reconstruction and beautification almost to the exclusion of socio-economic matters. Naturally such fundamentally unrealistic conceptions were rarely carried out and then only in part; most so called city plans lay unused in municipal archives. The more inclusive approach characteristic of community planning today represents a much more productive effort promising significant results, since analytical understanding is no longer so seriously bounded.²

Community planning is therefore concerned with the goal of providing the best possible environment in which to live and work. However, it must be concerned with more than goals. Planning must be concerned with both the goal and the means of attaining the goal simultaneously. It cannot adopt idealized solutions lacking in realism.³

A plan is a course of action which can be carried into effect, which can be expected to lead to the attainment of the ends sought and which is intended to be carried into

²Melville C. Branch, Planning: Aspects and Applications (New York: John Wiley & Sons Inc., 1966,) pp. 140-141.

³A. Benjamin Handler, "The Fundamental Aims of Planning," Plan Canada (Vol. 1, No. 1, 1959), p. 5.

effect. By contrast, an idealized solution is one which under existing circumstances could not be carried out, which would not have the consequences intended or which no one intends to carry out. Such a utopian scheme could not be intended for actual implementation but would be useful to give proposals or indicate possibilities which may become attainable at some time in the future.

Community planning is future oriented in that it proposes to accommodate change in a pre-arranged pattern and by an orderly, co-ordinated method, the results of which are supposedly superior to otherwise spontaneous decisions. The past cannot be changed and it must be accepted as given. However the lessons which it can reveal are important determinants for adaption to change in the future. Planning is a long term activity though it is often limited by short term concerns. Short term plans are generally of the action type consisting of plans for physical elements which show locations for roads, sites for houses and similar facilities and are intended to relieve temporary crises caused by rapid change or outside forces. Long term plans are those which are directive and try to anticipate and guide the effects of changes in technology, in economy and in population growth.⁴

⁴Clarence T. Aasen, "Comprehensive Settlement Planning

Because of the continuing nature of community change, plans designed to provide the best possible environment in a community must be considered in the light of on-going activities. As a part of the on-going social process, successful planning cannot be imposed upon a society from outside. It is limited in what it can achieve by the nature of the values and needs which the people of the community feel are important. To apply community planning to actual sites and circumstances, a carefully worked out procedure must be followed. Such a procedure requires a logical and efficient analysis from which a suitable synthesis or program for action can be made and carried into reality.

Planning Procedure

Community planning involves a continuing process of deriving, organizing and implementing programs which are designed to fulfill local goals for social, economic and physical well being, considering both immediate needs and those of the foreseeable future. Consistent with this activity, four main phases can be identified:

1. The identification of goals;

in the Mackenzie River Delta N.W.T.", (unpublished Master's thesis, The University of Waterloo, Waterloo, 1967), p. 5-8.

2. The identification of the nature, meaning and implication of the goals;
3. The formation of plans and programs regarding the means of attaining the goals. Alternate solutions may be proposed.
4. The action of carrying out the plan which has been agreed upon.

While these phases of the planning process may be separately identified, it does not mean that they are not inter-related. It is necessary to reconsider, re-analyse and redesign all aspects of these phases to adjust to continually changing conditions and circumstances.

Identification of goals. First, before any technical planning activity can be carried out, it is necessary to identify the broad goals which it is wished to attain by means of community planning.

Human action has a general capacity to cope with a varied and diverse environment, that is, it is adaptive. While a system of human actions may passively adapt to environmental conditions, the general trend is toward activities which constitute varying degrees of control over aspects of the environment. Characteristically, human actions are directed to the attainment of anticipated conditions or goals.

In the attempt to achieve expectations, that is, the

anticipated future conditions, a person must first conceive of the future state which he values and wishes to bring about. The process of identifying needs and objectives, therefore, means the manner in which the community locates or focuses upon the problems about which it is disturbed and establishes goals for community achievement, or both. It is a process of becoming conscious of certain things which are not liked, things which are needed or similar general problem areas of concern with existing situations. It is the feeling which surrounds the expression of these opinions that will form the motivation for action.⁵

An ordering or ranking of goals gives an indication of the priorities which the community places on particular aspects of its future development. Among the many goals which may be revealed, some will represent ideas about which there is much feeling, great conviction and unanimity of opinion. These will be the things requiring first attention in selecting methods of attaining the goal.

Identification of nature and meaning of the goals. The second phase of planning requires exploration of the nature,

⁵Murray G. Ross, Community Organization (New York: Harper & Brothers, 1955), pp.44-45.

meaning, scope and implications of the problems associated with the attainment of the desired goal. Even if the problem is well defined, it is often difficult to see clearly all the relationships which may surround it. Therefore all possible aspects of the existing physical, economic and social structure of the community, relevant to the goals, need to be inventoried and past trends and processes which have brought about these conditions need to be analysed. From such analysis, predictions can be made concerning future trends and possibilities.

When concerned with a particular community, topics of investigation are weighted according to the specific problems of the area. In a northern location they would include social characteristics of the population, economic opportunities, such as employment, hunting and fishing, arts and crafts, and the physical infrastructure of the community including transportation facilities, water supply, waste disposal, housing and education facilities. The relationship of the community to its hinterland and to other centers of administrative and economic influence need also to be evaluated in order to predict possible future movements of population.

The inventories and surveys are concerned with a number of factors. These include an analysis of the present

state of the physical facilities and the local economy; the relationship of present living conditions to proposed levels of adequacy; the foreseeable trends in population movements, both within and outside of the settlement area; and the anticipated development programs which will have an effect upon the lives of the community residents. While no plan is only physical or only socio-economic but always both, it is often necessary, for analytic clarity, to make a separate treatment of the different aspects in order to gain a better understanding of the complex whole. This is particularly necessary in a situation in which rapid change is taking place, since planning must operate within the on-going situation.

During this phase, continual refinement and analysis of the problem is required. To deal with all relationships and implications could begin a task which could never be completed with the resources available. Therefore, while the relationships must be seen as completely as possible, judgments consistent with the desired goals must be made concerning the emphasis which any particular aspect will receive.

Formation of plans. The first two planning stages are essentially analytical while the next are predominantly of a synthesis or integrating nature. Data which have been

collected are now correlated so as to provide a rational base upon which to formulate the planning program designed to fulfill the desired goal.⁶ Thus community planning is more than a description of communities and an analysis of the relationships which are evident or discovered. It is intended to go farther and pose solutions which will enable more desirable relationships to develop; its intent is prescriptive in terms of activities which are compatible with achieving a specific goal.

In a multi-faceted environment there may be a number of choices of action which can bring about a desired situation. An evaluation or assessment of these choices, in the light of their probable consequences, is necessary to make a specific commitment to a particular one.⁷

It is unlikely that exploration of the situation will yield a ready answer since the relationships between the various community activities will be viewed differently by differing people or groups. Therefore it may be necessary

⁶Walter Stohr, "Planning for Depressed Areas - A Methodological Approach," American Institute of Planners Journal (Vol. XXX, May 1964), pp. 125-127.

⁷T. Parsons and E. A. Shils, Towards a General Theory of Action (Cambridge: Harvard University Press, 1951), p. 11.

to prepare two or more tentative solutions, one of which can be chosen in combination with others to form a single program for action. The working out of alternate plans from which to choose, provides the opportunity for good working relationships to develop between all members of the community and makes possible the best decision for future programs.

Implementation. The final phase of community planning relates to the action required in implementing the plan intended to give reality to the desired goals. While the need for planning arises from human requirements, its implementation is a process of political and administrative activities, formulated at the appropriate level of government, in the form of specific programs, regulations and operations to carry out the plans. It is important that plans be based on rational argument and facts in order that political decisions can be guided to the best possible solution for all people concerned.⁸ Anything less than a thorough

⁸Legislators may often be subjected to pressures from those who fear their interests may be adversely affected by a particular plan. For an analysis of the relationship of plan implementation and the political process refer to: John Dakin, "The Background Ideas of Planning," Plan Canada (Vol. 2, No. 3, 1961), pp. 105-106.

approach to the implementation of desirable plans jeopardizes all the previous work which will have gone into planning.

The planning process cannot be considered to have ended with the completion of this last phase, for changes are continually occurring in all parts of the process. For example each decision making sequence of defining goals and determining means carried out by one individual exists in an environment of similar sequences being carried out by other individuals. Furthermore, this process exists in relation to a changing physical environment. The goal may be unrealistic in the face of available means, means directed to achieving the goal may not be compatible with success, means may be thwarted by the activities of others in pursuit of alternative goals, or the environment may not be sufficiently stable and cause dislocation of means and ends. That is, as the environment changes, means directed to a goal yet unachieved may become unsuitable, the goal itself may become unrealistic in terms of the means offered by the environment or new possible means may not be recognized as such in the altered system. The events which lead from an aspiration for a certain future condition to its realization are located in the decision making sequence of the persons involved and the fluctuations in the environment in which

the decision making sequences takes place.⁹

Community planning is the blending of all the various phases described and no one of them can be considered as constituting the overall process. Economic and social conditions cannot successfully be subordinated to physical development. Equally important is the continuous consideration of the end results of actual accomplishment of the plan and the adoption of necessary adjustment to suit changing conditions.

The Community, Planners and Plans

The foregoing discussion has described and defined the planning process. Because it takes place in relation to human activities, planning is associated with a particular area or region, with particular people or groups of people and with a resulting plan as an outcome of their deliberations. To obtain a more complete understanding of community planning, it therefore seems useful to consider further those who are most concerned with planning and, as well, plans themselves. While the following discussion will be, as much as possible,

⁹D. G. Smith, The Mackenzie Delta - Domestic Economy of the Native Peoples (Ottawa: Northern Co-ordination and Research Center, 1967), pp. 6-7.

in general terms, the more pertinent aspects will focus directly on the Arctic setting to which this thesis is directed.

The community. The fundamental orientation of community planning is toward the well-being of the individual, although it may often be necessary to subordinate personal interests for the greater general benefit of the community as a whole.¹⁰ Further, because of the flexible and continuing nature of the process, it cannot be separated from the local setting and therefore those persons charged with carrying out community planning activities must be thoroughly acquainted with local conditions and problems. In addition, community planning cannot be an isolated activity and cannot be successfully carried out by any one person.

Democracy as a value, means that community planning is carried on in the interests of the people of the community and is based upon the participation of the people generally in the making of decisions. Since planning is a part of the on-going social process, it is limited in what it can achieve by the nature of society as a whole. It cannot successfully be imposed upon society from outside but needs

¹⁰Gerald A. P. Carrothers, op cit., p. 31.

to be continually related to local conditions. The failure to understand the dependent nature of planning will often lead to seeking unachievable goals or to unworkable methods of achieving them.¹¹

The values which are held by the people of a community act as a controlling factor in the planning process. It is therefore particularly important that there be an opportunity for the local people to express their opinions and desires during all phases of the planning process, rather than only before or after a plan has been implemented. Successful planning requires the co-operation and support of persons in the community and also of those individuals or organizations, such as the federal government, from outside the area who may have an influence over local conditions.

Planners. Planning is a two way process in which the fundamental principle is interaction between experts and experience, between specialists and the people.¹² The people have experience in the conditions of the environment in which they live and thus have needs which they desire to

¹¹Dakin, op. cit., p. 97.

¹²A. Hillman, Community Organization and Planning (New York: The Macmillan Company, 1950), p. 355.

attain. A specialist, usually called a planner, is able to assess the needs of the people and assist them to develop the means by which their needs may be satisfied. The inter-relation between planners and the people of the community is desirable in order that notions of efficiency do not overlook the fact that some people might want to suffer certain wants rather than abandon certain rights, that is, efficiency may be imposed upon people at too high a price in human values.

The planner cannot discover the needs of people merely by asking them what kinds of homes and community they want to live in for they do not know beyond their experience. However, with their assistance he must discover their requirements and goals. He must explore patiently, realistically and imaginatively and should live in the places he helps to create so that the realities of the living community can be felt. It is necessary to understand the people of the community, the environment of the area and the reaction of the people to the environment.

There are further reasons for the need of a particular individual to be charged with the active responsibility of community planning. The pressures of day-to-day activities give little time for local officials to consider community planning. Also, there is not always agreement on planning

for the future. Information and assistance is required from a person who has an understanding of the ramification of the planning process and can facilitate the co-ordination of activities related to community development.

It is important to emphasise that a planner alone cannot accomplish community planning. His chief role is to guide, assist and co-ordinate. While the planner cannot be expected to be an expert in all aspects of physical, social and economic life of the community, he should have an awareness and understanding of all related fields so he can diagnose ailments and utilise the proper specialists to perform the necessary correction. He should also be able to anticipate problems of community development in order to prevent or minimise their detrimental influence.

When related to planning in the Arctic, the planner must thoroughly understand the environmental conditions which prevail in the region. The limiting physical conditions, the unusual social and economic situation and the political organization, which is different from all other Canadian regions, needs to be understood. These factors are a part of the overall environment and will be considered in Part B where their influence on planning will be further considered.

Plans. A means of communication between the people

of the community, the planner and the political organization is required if planning is to be effective. The medium which is used to translate the goals of the people into the action process associated with implementation is the plan. "Plan" as used here serves as a general term for a co-ordinated system of some kind intended as a guide to action. For example, a plan expressing desired space relations is called a "master plan," or "general plan." A plan expressing economic factors such as the desirable relationship between projections of resources and of service requirements is called a "financial plan" or "budget." A plan proposing a co-ordinated system of activities is called a "plan of action" or more commonly, a "program." Each of these is a co-ordinated system intended as a guide for action which carried with it the notion of improvement.

While community planning has social and economic objectives and political methods of application, the product of planning is essentially physical. However, the actual physical improvements are not the ends of the plan but a means towards the attainment of desired goals.¹³ The total impact caused by the improvements takes place within the web

¹³For example better housing can bring about more pleasant and healthful living conditions for the resident.

of physical, economic and social causes and effect.¹⁴ In most instances, the physical development is symbolic and expressive of the social and non-physical values and attitudes of people since the structure of the physical community is a major determinant of the way of life followed by the inhabitants.

This brief account of community planning, the planning process and the actors taking part in the process therefore forms the background against which to view the changing conditions of the Arctic in an attempt to determine the future role of community planning in the Arctic environment.

¹⁴ David Farbman, A Description Analysis and Critique of the Master Plan (Mimeographed, 1960), p. 25.

PART B

THE ARCTIC ENVIRONMENT

CHAPTER III

THE PHYSICAL BACKGROUND OF THE KEEWATIN ARCTIC

Excluding the waters of Hudson Bay, the District of Keewatin covers an area of 228,160 square miles, of which 9,700 square miles are covered by fresh water lakes. Seventeen per cent of the total area of the Northwest Territories and six per cent of Canada's surface lie within its boundaries.¹

A more comprehensive understanding of the people living in a particular region can be obtained through an acquaintance with the habitat in which they wage their struggle for existence. Therefore a description and analysis of the natural environment has been chosen for the first topic in the investigation of the Keewatin Arctic. This chapter will indicate some of the elements which have a particularly dominant effect on all phases of settlement life.

¹Dominion Bureau of Statistics, Canada Year Book (Ottawa: Queen's Printer, 1967), p. 7.

I. EXTENT OF THE CANADIAN ARCTIC

The word "Arctic" refers to the northern polar region of the world.² However the extent of the area which has been termed Arctic has been defined by many differing criteria.

The Arctic circle has been considered the southern limit of the Arctic in some instances. The Arctic Circle, a mathematical line drawn at $66^{\circ} 33\frac{1}{2}'$ north latitude, is based on an astronomical concept. It marks the southern limit of the zone in which there is at least one annual period of twenty-four hours during which the sun does not set and one during which it does not rise.³ This line does not relate to the nature of the terrain and life of the area, therefore it is not a convenient boundary indicator.

On a climatic basis the line most commonly used as the southern boundary of the Arctic is the 50° Fahrenheit isotherm for the daily mean temperature of the warmest month.

²Arctic is derived from the Greek word Arktos meaning bear and refers to the northern constellation of Ursa Major, The Great Bear. Encyclopaedia Britannica (Chicago: William Benton, Vol. 2, 1963), p. 330.

³Moir Dunbar, "The Arctic Setting", The Arctic Frontier, R. St. J. Macdonald, editor (Toronto: University of Toronto Press, 1966), P. 4.

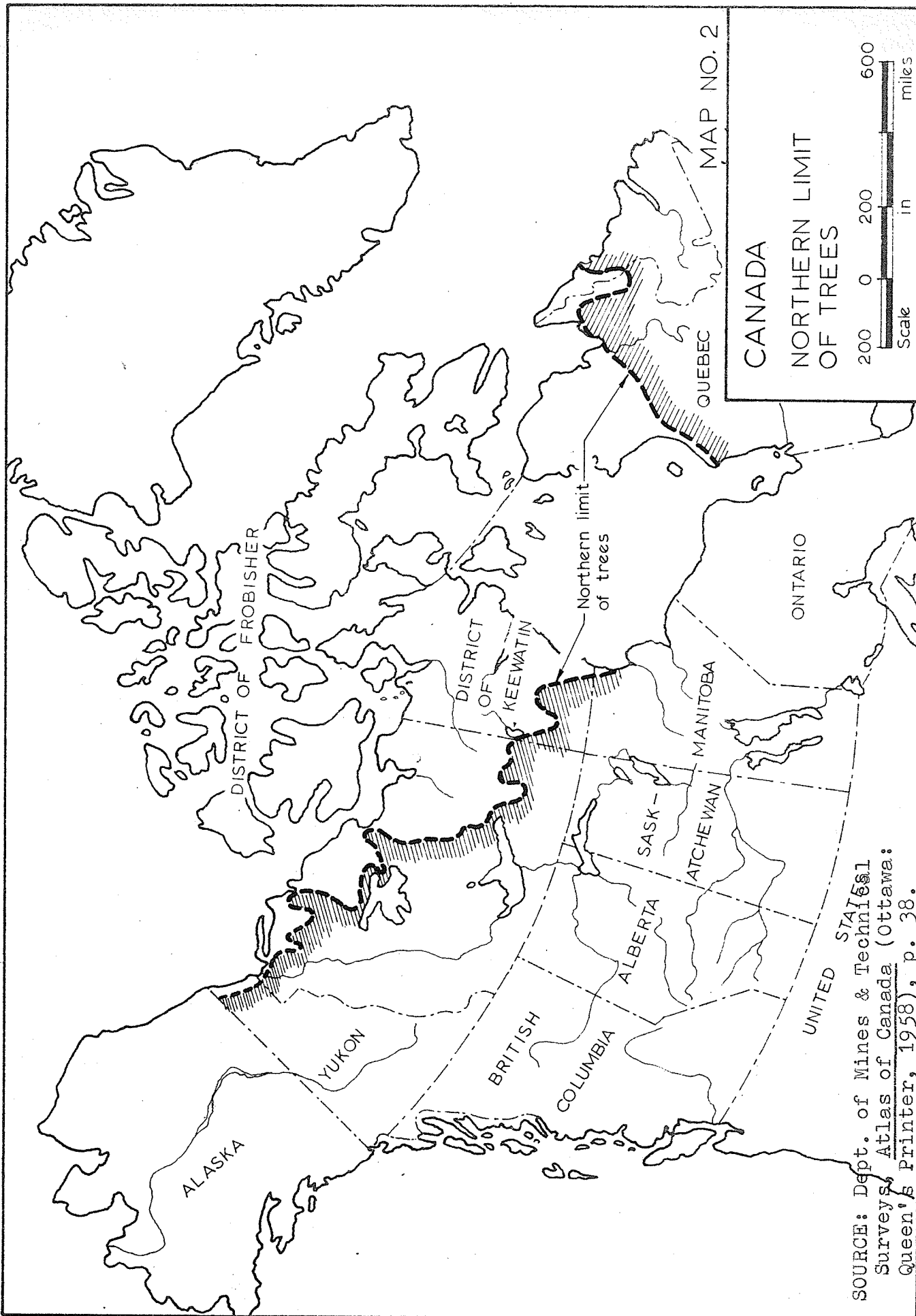
Such a concept is not truly satisfactory either because it does not provide a ready method for identification on the ground and its location must be interpolated from data collected at widely spaced meteorological stations.

While no dividing line is completely definitive, the most useful and easily identified is that of the northern limit of the stands of trees. This line of demarcation is the edge between the barrens and the bush and, in Canada, it divides not only vegetation but also cultures. The tree line has been historically the farthest north that the Indians ventured as well as the southern limit of the Eskimos' travels.⁴

Map 2 indicates the approximate location of the tree line in Canada, above which is the Arctic region and below, the area termed sub-Arctic.⁵ The tree line is not clearly defined. It is a zone in which trees become smaller and gradually disappear. The line indicated on Map 2 is a very generalized one which attempts to approximate the limit of tree growth but it can be expected that there are scattered

⁴Ibid.

⁵Because this thesis is directly concerned with the Arctic region there will be no attempt to define the other limits or characteristics of the sub-Arctic region.



clumps of trees to the north of it as well as small barren areas to the south.

The direction of the tree line is a general northwest-southeast diagonal across the northern part of the Canadian mainland. The 50°F. isotherm which is indicated on Map 4, Page 42, also approximates this direction but in a slightly more northerly location.⁶ Except for the islands in Hudson Bay and a small portion in its south western corner, the District of Keewatin is above the tree line and is therefore representative of the Arctic environment. Some of these physical features will be examined in the following sections of this Chapter.

II. PHYSIOGRAPHIC FEATURES

Land Form

Topography. The major portion of the Keewatin District forms a part of the geologic and physiographic

⁶The polar climate, which influences the form of the terrain and the form of life which can live on it, is not symmetrical about the earth's axis, hence the tree line and isothermal lines do not parallel the latitudinal lines. See: F. K. Hare, "Arctic Geography and Climate," Polar Atmosphere Symposium, R. C. Sutcliffe, editor (London: Permagon Press, 1958), pp. 4-5.

province of the Canadian Shield. Most of the rocks are granites and granitic gneisses but there are many other variations. Sandstone and conglomerates are found in the northwest part of the District while limestone makes up the southwest portion of Southampton Island at the entrance to Hudson Bay.

Everywhere the overburden of glacial and marine deposits tends to be thin. Consequently bare rock knobs and ridges are the rule, with the depressions between supporting some vegetation on the fine material that has washed down from the higher points.

The topography is generally one of low relief, with differences of less than 200 feet. South of Repulse Bay the land rises steeply to about 2,000 feet at Wager Bay, then drops down to sea level at Chesterfield Inlet. To the west and south of the Inlet lies an extensive plain which rises very gradually from the great depression of Hudson Bay. Baker Lake, about 200 miles inland, is only twenty feet above sea level and boats can sail into it through connecting channels from the sea.

From Repulse Bay northward the coast is rugged while south of Repulse Bay the coast becomes lower with many small lakes near the shore. North of Chesterfield Inlet there are

many bays, inlets and indentations with relatively deep water close to the shore and many off-shore islands. To the south of the Inlet the bays become larger but reefs and rocks become more numerous and tidal flats are common. From just south of Rankin Inlet to Churchill is a coastal plain, low and relatively featureless with extensive tidal flats and almost no fringing islands.⁷

Drainage. The topography is laced with rivers and lakes in great profusion although the drainage system is poorly developed. There is a gradual slope eastward to Hudson Bay, except along the northerly coast which drains into the Arctic Ocean. There are two major river systems; the Thelon, which drains most of the southwest area of the District and flows along a well-defined channel into Baker Lake, and the Back River, which flows into the Arctic Ocean. Because of numerous rapids, none of the rivers are navigable by boats, other than canoes, and are thus seldom used as transportation routes.

The drainage pattern is a product of the glaciation period. Thus most lakes show a strong orientation pattern,

⁷J. Brian Bird, "Terrain Conditions in the Central Canadian Arctic," Geographical Bulletin No. 7 (Ottawa: Department of Mines and Technical Surveys, 1955), pp. 1-6.

generally west and northwest. The numerous small lakes, particularly those near the coast, are shallow and contain little water. They exist mainly because of the impermeable nature of their bed, due to either solid rock or permafrost, and the low rate of evaporation during the cool summer.⁸ During winter they usually freeze to the bottom, a factor which reduces their capacity to maintain life and limits their usefulness as water supply sources for settlement use.

Permafrost

The climate of the Arctic is such that a portion of the ground, often hundreds of feet deep, remains frozen throughout the year. This perennially frozen ground is known as permafrost.⁹

The surface of the ground above the permafrost, called the active layer, alternately freezes and thaws with the seasons. The thickness of this layer depends upon the surface cover and may only be a few inches beneath an

⁸D. M. Brack and D. McIntosh, Keewatin Mainland Area Economic Survey and Regional Appraisal (Ottawa: Northern Affairs and National Resources, 1963), pp. 1-2.

⁹Permafrost is not the name of a new material but of the frozen equivalent of materials, such as bedrock, gravel, sand, silt or clay, which are also found in warmer climates.

insulating layer of moss to as much as thirty inches in well drained gravel deposits.¹⁰

In undisturbed areas a condition of temperature equilibrium has generally been established by nature between the permafrost and the active layer. Any change in the natural insulating cover at the ground surface can upset this thermal balance and start the permafrost thawing. For example solar heat reflecting from the southerly side of a building may cause the permafrost to recede on that side while the shadow of a building may reduce the soil temperature on the north side and bring the permafrost closer to the surface.¹¹

For building purposes the presence of permafrost can be neglected when the bearing strength of the ground is the same whether it is frozen or thawed, for example on bedrock or well drained gravel areas. However other soils, particularly fine grained sand, silt or clay, which may have a high bearing strength while frozen, can change to a soft liquid-like

¹⁰

R. F. Legget, H. B. Dickens, and R. J. E. Brown, "Permafrost Investigation in Canada," Geology in the Arctic (Vol. II, 1961), pp. 956-969.

¹¹

R. F. Legget and H. B. Dickens, Building in Northern Canada (Ottawa: National Research Council, 1959), pp. 8-9.

slurry with little or no supporting power when thawed.¹²

This can lead to drastic settling of structures and destruction of roads or airstrips if construction techniques which take into account the possibility of unstable soil are not used.

Aside from making excavation and construction difficult, permafrost obstructs vertical drainage of thawing soils and swamps and marshy areas result. Drainage is thus restricted to flow on or near the surface of the ground. Further consideration of the permafrost problem will be included in Part C of this thesis.

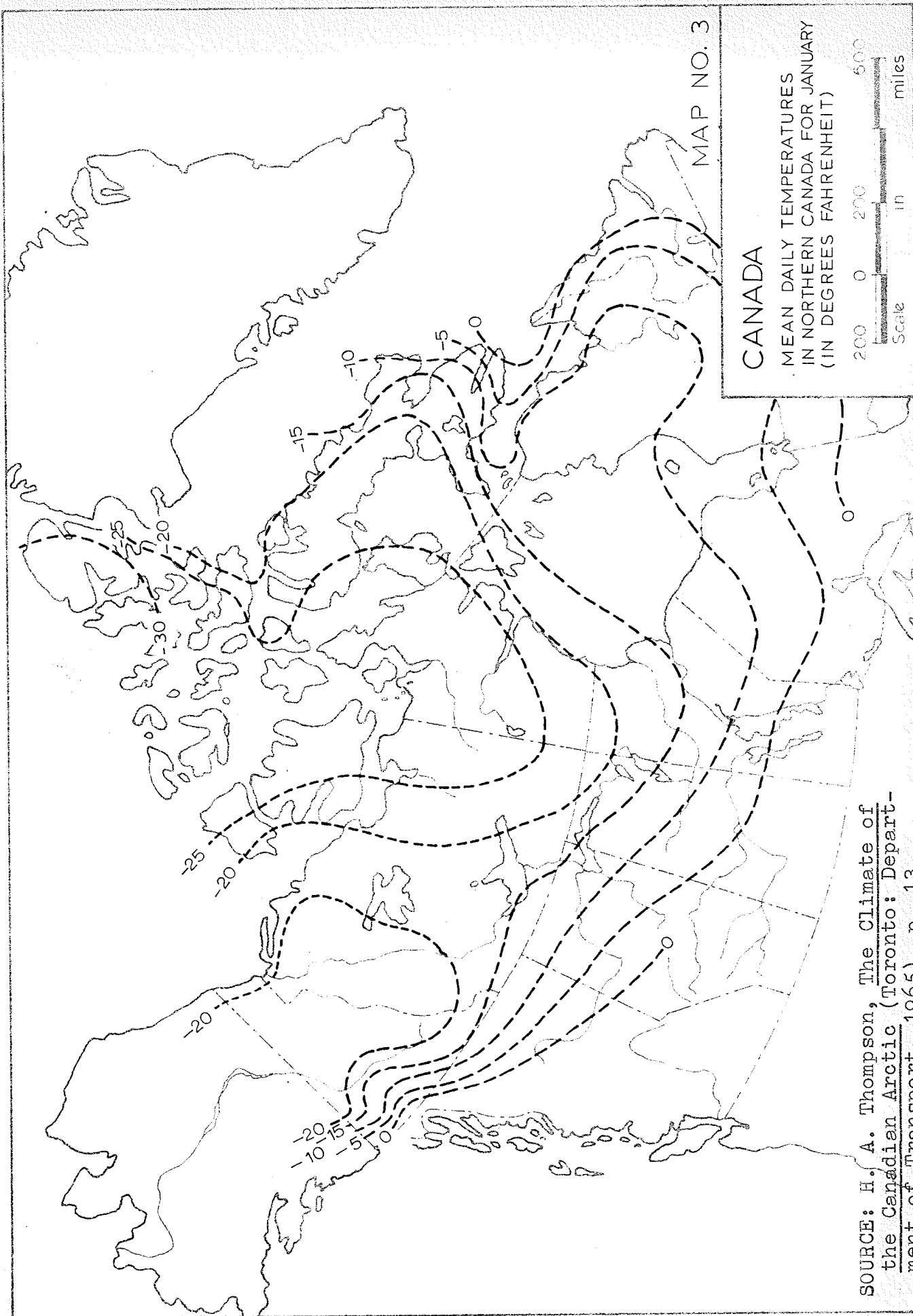
III. CLIMATE

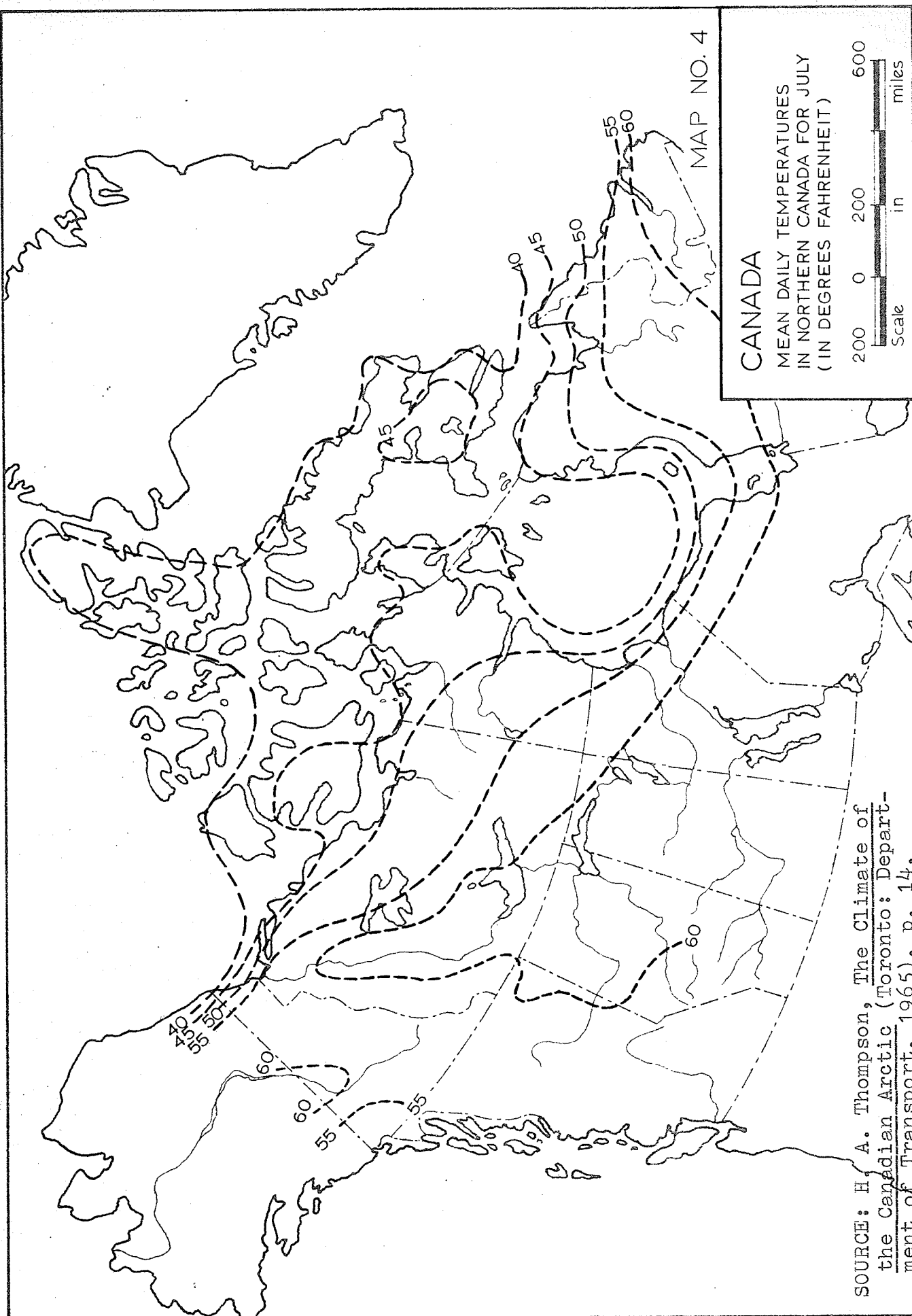
Temperature

On a monthly or yearly basis, the Keewatin District is one of the coldest inhabited areas in Canada. A short cool summer and a long cold winter characterize the climatic conditions of the area.

The mean daily temperatures in northern Canada for January and for July are shown on Map 3 and Map 4 respectively.

¹²P. F. Cooper, The Mackenzie Delta-Technology (Ottawa: Northern Coordination and Research Center, 1967), pp. 4-5.





The mean winter temperatures which prevail in Keewatin range between -20° and -25°F . During summer a relatively warm land mass is indicated but the waters of Hudson Bay remain cool. Although average temperatures of $+45^{\circ}$ to $+50^{\circ}\text{F}$. can be expected, a southeasterly wind quickly brings a cooling trend.

Table I indicates, in more detail, the climatic data recorded by the Chesterfield Inlet meteorological station. Only during four months of the year is the average of the mean daily temperature above the freezing point. This is indicative of the length of the period of cold weather characteristic of the area. The minimum and maximum mean temperatures do not differ greatly from those recorded in more southern regions, therefore the low mean annual temperature, of about $+12^{\circ}\text{F}$. is due to the great length of the cold period rather than to extremes in low temperature.¹³

Another measure of temperature conditions is the monthly and annual totals of degree days below 65°F ., which

¹³Comparable temperatures for the Winnipeg area are: mean annual temperature $+35^{\circ}\text{F}$; mean annual minimum temperature -40°F ; and mean annual maximum temperature $+95^{\circ}\text{F}$. Temperature sources: Morley K. Thomas, Climatological Atlas of Canada (Ottawa: National Research Council, 1953), pp. 31-35.

*

Lat.	Long.	Height above M.S.L.	Height above M.S.L.
63° 20' N	90° 43' W	-	21 feet

AIR TEMPERATURE										PRECIPITATION				WIND			Mean Days With		Degree Days
	Mean Daily	Mean of Daily		Mean of Monthly		Highest Recorded	Lowest Recorded	Rain	Snow	Total Water	Most Prevalent			Fog Visibility 1/8 miles	Blowing Snow Visibility 6 miles or less	Below 65°F			
		Maximum	Minimum	Maximum	Minimum						Direction	Percent-	Average speed m.p.h.						
January	-25	OF	-18	-31	6	OF	-48	31	OF	-60	In.	.29	.40	N	44	15.3	1	15	2784
February	-25	OF	-18	-32	7	OF	-48	31	OF	-57	In.	.19	.15	N	39	14.2	1	12	2559
March	-12	-4	-20	18	40	30	-52	0	2.9	.29	.33	.29	.30	N	37	12.9	2	10	2440
April	4	12	-6	29	25	42	-38	0	4.2	.42	.30	.42	.30	N	27	13.2	2	7	1878
May	22	28	17	38	-3	45	-17	.13	2.8	.41	.44	.41	.44	N	23	14.9	3	7	1361
June	37	43	32	63	21	81	5	.88	.8	.96	.76	.96	.76	N	25	11.8	5	1	849
July	48	55	40	74	33	84	26	1.64	0	1.64	.85	1.64	.85	N	21	11.7	6	0	530
August	48	54	42	69	36	86	27	1.70	0	1.70	1.19	1.70	1.19	N	28	13.0	4	0	549
September	37	41	33	55	22	67	9	1.53	1.3	1.66	1.33	1.66	1.33	N	28	15.2	4	1	840
October	22	27	17	39	-4	49	-22	.43	5.4	.97	.61	.97	.61	N	26	17.1	3	6	1345
November	1	8	-6	30	-26	49	-38	.01	5.1	.52	.34	.52	.34	NW	29	14.9	3	10	1941
December	-16	-8	-23	15	-40	24	-54	0	4.7	.47	1.10	.47	1.10	N	42	15.6	1	14	2492
Year	12	18	5	76	-50	86	-60	6.32	32.0	9.52	1.33					14.2	35	83	19568
Period	1951 - 1960		1921 - 60				1951 - 60				1951 - 60		1951 - 60						

* Source: H. A. Thompson, The Climate of the Canadian Arctic
Department of Transport, Toronto, 1965.

are termed "heating degree days."¹⁴ Cumulative "heating degree days" values give an indication of the severity of the climate as well as the duration of cold weather and are useful in predicting fuel requirements for heating buildings. Weather stations in Keewatin register approximately 19,500 heating degree days, a total nearly double the 10,000 heating degree days at Edmonton and Winnipeg.¹⁵ This indicates that the amount of fuel required to heat a building in the Arctic would be about twice the amount required to heat a similar building in the southern cities.

Ice. The length and coldness of the winter means that the lakes and sea are covered by ice for most of the year. This factor is particularly important because of the dependence upon lakes as a source of fresh water and upon the sea as a transportation route. Only during the period from June to September is the area free of solid ice conditions.

Ice formation to depths of eight to ten feet is common throughout the area.¹⁶ In general this uses up all of the

¹⁴There are as many heating degree days in a single calendar day as the number of degrees by which that day's mean temperature falls below 65°F.

¹⁵Thomas, op. cit., p. 61.

¹⁶D. M. Brack and D. McIntosh, op. cit. pp. 2-3.

free water which is naturally available in lakes near the existing communities and therefore reservoirs must be constructed to provide water for winter use, or ice and snow must be melted.

Insolation

One of the main reasons for the low temperature regime in the northern latitudes is the limited amount of solar radiation which is available throughout the year. The absence of incoming radiation from the sun during the long Arctic nights results in sustained cooling of the snow and ice surfaces. In Keewatin, the maximum height of the sun on December 21st ranges from about ten degrees above the horizon at the 60th parallel of latitude to zero degrees at the Arctic Circle. On June 21st the maximum heights range from 54 degrees to 44 degrees in the southern and northern locations respectively. Daylight conditions range from days with only about two hours of sunlight to days in which it is light for the complete twenty-four hours.¹⁷

Even during the periods of near continuous daylight, only a small percentage of the heat energy is being transferred to warm up the land and air. The high reflectivity

¹⁷Thomas, op. cit., pp. 187-188.

of the area and the low angle of incidence of the sun's rays tend to direct as much as fifty per cent of the heat radiation back into the atmosphere.¹⁸ The climatic regime of the warm season develops under the influence of constantly increasing daylight, the increasing elevation of the mid-day sun and increasing total radiation. However, most of the heat is expended in melting snow and ice and evaporating moisture from the ground, which is nearly always damp. The main features of the cold season are the accompanying periods of darkness and the relatively small angle of the sun during transitional periods which accounts for the deficiency in ultra-violet radiation during the entire cold season.¹⁹

The amount of sunlight can have an effect on the form of settlements as well as on the psychological outlook of people moving into the Arctic from the south. The long hours of darkness can create a depressed attitude and outlook on life while periods of continuous sunlight may disrupt normal time concepts for persons moving into the Arctic from

¹⁸ H. A. Thompson, The Climate of the Canadian Arctic (Toronto: Department of Transport, 1965), p. 2.

¹⁹ I. A. Arnol'di, "The Health Aspects of Acclimatization of Population of Polar Regions," Problems of the North No. 6 (Translated by National Research Council, Ottawa: 1962), p. 61.

southern locations.²⁰ The variations in available sunlight also give rise to lighting problems in buildings which must be overcome by effective window design, building orientation and supplementary lighting facilities.

Precipitation

Precipitation varies somewhat between coastal and inland locations, however the information contained in Table I, page 44, gives an indication of the amount of water falling on the Keewatin area. Most rainfall occurs during the months of July and August with a total annual fall of about 6.3 inches.

The period from October to December is the stormiest of the year and it is at this time that the greater portion of the annual snowfall takes place. Throughout late December to April the frigid atmosphere contains so little moisture that the few weather disturbances going so far north produce only thin clouds and light snowfall, particularly near the coast. The total annual snowfall amounts to about thirty-five inches which, combined with the

²⁰ David Rioch, "Psychiatric Problems of Man in the Arctic," Man Living in the Arctic (Washington: National Academy of Sciences, 1960), pp. 103-113; and T.S. Boag, "The White Man in the Arctic," Journal of Psychiatry Vol. 109, No. 6, December 1952, pp. 444-449.

rainfall, gives an average annual fall of about ten inches of water.

Winds

Strong winds are common over the barren lands surrounding Hudson Bay. The most prevalent wind direction is from the north or northwest. As the data in Table I, page 44, indicates, winds occur about twenty-five per cent of the time and during the winter have an average speed of about fifteen miles per hour.

Although the steady cold and light snowfall are characteristics of the Arctic winter, it is only when they occur in combination with strong winds that travel becomes hazardous or even impossible. Continual winds tend to keep loose snow moving so as to frequently cause blizzard conditions even when no snow is falling. The higher exposed areas are generally blown clear while the lower slopes, particularly those covered with rock debris, experience considerable deposition. Within settlement areas, drifts form on the lee side of buildings and other obstructions creating difficult conditions.

When combined with low temperatures, the winds take on an added severity by increasing the rate at which cooling occurs. A wind speed of one mile per hour can be roughly

equated to a drop in below freezing temperature of about one degree Fahrenheit on exposed skin surfaces.²¹ On the basis of this wind chill effect, the most severe area in the Arctic during the coldest month, is the barren land to the northwest of Hudson Bay.²²

IV. RESOURCES

Renewable Resources

The renewable resources which are presently of major economic importance to the people living in Keewatin are:

1. Land animals, such as foxes, caribou, and polar bears. Wolves and wolverine are indirectly important because they destroy other more valuable animals;
2. Sea animals, such as seals, walruses and whales; and
3. Fish and birds including Arctic char, trout, whitefish, ducks, geese and ptarmigans.²³

²¹This is a very general "rule of thumb" only. Wind chill is actually a rate of cooling, not a temperature. However the "equivalent wind chill temperature" does give an indication of the severity of conditions to persons with limited scientific knowledge. This is the "temperature" which gives the same rate of cooling with no wind (a wind of 5 m.p.h. is often used) as is produced by the actual conditions of temperature and wind speed. Refer to: Department of Transport, Wind Chill, Wind Chill Temperature Graph, and Wind Chill Nomogram, Mimeographed Text and Tables (Winnipeg: Meteorological Branch).

²²Thompson, op. cit., p. 7.

²³D. M. Brack and D. McIntosh, op. cit., p. 11.

Vegetation, in the form of mosses and grasses, is common in low damp areas. Small willows, a foot or so in height, grow around wet marshes and in the more sheltered locations. Lichens predominate on the rock outcrop areas. The Arctic region, by definition, does not support the growth of tree species. The Arctic flora is not of direct economic importance, but its usefulness to man is derived from the animal life which it supports.²⁴

Mosquitoes and black flies are abundant despite the short breeding season. While not a useful resource, their presence must be considered because they bite humans and so interfere with outdoor activities, both occupational and recreational, unless controls are used. Insect harassment of, and parasitic growth on, wildlife, especially the caribou, is detrimental to their health, and thus indirectly influences the standard of living which the hunting peoples can enjoy.

The renewable resources are not abundant and their food potential is not sufficient to sustain an increasing population. Their value will be in continuing to provide a major portion of the protein requirements of the Eskimo

²⁴N. L. Nickolson, "The Northwest Territories: Geographical Aspects," Canadian Geographical Journal (Vol. LX, No. 1, January 1960), pp. 9-12.

people. The fluctuation in numbers of animals and in the prices of furs cannot provide a stable economic base upon which to develop the Arctic.²⁵ The present exploitation of the renewable resources is carried out with varying degrees of intensity and efficiency throughout the area.²⁶

Non-renewable Resources

There appear to be no immediate prospects for mineral production in the Keewatin District of the Northwest Territories. The Rankin Inlet nickel mine was the first, and so far, only experience in modern mining in the Arctic and the delicate balance between mineral resources and transportation economics has been reflected in its operations.

The claims were first staked in 1928 but production, by a private company, did not begin until 1957. Operations were carried out for five years after which time continued production became uneconomical and the mine was closed in

²⁵In the summer of 1966 the price, to the hunter, of a sealskin was about \$14.00. In 1967 the price had dropped to about \$3.50 per skin. Father Goussaert, Pelly Bay - Personal communication.

²⁶For a description of the utilization of renewable resources refer to: D. M. Brack and D. McIntosh, op. cit., pp. 12-57; and D. M. Brack, Southampton Island Area Economic Survey (Ottawa: Department of Northern Affairs and National Resources, 1962), pp. 35-45.

1962. During this period eighty Eskimo men formed about half of the labour force and proved capable of working in a modern mining enterprise.²⁷ However with closure of the mine, the community, which had about 500 residents, was left without an economic base and the people were again dependent upon both the renewable resources of the area and the government to sustain the standard of living which they had become accustomed to.

Future mineral exploitation will depend upon increased exploration to locate ores which can be economically exploited. The majority of Keewatin consists of Precambrian rock of the "Canadian Shield," from whose southern fringe comes a large portion of Canada's mineral production of nickel, gold, lead and zinc. It can therefore be expected that these minerals will be found in equally large quantities in the northern areas. This forms a potential incentive for future development which could have considerable influence on the settlement pattern in the area. However development must await southern economic pressures to spur it forward, for although the north may have the manpower to undertake mining operations, it does not presently have the capital required to initiate and sustain

²⁷ R. A. J. Phillips, Canada's North (Toronto: Macmillan of Canada, 1967), pp. 203-204.

successful operations.²⁸ Transportation is the main reason why the territorial economy is characterized by high costs. Distance from markets and sources of supply and small unbalanced volumes make transportation one of the largest single cost items in mining as well as in other industrial operations.²⁹

²⁸Dunbar, op. cit., pp. 17-19.

²⁹Transportation factors are further considered in Chapter IV.

CHAPTER IV

HISTORICAL BACKGROUND OF ARCTIC DEVELOPMENT

The activities of World War II made the Arctic far more accessible than ever before and brought many Eskimos into contact with large numbers of white people. The living conditions and problems of the native peoples then gradually came to the attention of the government and the country as a whole.¹ With the end of the War it was possible to make an assessment of the economic and social difficulties of the northern inhabitants and begin to improve the physical environs in which they were living.

This does not suggest that official interest in the north has developed only in the past twenty-five years. Government interest goes back to 1870. Then the Hudson's Bay Company ceded to the crown its territorial rights in Rupert's Land which, together with the Northwest Territories, were transferred by the United Kingdom to Canada.²

¹Diamond Jenness, Eskimo Administration: II Canada (Montreal: Arctic Institute of North America, 1964), p.26.

²At the time of confederation the newly formed Canadian Government did not obtain the rights for administration of the northwestern part of the continent. The control of this land was still held by the Hudson's Bay Company under the 1670 Royal Charter which had given it

It is only in the relatively recent past that there has been a growing awareness on the part of the government and the other people of Canada of their responsibilities to the Eskimos and the need for a program which would enable the native people to share in more of the benefits of national life.

This Chapter will consider factors which have influenced the limited movement of "civilized" man into the Arctic region of Canada and the changes which the indigenous people have undergone through contact with the white man. The contents of this Chapter will be mainly concerned with the District of Keewatin, although the more general aspects may also be applicable to other areas of Canada's Arctic.

I. POPULATION ASPECTS

The Indigenous People

When the first European explorers sailed into the Arctic waters of North America in the early 17th Century, they found a land inhabited by a race of people who had

administrative authority and trading rights over the lands and seas about Hudson Bay. For further details concerning this transfer see: Gordon W. Smith, "Sovereignty In The North: Aspects Of An International Problem," The Arctic Frontier, R. St. J. Macdonald, editor (Toronto: University of Toronto Press, 1966), pp. 201-204.

lived there for hundreds of years. The people they encountered had learned to cope with the environment and live in the seemingly bleak and barren land. Their stone age culture depended upon a subsistence way of life in which wild animals and fish formed their major source of food in addition to providing material for clothing, weapons and utensils. This involved a nomadic existence in continuous pursuit of game which roamed over a vast expanse of territory.³ Because the present Eskimo people have only recently emerged from this culture, it will be beneficial, for an easier understanding of the present situation, to briefly examine their historical way of life.

The origin of the Eskimo people is still conjectural and their historical movements across the lands are not definitely determined. However it is now generally held that the present Canadian Eskimo has evolved from the western Thule culture group who were more advanced than the Dorset Eskimos who had occupied the Canadian Arctic from about 700 B.C. to 1200 A.D. The Thule culture group

³For a description of the prehistorical life of the Eskimos who lived in the area of the present District of Keewatin see: Knud Rasmussen, Report of the Fifth Thule Expedition 1921-24 (Copenhagen: Gyldendals Forlagstrykerei), especially Vol. IV, 1927; Vol. V, 1929; and Vol. VIII, 1931.

migrated across the top of the continent to the east coast about 1,000 years ago.

The majority of the natives lived along the sea coast and depended upon successful harvests of sea mammals as a source of food, clothing and energy. However one group of Eskimos remained different from the others and declined to live near the sea. They inhabited the interior of the present day Keewatin District and depended mainly upon the caribou for their livelihood.

In order to survive, the Eskimo had learned to utilize the materials which his environment provided. The igloo provided shelter against harsh winter climates. This dome shaped snowhouse combined the advantages of strength, insulation and speed of construction as well as expendibility, for they could be readily abandoned when dirty or when a move to better hunting grounds was required, and a new one easily constructed. However its most serious limitations were at the beginning and end of the winter when intense cold preceded the snow and the spring sun melted the walls. Caribou skin tents provided shelter during these periods and also during the summer.

The kayak, a skin covered boat designed for one or two occupants, was used mainly for hunting. In it both the

mammals of the open sea and the caribou crossing the interior lakes could be pursued. A larger skin covered boat, the Umiak, was used for carrying heavier loads along the coastal waters. During the summer, travel on land was by foot with dogs carrying packs. Winter travel was by dog team and sled.

Caribou skins provided the warmest clothing and the greatest protection from the strong winds. Seal skins were often used, especially for foot wear, by those living near the coast. Weapons for hunting consisted of bone or ivory harpoons, bows and arrows, and spears.⁴

The Eskimo community was loosely organized with no formal authority outside the family, although individuals of unusual hunting ability and prestige might exercise temporary and informal leadership across kinship lines. The most common level of authority was the head of the family, or husband, who in turn looked up to his father or, if his father was dead, to his paternal uncle or oldest brother. Thus the authority structure consisted of a small number of families closely related along the father's line. The Eskimos generally worked together sharing in the bounty of

⁴R.A.J. Phillips, Canada's North (Toronto: Macmillan of Canada, 1967), pp. 27-34.

the hunt and taking responsibility for the sick.⁵

The power of public opinion appeared to control and minimize interpersonal conflicts thus making formal regulations unnecessary. Only in cases whereby individuals dangerous to the well being of the community were executed was there evidence that law existed in the culture. Even in such circumstances the decision on how to handle the situation rested with the deviant's family.⁶

The Eskimo religion centered on supernatural characters believed to control the weather or the hunt and consisted of a rigid system of taboos. The religious leader, or shaman, was respected for his supposed power to intercede with these supernatural forces. The shaman's powers were also supposed effective in the treatment and control of sickness and under these circumstances the relationship between insanitary surroundings and the spread of disease was never understood.⁷ Therefore the people were unconcerned about

⁵Asen Balikci, Development of Basic Socio-economic Units in Two Eskimo Communities (Ottawa: Queen's Printer, 1964), pp. 39-41.

⁶Geert Van Den Steenhoven, Legal Concepts Among The Netsilik Eskimos of Pelly Bay, N.W.T. (Ottawa: Northern Coordination and Research Center, 1959), contains several case histories of the Eskimo concept of law and order.

⁷Phillips, op. cit., p. 35.

the disposal of garbage and wastes in the vicinity of the dwelling units and made no attempt at maintaining sanitary conditions.

The Eskimo had no written language but they had a strong oral tradition in which legends of fact and fiction were transmitted from generation to generation. The telling of stories usually took on a recreational theme in the form of drum dances and songs. Although the Europeans met a group of people who appeared to be always in good cheer and with a generous nature, recent studies have indicated that their life has been clouded with tensions and hardships as great as in any other society.⁸

The Changing Way of Life

Contact with Europeans. The Eskimo people first came into contact with Europeans when the 17th Century explorers sailed into the Arctic regions of North America in search of a shorter route to the riches of the Orient. Continued contact was maintained by the whalers who hunted the Arctic waters during the 18th and 19th Centuries.⁹ In the present

⁸Asen Balikci, Suicidal Behaviour Among The Netsilik Eskimos (Ottawa: Northern Coordination and Research Center, 1960), deals with this aspect in a comprehensive manner.

⁹The early explorers seldom stayed in one place for

century fur traders, missionaries and government personnel have moved into the Arctic in increasing numbers and have had great influence upon the Eskimos' way of life.¹⁰

Change in the Eskimo way of life was mainly caused by new and different values which were placed on wild life in the Arctic environment.¹¹ While this new economic situation was emerging, new concepts of religion and law were also introduced and these too brought changes into the lives of the native peoples. Thus the primitive culture of the Eskimos

long and had only limited effect on the Eskimos' way of life. The whalers actually made the first commercial contact and introduced new tools and sea faring methods to the natives. For a more detailed account of the voyages and activities carried out during this period see: M. Dunbar, "The Arctic," Encyclopaedia Britannica (Chicago: William Benton, Vol. 2, 1963), pp. 331-338.

¹⁰The Hudson's Bay Company established fur trading posts throughout the Arctic during the period after 1909 and wherever they appeared the traditional way of Eskimo livelihood was modified. The native hunter devoted much of his time to trapping the white fox which had been previously considered useless. The furs were traded at the post for traps, rifles, cloth, matches, tobacco, tea, and other things he had learned to value. The desire to follow game about the land was reduced by the desire to be within easy reach of the trading post and the mission which was usually established near it. For a more detailed account of activities during this period see: Phillips, op. cit., pp. 57-81.

¹¹Department of Northern Affairs and National Resources, Annual Report 1954-55 (Ottawa: Queen's Printer, 1956), pp. 10-11.

had already been substantially modified before facilities for education and medical care were introduced into the north.

Initial communities. With the establishment of the trading posts in the Arctic there has been an accompanying trend toward concentration of population around them. The stages of community growth have followed relatively similar patterns throughout the Arctic. Although the speed of acculturation of the Eskimo has not been the same for all areas, the distinct and gradual movement toward settlement living has made the community way of life predominate at the present time.

Initially, the trading posts were established in proximity to good trapping areas, but with the exact sites chosen so that there was water access to the south and safe anchorages were available. The native people visited the post to trade and, since the rifle made hunting easier and the relative wealth obtained from trapping allowed more free time, they began to spend greater lengths of time in the vicinity. Some families settled permanently and used the post as a base from which to hunt in the immediate region.

When the missions, police detachments, schools and meteorological stations were established, it was usually at the site of the posts. They received supplies regularly and

were already, to some extent, centers of population. As a result, more people were attracted and small settlements sprang up but their location depended, in the first instance, on the fur trade and sea access.¹²

Post War activities. The Keewatin area of the Arctic was largely ignored by both government and individuals in the south. Except for the Hudson's Bay Company and the Missions, there was little interest indicated in the area until after World War II when the Federal Department of Northern Affairs and National Resources was formed in 1953.¹³

Concern for the Eskimo people increased after it was realized how poor their standard of living and tenuous their way of life was when compared to acceptable southern minimal standards. The government soon established a policy to attempt

¹²G. W. Rowley, "Settlement and Transportation in the Canadian North," Arctic (Vol. 7, No. 3 & 4, 1954), pp. 336-338.

¹³The Department's main purpose was to coordinate the activities of all government departments in the Territories, to promote measures for further economic and political development and to develop knowledge of the problems in the north and the means of dealing with them through scientific research. Statutes of Canada, Department of Northern Affairs and National Resources Act, 1953, Chapter 4, Section 6 (Ottawa: Queen's Printer, 1954), p.10.

to give the Eskimos the same rights, privileges, opportunities and responsibilities as all other Canadians The broader needs - and they are immediate needs - are health, education, and a sound economy.¹⁴

Although government activities improved living conditions somewhat they also increased the desire of the people to adopt a community way of life based on wage employment.¹⁵ Such a situation has raised other difficulties related to social and economic conditions. With the concentration of people, the surrounding areas are rapidly depleted of their wild-life resources and the traditional

¹⁴ Jean Lesage, "Enter the Europeans," The Beaver (Spring 1955, Outfit 285), pp. 4-5.

¹⁵ Dr. F. Vallee has outlined some of the reasons for the Eskimo changing their nomadic way of hunting life to the more sedentary settlement life: "In prior days, when the economic rewards from hunting and fishing dwindled in a particular area, the people would pack up and leave for another. In contemporary settlements the residents are more sedentary. One of the reasons for this concentration is the availability of a greater range of services and attractions in the communities. Schools, missions, nursing stations, stores, movies, and other allurements are found in varying degrees of frequency. In addition the people in the settlements have more of a stake in immovable property than did their ancestors. Houses and furniture are relatively fixed in one location in comparison with igloos or tents. Furthermore governments and commercial agencies have themselves sunk taxpayers and shareholders money into installations which cannot be easily abandoned even though in relatively uneconomic areas." F. Vallee, Debates of the Council of the Northwest Territories, 29th Session (Ottawa: 1965), p. 19.

food supply for the Eskimo people is unavailable. It has therefore become necessary for many of the people to depend upon wage employment in order to buy food and other goods imported from the south, to exist at a reduced standard of living or to depend on welfare payments for their needs. In areas with limited opportunities for work, the latter two alternatives have become predominant for the majority of the Eskimo people. The permanent community has thus developed not because of ecological circumstances but due to outside forces. The stable and renewable source of food which is necessary for the spontaneous growth of a community has not been available and it is only by importing goods from the south that their existence is possible.

At the present time the Eskimo society combines features of the traditional ways of native life and features adopted from the external influences of the past hundred years. For many of the older Eskimo people, there has been little or no organization beyond the family as they hunted in small groups following the movements of game and the changing seasons. Theirs has been a world of snow houses for winter shelter and tents for summer residence, of caribou and seal skin clothing, of a division of labour between the men who hunted and the women who tended the home and camps. In the

course of the evolution of these social and economic relationships, many Eskimo characteristics have emerged which include self reliance, industry, keen power of observation, cheerful disposition, a concept of time different from ours and a tendency to be uninterested in providing for the future. These native characteristics are basic determinants for adaptation to a new way of life away from the paternal influence, of administrators and traders, characteristic of the past.

II. FORMATION OF GOVERNMENT

Government of the Northwest Territories

Due to its relatively small population and the limited development of its economic resources, the Northwest Territories has never been given a government with provincial status.¹⁶ The present government is subject to the 1952 Northwest Territories Act, a Federal statute, under which it was created and assigned certain responsibilities.

Executive authority is placed in a Commissioner who is appointed by, and is responsible to, the Federal Government.

¹⁶ Refer to Appendix A for additional information concerning the development of government in the Northwest Territories.

The Commissioner is required to administer the Government of the Northwest Territories on the instructions of the Governor in Council or the Minister of Indian Affairs and Northern Development. The members of council, of which seven are elected and five are appointed, are a legislative body and can act only within the range of subjects placed under territorial jurisdiction by the Act. In general, matters of local concern similar to those assigned to a Province have been assigned to the Government of the Northwest Territories.¹⁷

For reasons similar to those preventing it from having full provincial status, the Government of the Northwest Territories does not have a public service for carrying out those duties which have been allotted to it. An arrangement has been made so that, for territorial purposes, the administration of the Northwest Territories will be carried out by the federal civil service. Thus, not only are the specific federal responsibilities carried out by federal departments but the residue of duties, which in the south

¹⁷ Statutes of Canada, An Act to Amend the Northwest Territories Act, Chapter 22, 1966 (Ottawa: Queen's Printer, 1967), pp. 147-153; and Statutes of Canada, The Northwest Territories Act, Chapter 46, Section 13 & 14 (Ottawa: Queen's Printer, 1952), pp. 285-286.

are usually provincial, are also carried out by the federal staff.¹⁸

Administrative Organization

The Department of Indian Affairs and Northern Development has, by statute, responsibility for co-ordinating all federal activities in the Northwest Territories and for carrying out the major portion of the territorial administrative duties as well. For administrative purposes the department has divided the Northwest Territories into two districts, Mackenzie and Arctic. Each is headed by an Administrator who is in charge of the field forces for his district. He is responsible to the Director of the Northern Administration Branch of the department. The headquarters for the Mackenzie District is in Fort Smith, N.W.T., while the headquarters of the Arctic District is in Ottawa.

A District is further divided into regions, each headed by a Regional Administrator. Each Region consists of

¹⁸ Some changes in this form of administration are expected to take place in the near future. In 1967 the headquarters for the Government of the Northwest Territories was moved to Yellowknife, Northwest Territories from Ottawa. The Government is presently organizing a civil service to administer its own affairs in the Mackenzie District on a trial basis. News item, The Winnipeg Free Press, September 28, 1967.

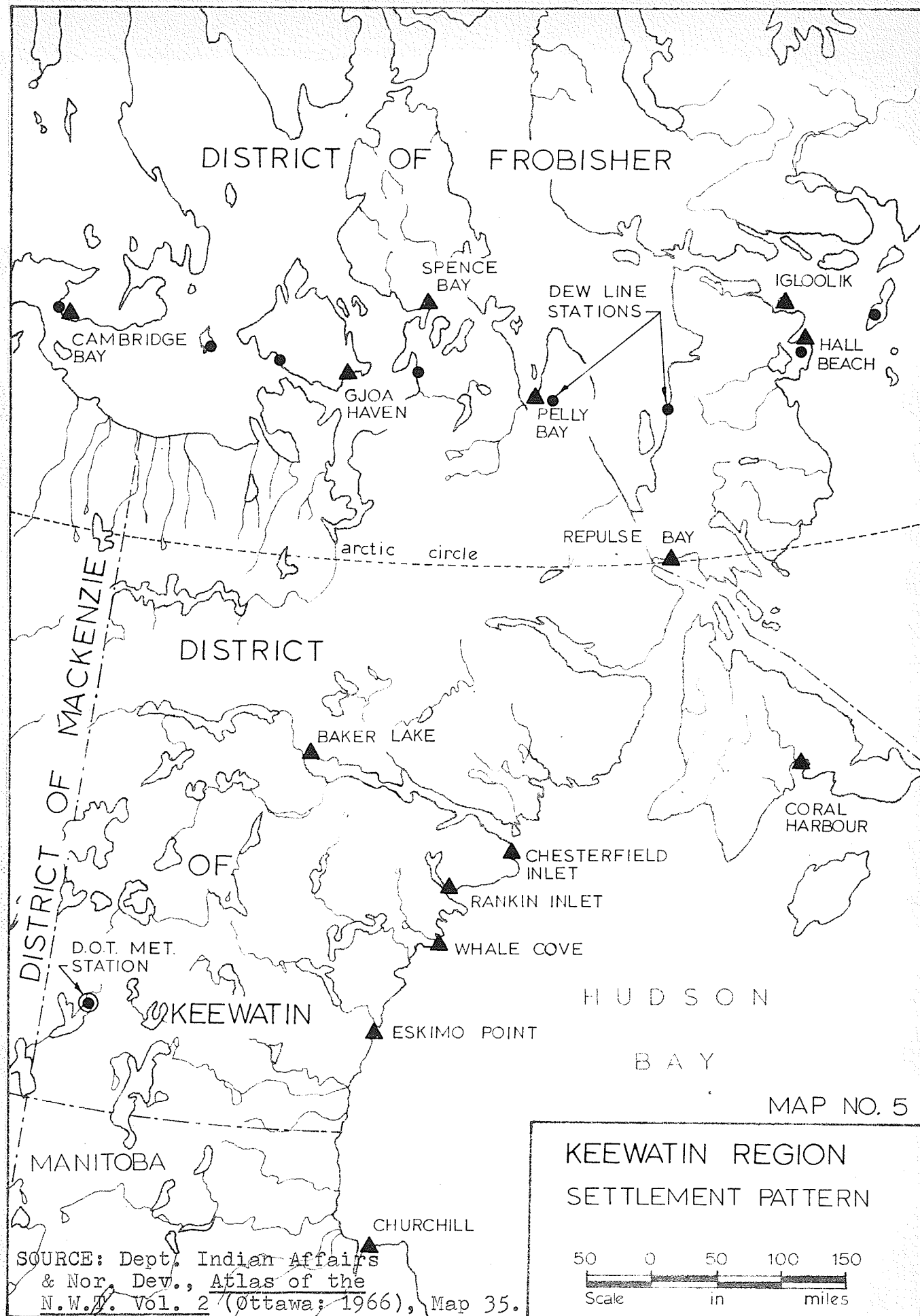
a number of areas, the smallest administrative unit. Area Administrators report to their appropriate Regional Administrators.

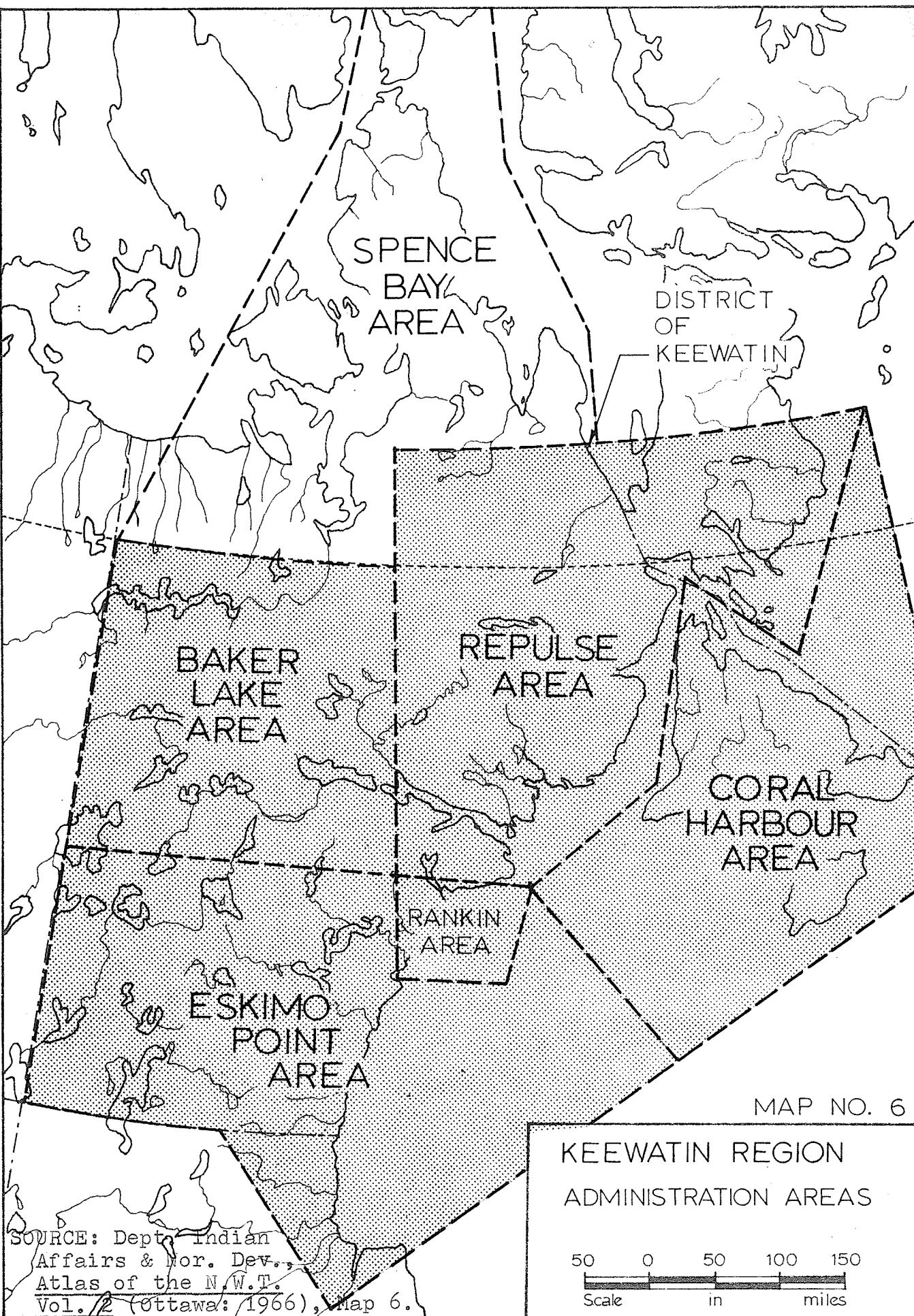
The Keewatin Region is one of three in the Arctic District and contains six areas. Its regional headquarters is located outside of the Northwest Territories at Churchill, Manitoba. Map 5 shows the distribution of the communities in Keewatin, while Map 6 indicates five of the areas in the Keewatin Region.¹⁹ The Spence Bay Area of the Mackenzie District takes in a portion of the Keewatin District, including the community of Pelly Bay. Repulse Bay, which is geographically located in the Franklin District, is included within the Keewatin Region for administrative purposes.

The Area Administrator is the senior resident representative of the federal government. He is often called upon to perform functions for other federal departments and serves an important role in local government.²⁰

¹⁹The sixth area is the Resolute Area located about 1,100 miles directly north of Churchill, Manitoba and containing the community of Resolute Bay.

²⁰A. W. R. Carrothers, Report of the Advisory Commission on the Development of Government in the Northwest Territories (Ottawa: Dept. of Indian Affairs and Northern Development, 1966), pp. 28-30.





III. TRANSPORTATION AND COMMUNICATIONS

Transportation

Air. Air travel is the most common method of transportation of passengers and certain classes of goods into the Arctic from southern centers as well as for movement between Arctic communities.²¹ Because of the great distance involved and the lack of any alternative year round transport, air movements are particularly significant with regard to low weight, high-value goods, goods which are urgently required and goods which must be moved into areas not accessible by other means.²² Costs of movement by aircraft are high in the Arctic when compared to southern costs.²³ Schedules are often controlled by climatic conditions, particularly when improved landing strips and navigational aids are not available.

²¹J. R. K. Main, "Transportation as a Factor in Northern Development," Resources for Tomorrow Conference Background Papers (Ottawa: Queen's Printer, 1961), P. 586.

²²Department of Northern Affairs and National Resources, The Northwest Territories Today (Ottawa: Queen's Printer, 1965), p. 45.

²³The one way passenger fare from Churchill to Rankin Inlet, a distance of 280 miles is \$56.00, a rate of about twenty cents per mile. A comparable southern rate is seven cents per mile for the movement from Winnipeg to Regina; a distance of 330 miles at a fare of \$23.00. Air Canada Winnipeg, Passenger Service Agent, personal communication.

Present schedules link the Arctic communities together in only the north-south direction. The only scheduled service for Keewatin is operated out of Churchill, Manitoba.²⁴ Churchill is also the main base for charter aircraft working in Keewatin.

The limitations placed upon air travel by climatic conditions is most severely felt in those communities where improved landing facilities are not available. During break-up and freeze-up they are essentially isolated from outside assistance for periods of up to a month at a time. This period is generally both cold and damp and thus one with a high incidence of illness. In effect, the period of greatest need for medical assistance usually coincides with the period of limited movement.

Helicopters would be useful in the Arctic environment, if their range and capacity could be increased to a more suitable level. At the present time they are seldom utilized for movements between settlements, although prospecting parties and scientific exploration groups use them

²⁴ The Territorial Government is presently considering the establishment of a scheduled service operating from Yellowknife, Northwest Territories across to the eastern Arctic. This is desirable to improve communications between the communities and the territorial capital in Yellowknife. S. Hodgson, Council of the Northwest Territories Debates (Yellowknife: Febr. 7, 1968), p. 6.

extensively. The hovercraft has recently undergone tests in the north but as yet it has not proved economically useful for transportation purposes.²⁵

Sea. Sea transportation has continued in importance since the days of the earliest explorers. At the present time the major portion of heavy or bulk goods are transported to the Arctic in ships. Loaded ships, from Montreal or other southern ports, move into Hudson Bay immediately after the clearing of ice, usually in early August, and make initial delivery to settlements. During the rest of the season, which lasts for about three months, freight is picked up from the port of Churchill, Manitoba and distributed to the settlements of Keewatin.

One way haulage, the delivery of mixed loads to numerous points and the need for expensive packaging and expensive handling methods have combined to keep costs of sea transportation high.²⁶ The lack of harbour facilities

²⁵For purposes of northern development the hovercraft offers possibilities for movement of goods over land, water, ice and snow. A comprehensive analysis of the potential of the hovercraft is contained in P. F. Cooper, Jr., Air Cushion Vehicles in the Canadian North (Ottawa: Northern Coordination and Research Center, 1965).

²⁶Main, op. cit., pp. 580-584.

at the communities requires that landing barges be used to move the goods from the boat which must often anchor up to a mile from shore due to inadequate depth of water closer to shore. The transfer of freight from boat to barge is difficult during periods of rough water and losses can be extensive. In addition, the delivery of a year's supply of food and other material at one time requires extensive storage space which is expensive to provide. Spoilage can be a considerable cost factor if efficient quality control is not maintained over storage facilities.

Land. There are no improved land transportation facilities connecting the settlements of Keewatin with the south or with each other. Within the settlements themselves there are only a few improved roads or trails which are suitable for use by trucks and other heavy equipment.

Skidoos, snowmobiles and similar tracked, over-snow vehicles are rapidly becoming the major means of movement both within the settlements and in the hinterlands. The use of these vehicles has virtually replaced the dog team and sled in some areas.²⁷

²⁷ Personal observation.

The skidoo is particularly useful in the hunting and trapping activities of those people living off the land. It is useful as a means of extending the area which can be covered from a central point as well as in making more frequent inspection of traps. It also makes less stringent demands upon the owner than does the dog team. Fuel is used only when operating the machine while dog food must be obtained every day. Should the owner become sick or otherwise unable to obtain this food, the dogs may die and he will be limited in his ability to move about and maintain his livelihood. However the skidoo is presently not constructed well enough to withstand the harsh operating conditions encountered in the Arctic environment.²⁸ The photographs in Figure 1 indicate the facilities which provide the major means of travel in the Arctic, varying from the modern aircraft to the traditional dog team.

Communications

A communications network is a vital supplement to transportation facilities, in particular in an area where

²⁸ An assessment of the difficulties associated with the use of the skidoo under similar conditions in the western Arctic is contained in P. S. Usher, Banks Island Area Economic Survey (Ottawa: Department of Northern Affairs and National Resources, 1965), pp. 89-94.



Chesterfield Inlet
An "Otter" and a G-5 tractor
on the ice "strip."



Repulse Bay
Dog team heading for the ice
edge and a seal hunt.

FIGURE 1

ARCTIC TRANSPORTATION

distances between destinations are great and climatic conditions are highly variable. Communications are important, not only for business use and during emergencies but also for social purposes.²⁹

At the present time the needs are being met by a number of agencies, both governmental and private, which operate two-way radio facilities. A recent study has concluded that high frequency radio networks appear to be the most economical and effective means of connecting the sparsely settled parts of the north with the national telephone network. However such service is not of the best quality and suffers from a lack of privacy.³⁰ Communication systems providing a higher quality of service must await concentrations of population or development of new equipment which will make installation economically feasible.

²⁹ Michael Marsden, "Resources and Communication in the Arctic," The Arctic Frontier, R. St. J. Macdonald, editor (Toronto: University of Toronto Press, 1966), P. 47.

³⁰ Trans-Canada Telephone System, A Study of Communications in Northern Canada (Montreal: 1962), pp. 9-15.

CHAPTER V

SETTLEMENTS IN KEEWATIN

The vast expanse, the severe climate, poor communications and a small population have imposed a spotty, "focal" settlement pattern on Keewatin, resulting in isolated centers without any multi-faceted economic development of the region as a whole. The communities of Keewatin are small, as are most settlements in the Arctic. Their population size ranges from 150 to about 600 people and normally consists of a majority of Eskimos, a trader, one or more missionaries and a number of administrative, professional and technical government personnel.

This Chapter will consider the general characteristics of the population of the Keewatin District as well as some of the government programs which have been initiated to give the people greater opportunity to enjoy more of the benefits of national life.

I. POPULATION AND ADMINISTRATION

Population

The 1966 population of the District of Keewatin was 2,886 persons. This represents an increase of nearly four

and one half per cent per year over the 1961 population of 2,345 people. This was a rate of growth over twice the national average of about two per cent for the same period.¹ The population of Keewatin constitutes about ten per cent of the total population in the Northwest Territories and slightly over 0.1 per cent of the Canadian population. About 89 per cent of the people are native Eskimo and the remainder are non-Eskimos who are resident in the Arctic while carrying out specific duties for the Federal Government or other southern based organizations.²

The population is remarkably young with slightly over one-half the people under fifteen years of age.³ Comparable figures for all Canada indicate about thirty-five per cent under fifteen years of age.⁴ As these people grow and form families of their own, there will be greater need for

¹ Dominion Bureau of Statistics, Population of Canada (Ottawa: Queen's Printer, 1967, Vol. I), p. 849.

² Regional Administrator, Department of Indian Affairs & Northern Development, Churchill, Manitoba. Personal communication.

³ D. M. Brack and D. McIntosh, Keewatin Mainland Area Economic Survey and Regional Appraisal (Ottawa: Department of Northern Affairs and National Resources, 1963), p. 136. These figures are for 1962.

⁴ Department of Northern Affairs and National Resources The Northwest Territories Today, (Ottawa: Queen's Printer, 1965), pp. 15-22.

additional homes and economic opportunities to allow them to enjoy a standard of living which is on a level with that enjoyed by other Canadians. Whether such facilities and opportunities can be provided in the Arctic, will only be determined in the future.

The density of population within the District is approximately one person per eighty square miles, about one-half the density of population in the Northwest Territories as a whole. However in reality the actual concentration of population in Keewatin appears larger, for the people reside within eight small settlements distributed along the coast as indicated in Map 5, page 71. Table II indicates the relative size of the settlements, in addition to the major organizations and facilities which are located within them. It can be seen that Rankin Inlet is the largest and has the greatest number of facilities, a result of its initial dependence upon the nickel mine. Repulse Bay, while not the smallest in terms of total population, has the least number of facilities at this time.

Health. The general health of the residents in the whole Northwest Territories is poor compared to average conditions for the rest of Canada. The average age of death

TABLE II

COMMUNITIES OF KEEWATIN

COMMUNITY NAME	POPULATION*		SCHOOL	MEDICAL FACILITIES	AREA ADMINISTRATION	R.C.M.P. DETACHMENT	LAND	
	Eskimo	Non-Eskimo					AIR STRIP	STORE
Eskimo Point	464	40	4 rms.	nursing station	Resident Area Admin.	2 R.C.M.P. 1 Eskimo	gravel strip	Hudson's Bay Co.
Whale Cove	160	21	2 rms.	--	--	--	--	Co-op Store
Rankin Inlet	439	77	4 rms.	nursing station	Resident Area Admin.	2 R.C.M.P. 1 Eskimo	gravel	Hudson's Bay Co.
Baker Lake	578	77	6 rms.	nursing station	Resident Area Admin.	2 R.C.M.P. 1 Eskimo	gravel	Hudson's Bay Co.
Chesterfield Inlet	198	42	5 rms.	30 bed hospital	Resident Area Admin.	--	--	Hudson's Bay Co.
Coral Harbour	298	38	3 rms.	nursing station	Resident Area Admin.	--	gravel	Hudson's Bay Co.
Repulse Bay	161	4	--	--	--	--	--	Hudson's Bay Co.
Pelly Bay	148	3	1 rm.	--	--	--	gravel	Co-op Store

*Population figures are for March 1968, except for Pelly Bay which are for August 1967.

Source: Commissioner of the Northwest Territories, Annual Report 1966-67 and personal observations.

for the Eskimo is nineteen years compared to sixty two years for all Canada.⁵ Recent figures indicate an Eskimo death rate of 63.8 persons per 1,000 persons after the first year of life. A similar rate for all Canada is 23.6 deaths per 1,000 persons. The Eskimo infant mortality rate of 108 per 1,000 live births is still four times the national average despite improved health facilities and treatment over prior years.⁶ Major causes of hospitalization and death in the Arctic areas are respiratory disease, such as pneumonia and tuberculosis, gastro-intestinal disease and meningitis all of which have been linked to poor housing, unsanitary living conditions and lack of adequate diet.⁷ Keewatin has contributed greatly to these poor health statistics and there is no indication of immediate improvement in the situation.⁸

⁵Lloyd Barber in Council of Northwest Territories Debates, 36th Session (Yellowknife: N.W.T., Feb. 26, 1968), p. 935.

⁶Dominion Bureau of Statistics figures as quoted by R. Williamson in Council of the Northwest Territories Debates (Yellowknife: N.W.T., Feb. 8, 1968), p. 40.

⁷Refer to Appendix B, page 244, for extracts from reports which have referred to the relationship between poor health and poor living conditions.

⁸Jed Stuart, "T. B. Epidemic Looming in N.W.T.," Winnipeg Free Press, March 30, 1968. This news item quotes a public health nurse, who recently worked in Eskimo Point,

Education. Education facilities are provided in all Keewatin communities, except Repulse Bay where the students are airlifted to the boarding school at Chesterfield Inlet. A total of twenty-five classrooms accommodated 597 pupils during the 1966-67 school term. Thirty-six of the students were non-Eskimo.⁹

Thirty-nine per cent of the students are in grade one with five per cent in grade six, the highest grade formally taught in the communities. Higher grades may be taken by correspondence or by attending the Federal school in Churchill, Manitoba.

Adult education is presently being carried out on an experimental basis in Keewatin. The main purpose is to provide

"the educational training and guidance which adults require to face the complex social, economic and cultural problems encountered in their rapidly changing environment Many adults have had little or no schooling and as their children advance in school, the gap between parents and children increases."¹⁰

as saying that there is danger of an outbreak of tuberculosis in this community because "the cold dim slovenly, one-room shacks, with no running water or electricity breed diseases such as tuberculosis and bacterial meningitis, a still unexplained killer that has been lurking in the north."

⁹Information concerning education facilities is obtained from Commissioner of the Northwest Territories, Annual Report 1966-67, p. 77.

¹⁰Ibid.

Local Administration

Five levels of local government recognized by the Territorial and Federal Governments include: unorganized settlement, development area, local improvement district, village, and town.

The unorganized settlement is one which the Commissioner of the Northwest Territories feels has no apparent need for controls to promote orderly development other than those supplied by the Area Administrator or the Royal Canadian Mounted Police. An advisory committee of local citizens may be formed to give advice to the senior resident government official but he is under no obligation to accept this advice. The community has no financial responsibilities and no local taxes are imposed. All of the communities in Keewatin fall in this category of administration.

The next stage, the Development Area, is created in any settlement in which the Commissioner of the Northwest Territories deems it necessary to implement rudimentary controls to ensure orderly development, consistent with proper land uses, with a view to future development. This control is exercised by the Commissioner through an appointed "Site Control" or "Development" Officer who administers regulations

formed by the Commissioner under an Area Development Ordinance. An advisory committee may be formed, however it has no official status and the method of its formation is neither outlined nor controlled by Territorial regulations. No direct financial responsibilities are placed upon residents of these communities.

The next three stages provide for local contributions toward the cost of local services and for increased local representation in more authoritative positions. The responsibilities for local affairs within the Town and Village structures are similar to those held by their southern counterparts. A basic requirement for these three latter forms of local administration is ownership of property by the residents of the community.¹¹

II. HOUSING AND COMMUNITY DEVELOPMENT

Eskimo Rental Housing Program

In 1965 the Department of Indian Affairs and Northern Development initiated a housing program designed to provide better living accommodations for all Eskimos in the Northwest

¹¹ Further information concerning local government is contained in: A. W. R. Carrothers, Report of the Advisory Commission on the Development of Government in the Northwest Territories (Ottawa: Department of Indian Affairs and Northern Development, 1966), pp. 50-55.

Territories. One of its objectives was to provide houses, related to family size, at a rental rate determined by the families income. It is expected that approximately 1,500 three bedroom prefabricated bungalow type houses will be constructed in the Arctic during a four to five year period.¹²

The current program follows a period of trial and error, beginning in 1959, during which about 1,200 dwelling units were built throughout the Arctic. Initial buildings were made of wooden framing covered with plywood panels and contained one room. They were of a rigid frame design, twelve feet by sixteen feet in size, with side walls sloping in at the top. The material was sold to the Eskimo resident for about \$550.00 and he erected the structure himself under the supervision of government officials.¹³ Houses of other designs were later made available. The "370 model" consisted of a one room prefabricated structure twelve feet by twenty-four feet in size. A two room prefabricated building, called the Angirraq, was introduced in 1963. It offered greater

¹²Department of Indian Affairs and Northern Development, Annual Report 1965-66 (Ottawa: Queen's Printer, 1966), pp. 29-33.

¹³Dominion Bureau of Statistics, Canada Year Book 1967 (Ottawa: Queen's Printer), pp. 208-209.

strength, better insulation and the opportunity for more privacy than did the others.¹⁴

The 1965 program makes available two basic prefabricated house models at a rental rate based on the income of the Eskimo resident.¹⁵ The houses contain three bedrooms, a combined living room-kitchen, a bathroom and a cold porch. The basic outside dimensions for the Ukuvik Model is 28 feet by 24 feet while the Urquag Model is 20 feet by 32 feet.

The rental rate is approximately one fifth of the residents annual income, with a maximum of \$67.00 per month for the three bedroom house. Rental payments include enough fuel oil for heating the home, basic furniture, electricity, water supply, garbage and sewage removal and all large repairs.

¹⁴A more detailed description of the Angirraq is contained in R. E. Platts, "The Angirraq - Low Cost Prefabrication in Arctic Houses," Arctic (Vol. 19, No. 2, June 1966), pp. 192-195.

¹⁵A prefabricated building is one which is built from components which have been assembled away from the construction site. For a comprehensive review of the reasons why this method of construction has become predominant in the Arctic refer to: Council of the Northwest Territories, Sessional Paper No. 7, Prefabricated Housing, 34th Session 1967, Ottawa, pp. 227-230. One of the principle advantages is that "the Department (of Indian Affairs & Northern Development) has found that it is possible to buy the complete manufactured panel for the same price as it could buy the bits and pieces (of material)."

In the two year period since the start of the program approximately 500 new units have been built in the eastern Arctic.¹⁶

Adult Education and Cooperatives

Adult education. The Eskimo Rental Housing Program is not concerned only with the provision of physical facilities. It is also concerned with adult education. A two phase course is being carried out to familiarize the adult residents of the new homes with the proper use of modern household items and to teach them a basic understanding of local administration procedures.

Before the construction of new houses, representatives from the Department of Indian Affairs and Northern Development visit the community to explain the rental plan to the residents and to provide the Eskimo families with an understanding of the major aspects of the program and its implications for their lives. At this time a Local Housing Authority is formed, consisting of a council elected by the residents, to administer the details of the program at the local level.

¹⁶ Further details of the housing programs are included in Council of the Northwest Territories, Northern Housing Program, 36th Session, Sessional Paper No. 4, (Yellowknife, N. W. T., 1968).

When the house is occupied a second group, composed mainly of home economists, spend four to six months in the community assisting the residents to adjust to their new surroundings. They explain such things as how to stock cupboards, operate on a budget, use store bought food and keep the home clean. The assistance provided by an Eskimo interpreter is designed to ensure effective communications and lead to the most efficient possible use of the facilities provided.¹⁷

Cooperatives. The formation of cooperatives has contributed to the economic and social development of the communities in Keewatin, as it has throughout the rest of the Arctic. Every community in Keewatin has developed, or is developing, a cooperative organization. Such diverse activities as the operation of fisheries, retail stores and bakeries, building construction and service contracts are being carried out under cooperative sponsorship. Dividends and wages provide a source of greater economic independence for many Arctic residents.¹⁸

¹⁷ Commissioner of the Northwest Territories, Annual Report 1966-67, pp. 66-67.

¹⁸ Alehsondis Sprudz, "Cooperatives in the Canadian North," North (Vol. XIV, No. 6, Nov.-Dec. 1967), pp. 26-29.

Not only are the cooperatives a means of facilitating the growth of economic power at the local level but they also provide experience in democratic processes. They have an important social benefit as was pointed out by A. W.

Carrothers:

The cooperatives help to establish equality in the native and at the same time may provide him with a comparatively easy means of transition from the traditional northern socio-economic unit of the land and the camp to the somewhat more heterogenous communities which will characterize northern living for some time.¹⁹

Cooperatives give the local residents responsibility for making decisions on their own and reduce, somewhat, their dependence upon government officials, traders, police and missionaries as they attempt to regain some measure of control over their own destiny.

¹⁹A. W. Carrothers, op. cit., p. 190.

CHAPTER VI

CHESTERFIELD INLET

Chesterfield Inlet, a community of about 200 persons, is located on the shore of Spurrell Harbour, a sheltered bay on the southeastern tip of Chesterfield Inlet. Its geographical location is approximately $63^{\circ} 20'$ north latitude and $90^{\circ} 43'$ west longitude. The location of Chesterfield Inlet in relation to the other communities of Keewatin is indicated on Map 5, page 71.

Chesterfield Inlet is one of the oldest settlements in the Keewatin District. It has been permanently inhabited since 1911. The existing conditions and way of life within the community are therefore the result of the full range of social, economic, physical and political forces which have influenced the development of the Canadian north.

It is the purpose of this Chapter to set out the existing conditions as found within the settlement during the summer of 1967.

I. THE EXISTING SETTLEMENT

Historical Background

Although the area in the vicinity of Chesterfield Inlet

was explored as early as 1761-62 by Captain W. Christopher, it was not until 1912 that the first permanent buildings were established at the present location of the settlement. In that year the Hudson's Bay Company established a fur trading post. During 1912 Father Turquetil established the first permanent Roman Catholic Mission in Keewatin at Chesterfield Inlet. The Federal Government built a Royal Canadian Mounted Police post in 1914 followed by a meteorological station in 1921.¹

In 1929 the Mission built a thirty bed hospital which served the whole Keewatin District. The Mission also constructed a hostel, to accommodate children from surrounding camps, and initiated a formal school program. A four classroom Federal Day school was constructed in 1955. Since that time children have been air-lifted from the settlements of Repulse Bay, Pelly Bay and Igloolik to attend school in Chesterfield Inlet. The program is still being continued with about eighty children being flown in from neighboring settlements.

¹Diamond Jenness, Eskimo Administration: II Canada (Montreal: Arctic Institute of North America, Technical paper, No. 14, 1964), pp. 18-28.

Other important buildings erected in the settlement, since 1960, include two bulk oil storage tanks of 240,000 gallons total capacity in 1961, a new church in 1965, a one classroom addition to the school in 1966 and fifteen prefabricated houses which were built at various times throughout the period for the use of Eskimo residents as well as school teachers and other government officials.

In the mid 1950's it was estimated that about 300 Eskimo people lived in the settlement. However in 1957 a total of nearly 200 Eskimos left Chesterfield Inlet to live and work in the nickel mining community of Rankin Inlet located about sixty miles to the south. The remaining small population made the operation of the Hudson's Bay Company post uneconomical and it was closed in 1961.² In 1962 the Rankin mine ceased operation and about eleven Eskimo families have returned to Chesterfield Inlet during the past five years. The increased population brought about the re-opening of the Hudson's Bay post in 1964 and an expansion to the school.

Land Use and Environmental Aspects

The existing land use is indicated on Map 7 in terms

²D. M. Brack and D. McIntosh, Keewatin Mainland Area Economic Survey and Regional Appraisal (Ottawa: Northern Affairs and National Resources, 1963), pp. 85-86.

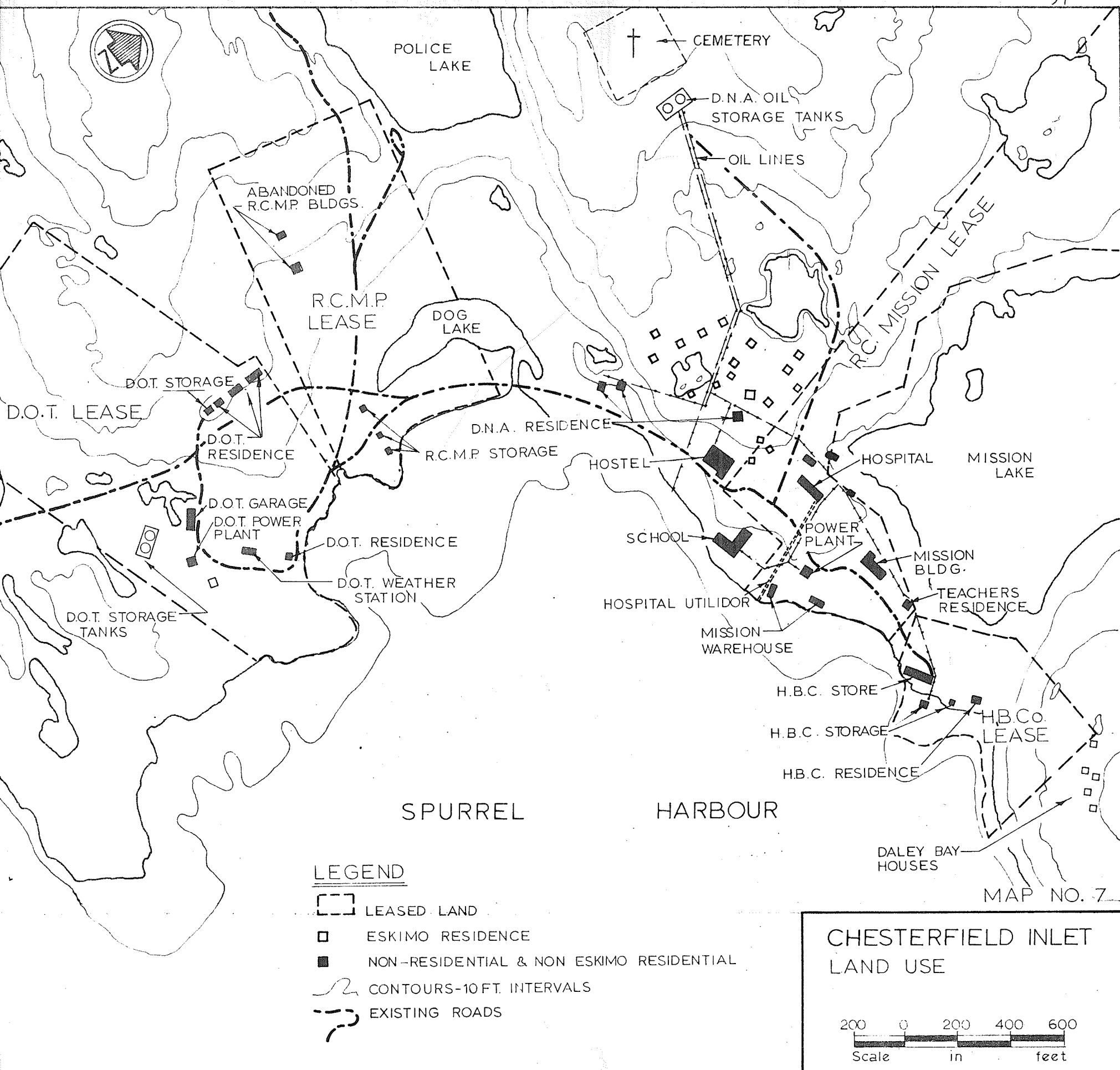
of individual holdings rather than as functional uses.³ The tendency for individual lease holders to develop their own areas as dependent holdings has fragmented the settlement and contributed to the present scattered layout.

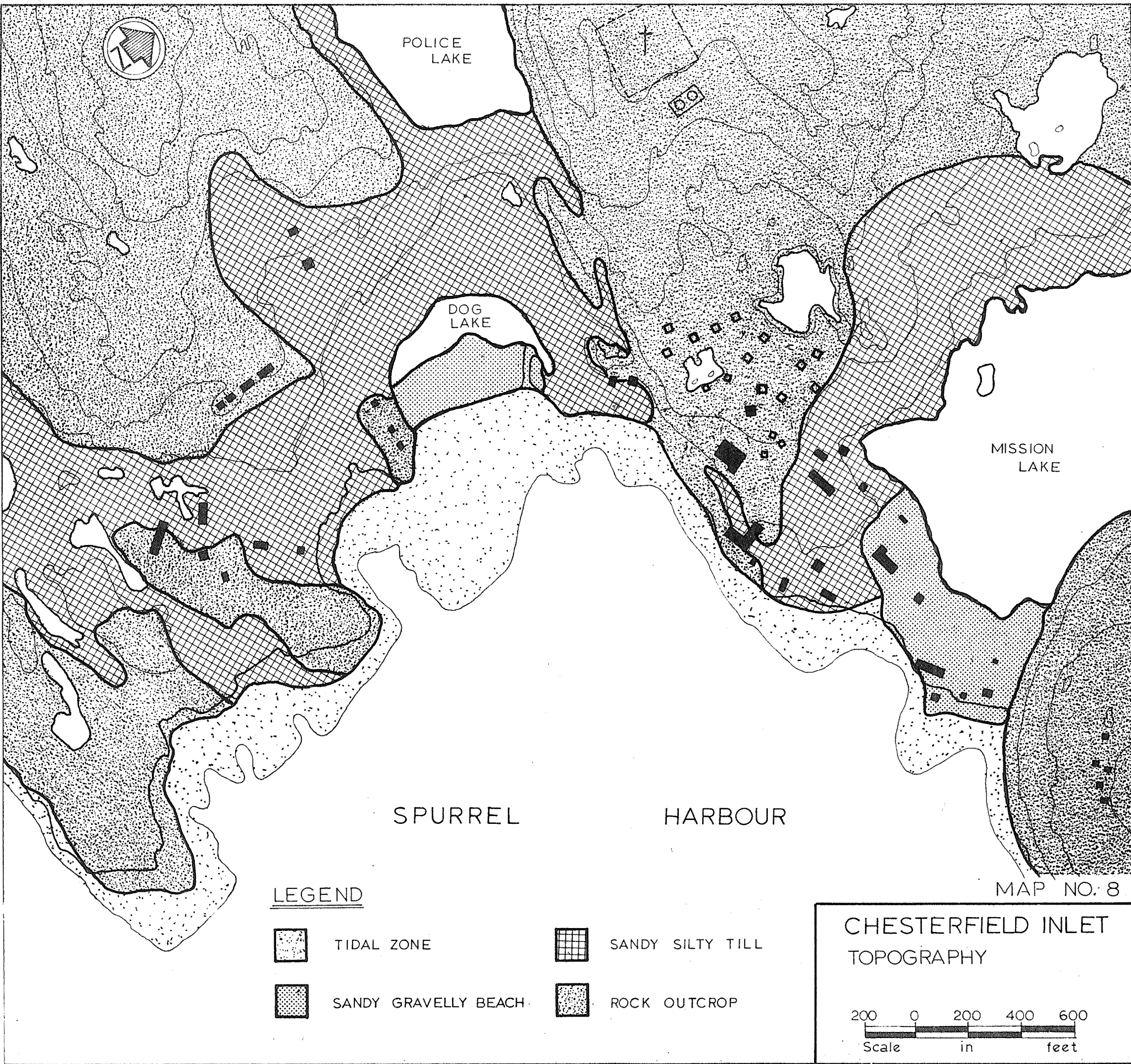
The existing pattern of settlement has also been influenced by landform. Map 8 indicates the topographical features of the area. Rock ridges combined with several inland water bodies have caused development to take place along a narrow coastal strip. The presence of rock outcrops, pond areas and permafrost conditions impose further restrictions within the settlement area.⁴

Initial development has taken place in areas of sandy till plain which exist along the coastal shore and which are relatively level and well drained. The Hudson's Bay Company post and the Roman Catholic mission occupy the best land which totals about fifteen acres. The Royal Canadian Mounted

³The maps and much of the statistical data contained in this Chapter appeared in other form in: Underwood McLellan & Associates, Planning Study Report for Chesterfield Inlet, N.W.T., 1967. (Mimeographed).

⁴R. Bone and V. Sim, Terrain and Site Analysis of Chesterfield Inlet, N.W.T., Unpublished report of the Geographical Branch, Department of Energy, Mines and Resources, Ottawa, 1962.





Police and the Department of Transport have taken possession of the major portion of the remaining good land. These organizations became established in the community in this same relative order and it is therefore logical for them to have chosen the best areas for their own use. However it is unfortunate that they have control over areas much larger than they can efficiently use in the foreseeable future. The Eskimo residents have therefore to live on rock areas which are difficult to build upon and to provide with access. This difficulty raises the cost of providing facilities with the result that a suitable level of servicing is not achieved.

Drainage conditions within the Eskimo residential area are poor and many small ponds retain water throughout the year. They tend to become polluted due to inadequate care in disposal of wastes. This pollution creates a potential source of diarrhoea and similar sickness because children tend to play in the water and, at times, drink it.

The settlement is spread over a length of nearly 4,000 feet of coast line with the result that access to the school, church and hospital, which are centrally located, is difficult for those living in outlying areas. Numerous snow drifts and the cold winter temperatures further hinder movement throughout the settlement. The five dwellings at the extreme

east end of the settlement, which are indicated as Daley Bay Houses on Map 7, page 97, are located in one of the most inaccessible areas. They were moved from Daley Bay, a previous camp site about fifty miles to the north of Chesterfield Inlet, in 1965. The steep and rugged rock outcrop in the area precludes vehicular access to the area and in the summer it is even difficult to walk to the homes.

A basic road network connects the boat landing dock at the Hudson's Bay Post with the other agency areas. Access is not provided to the Eskimo residences. The road to the oil tanks is built to the best standards, consisting of gravel fill placed over the till plain which is underlain by permafrost. The roads to the Royal Canadian Mounted Police lease and Department of Transport lease are essentially trails over the sandy beach areas with gravel fill in low and damp areas.

Climatic data recorded at the Department of Transport weather station has been indicated in Table I, page 44. Further comment concerning it will not be made here.

The sun rises and sets during each day of the year, although the winter hours of daylight are few. The maximum sun elevation on June 21st is 51° and on December 21st it is 4° . Freeze-up of the water in Spurrell Harbour begins in late

October and there is normally a solid ice cover by the second week of November.⁵ All of the small lakes and ponds freeze to the bottom. Mission Lake generally has free water beneath its ice cover, however information concerning the amount was not available. Information regarding the amount of free water in Police Lake during the winter was not available either. Break-up occurs during the first half of July with surface water on the ice making it unsuitable for aircraft landings by the middle of June.

Housing

The houses for non-Eskimo residents are built to comparable southern standards of size, design and interior fittings and are maintained in good condition. Eleven houses are supplied for use by personnel of agencies with responsibilities within the settlement. These houses include: four for the Department of Transport, one for the Hudson's Bay Company post manager, one for the Area Administrator, three for school teachers and two for the Royal Canadian Mounted Police. The Mission provides accommodation for its own people in the hospital and Mission building. Four houses of this

⁵W. T. R. Allen, Break-up and Freeze-up Dates in Canada (Toronto: Department of Transport, 1964), p.36.

total number are vacant. The Royal Canadian Mounted Police post is not occupied and only two Department of Transport houses are presently used.

A survey of existing Eskimo housing facilities was made from which each of the twenty-six houses were classified as to type and size as indicated in Table III, page 104. It was found that slightly less than one half of the houses have been built under the assistance of recent government housing programs.

Five houses are owned by the occupants, four are rented from the Department of Indian Affairs and Northern Development, five are rented from the Mission and twelve are provided by the Department as welfare houses. High maintenance costs and the large expense of heating, in particular, tend to discourage home ownership.⁶

Each dwelling was given a condition rating to determine its physical condition and to determine its probable future useful life span.⁷ A close correlation between age

⁶Fuel costs for a one room type "370" house amounts to approximately \$400.00 per year. This is about twenty per cent of the yearly cash income of the resident family.

⁷The housing condition ratings were based on the following criteria:

and building condition was observed as indicated in Table IV.

The majority of houses were judged to be unsatisfactory for use by the present families because of overcrowding. Seven of the homes provided less than thirty-five square feet of floor space per person, calculated on the basis of outside dimensions with no allowance for interior facilities such as stoves, tables and beds. Six houses provided between thirty-five and sixty square feet per person. The extreme ranges in available space were from a minimum of twenty-one square feet to a maximum of one hundred and forty-four square feet per person.⁸ In view of the fact that many of the homes consisted of only one or two rooms it is evident that overcrowding is severe and there is little opportunity for

Good -- Structurally sound building which is well insulated, provided with adequate heating facilities and in need of only minor repairs to maintain its useful life.

Fair -- Structurally sound building which is well insulated, provided with adequate heating facilities but in need of major repairs to maintain its useful life.

Poor -- Structurally unsound building which is poorly insulated and provided with inadequate heating facilities.

⁸ Fifty square feet of floor space per person is deemed a minimum requirement for health purposes. Department of National Health and Welfare, Eskimo Mortality and Housing (Ottawa: Information services Division, 1960), p. 67.

TABLE III

CHESTERFIELD INLET
ESKIMO HOUSING TYPES*

<u>House type</u>	<u>Size</u>	<u>Number</u>
Angirraq	16 x 14	1
Urquaq	20 x 32	1
Type "370"	12 x 24	6
Rigid frame	16 x 12	4
Original frame	variable	7
Miscellaneous	variable	7
	TOTAL	26

*The first four house type names refer to those introduced during past government housing programs. The other buildings were constructed under Mission supervision.

TABLE IV

CHESTERFIELD INLET
CONDITIONS OF ESKIMO HOUSING

<u>Age</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Total</u>
Under 5 yrs.	3	3	1	7
5 - 9 yrs.	0	6	0	6
10 - 19 yrs.	0	3	5	8
20 yrs. & over	0	1	4	5
	—	—	—	—
TOTAL	3	13	10	26

privacy.⁹ Such a situation influences the rapid spread of sickness and disease, especially colds, gastro-intestinal infections and respiratory disease. Table IX, appendix C lists in greater detail the number of occupants and the size of individual Eskimo dwellings.

Other serious deficiencies in housing facilities were observed. Storage areas and partitions for toilet facilities were found lacking. Few homes had adequate shelving and cupboard space. Floor coverings were difficult to clean and often consisted of only rough plywood. Warped door frames and poor window fittings allowed the entry of cold air and added to heating expenses. Natural lighting conditions within homes were generally unsatisfactory due to inadequate window areas particularly in the rigid frame structures.

The photographs of Figure 2 indicate some of the environmental conditions of the area as well as some of the community buildings. There is sharp contrast between the flat well drained area around the Mission-hospital complex which is blown relatively clear of snow and the area where

⁹ Nearly all of the families felt that they did not have sufficient room in their homes. However they also felt that they could not afford to heat a building of much greater size.



View of the hospital
from in front of the
Mission building.

Deep snow drifts form
in the Eskimo residential
area.



Snow blockage of entrances
and poor access hampers
garbage disposal for the
Daley Bay housing group.

FIGURE 2

CHESTERFIELD INLET JUNE 1967

the Daley Bay houses are located. Deep snow drifts block entrances and impede access resulting in garbage dumps close to the homes.

Utilities and Services

Water supply. The residents of Chesterfield Inlet obtain water for drinking and other purposes from nearby lakes, especially Mission and Police Lakes. During the summer, the Eskimo people haul their water by pail. The Mission utilizes a pump and plastic hose distribution system to carry water to the hospital, hostel, and mission building from Mission Lake and provides a tank haulage delivery service to Department of Indian Affairs and Northern Development facilities. The Hudson's Bay Company has its own pumping system. The Department of Transport operates its own delivery service with a 250 gallon tank mounted on a wagon or sled and towed by a snowmobile.

During the winter the Mission operates a delivery service to the hostel and hospital by means of a 2,000 gallon tank in a caboose and drawn by a TD-9 tractor. Water is pumped from below the ice of Mission Lake and is kept from freezing in the tank by means of a coal burning stove within the caboose.

Ice or snow is used as a winter water source in all other buildings. Blocks are cut from the lakes when about twelve inches of ice has formed. It is then hauled to the individual buildings and stored outside until required. The ice is placed in containers inside the building and melted by room heat. Snow is often obtained from the immediate vicinity of the dwellings and used to provide water for washing purposes.

Pressure water distribution systems are used in all of the dwellings provided for the Federal Government personnel. The Mission, Hospital, hostel and school also have interior storage tanks and pressure distribution systems. The Eskimo families must dip their water from pails or similar small containers usually placed near the cook stove.

The only water treatment provided is the addition of chlorine, in the form contained in Javex, to the hostel, hospital and school supplies. Other water supplies do not receive any purification treatment on a regular basis.

Sewage disposal. Waste water is disposed of in the immediate area of the dwelling units. The Eskimo people collect the wastes in pails and then throw it outside, usually near the doorway or in local ponds. Non-Eskimo

dwellings have plastic pipes which drain waste water underneath the building where it can disperse into the gravel pad upon which the building is constructed. This method of disposal leads to insanitary conditions within the settlement, particularly where several dwellings are close together as in the Eskimo residential area.

The hospital and hostel dispose of waste water through a two and one half inch diameter plastic hose leading directly to the sea shore. This appears to be a suitable method of disposal although freezing problems sometimes occur during the winter.

The most common method of collecting human wastes and other garbage is in polyethylene bags provided free of charge by the government. Toilet facilities generally consist of a pail lined with the plastic bag. As required, the top of the bag is securely fastened and carried outside for disposal. Although not an aesthetic means of handling sewage this method has become, by necessity, an acceptable one.

To be effective in maintaining sanitary surroundings, the use of the bags must be integrated with an efficient collection procedure. However in Chesterfield Inlet the pick-up of refuse appears to be carried out on a haphazard basis, particularly in the Eskimo residential area. In winter the collector's job is

handicapped by snow drift conditions, poor access and lack of proper equipment. The spring melting of snow reveals a sordid assembly of ripped plastic bags, decaying organic matter and other miscellaneous garbage.

During winter, garbage is usually hauled by sled and TD-9 tractor about three quarters of a mile from shore and dumped on the sea ice. This distance is adequate and no backwash of refuse due to winds or currents has occurred to date. A closer dumping location is undesirable for sanitary and aesthetic reasons. During the summer period, the garbage is deposited directly into the sea or placed in a land dump well away from the settlement.

The mission, hostel and hospital utilize a chemical toilet for human wastes. The contents are pumped out as required and hauled to a disposal point well away from the settlement.

Fuel. The settlement depends upon fuel oil for heating, cooking and the generation of electrical energy. The Department of Indian Affairs and Northern Development maintain two bulk oil storage tanks with a combined capacity of 240,000 gallons. The Department of Transport maintains a separate supply of 22,500 gallons. Distribution lines lead

to smaller storage tanks at each of the non-Eskimo homes and major buildings. The Eskimo people obtain their fuel from the outlet at the Hudson's Bay Company post and carry it, in 45 gallon drums, to their residence.

Electricity. Electricity is provided to all homes in the community, with the exception of the five residences of the Daley Bay group. The mission generators provide power for the major portion of the settlement. The Department of Transport and Royal Canadian Mounted Police have their own generating facilities.

Communications. Radio connection with the southern telephone system is provided through the facilities of the Department of Transport and the Bell Telephone system. The Hudson's Bay Company and the Roman Catholic mission also maintain radio contact with their respective organizations in neighboring communities.

Communication within the settlement is maintained by a telephone system which is operated and maintained by the Department of Transport. All of the non-Eskimo dwellings and offices and six of the Eskimo homes are connected to the system.

Transportation. Transportation to the community is provided by air services as well as by the annual sea lift. During winter, when sea ice conditions are suitable, a scheduled air service from Churchill is provided by DC-3 aircraft twice a month. In the summer, float planes utilize Mission Lake as a landing site. During break-up and freeze-up the settlement is isolated for periods of up to a month at a time. A land strip has been proposed for the area but its capital cost is high.¹⁰

Local transportation facilities are provided in a variety of ways. The Mission owns a three ton dump truck, two Caterpillar tractors (one with a front-end loader and one with a dozer blade), one tracked tractor, one rubber-tired tractor, and miscellaneous sleds and trailers. This equipment is used mainly for providing water and sewage services, maintaining roads and trails, clearing the ice airstrip, and carrying supplies brought in by air or sea. The Department of Transport has a snowmobile, a trailer and sled.

¹⁰ Department of Transport, Engineering Site Report for Development of Proposed Landing Strip at Chesterfield Inlet (Ottawa: 1966). This report estimates construction costs to be approximately three-quarters of a million dollars.

Sixteen Eskimo families own skidoos, one family owns a skidoo and a dog team, and three families have only a dog team. Eight families do not have any transportation facilities. Twelve canoes and outboard motors are owned by Eskimo families for use during periods of open water.

II. SOCIO-ECONOMIC FACTORS

Population

The population of Chesterfield Inlet, in the summer of 1967, consisted of 168 Eskimo and 30 non-Eskimo people.¹¹ Because of the small number of non-Eskimos and because of the tendency for most of them to be reposted at intervals of one or two years, the following analysis will only be concerned with the Eskimo residents.

The age - sex characteristics of the Chesterfield Inlet Eskimo population is shown in Figure 3, page 115. The high birth rate, which is slightly over four per cent, is reflected in the broad base of the pyramid. In addition, the narrow upper half of the figure indicates the early death of most of the Eskimo people.

Of particular importance is the large number of

¹¹Population data was obtained by an actual count of residents in the settlement in June 1967.

children under the age of fifteen years; 102 persons or nearly sixty per cent of the population. This group makes up a relatively large number of people who, in the immediate future, will be requiring an education and be expecting the economic and social opportunity to enable them to live under better conditions than their parents have experienced.

Family size averaged six persons and ranged from two families of two persons to one family of ten persons. The total number of Eskimo families is twenty-eight. The spread in family size indicates a need for a variety of dwelling sizes so that habitable space can be utilized without serious overcrowding.

Figure 4 indicates the past growth characteristics of the Chesterfield Inlet population and a projection for the next ten years. The history of the settlement has been marked by fluctuations in the number of people living in the area, a trend which has been influenced by economic opportunities in Rankin Inlet.¹² The population growth during the past five years has been about ten per cent per year, due largely to the migration of families into the settlement from Rankin Inlet.

¹² Refer to page 95. All population figures prior to 1967 have been obtained from Brack, D.M., and D. McIntosh, op. cit., p. 85.

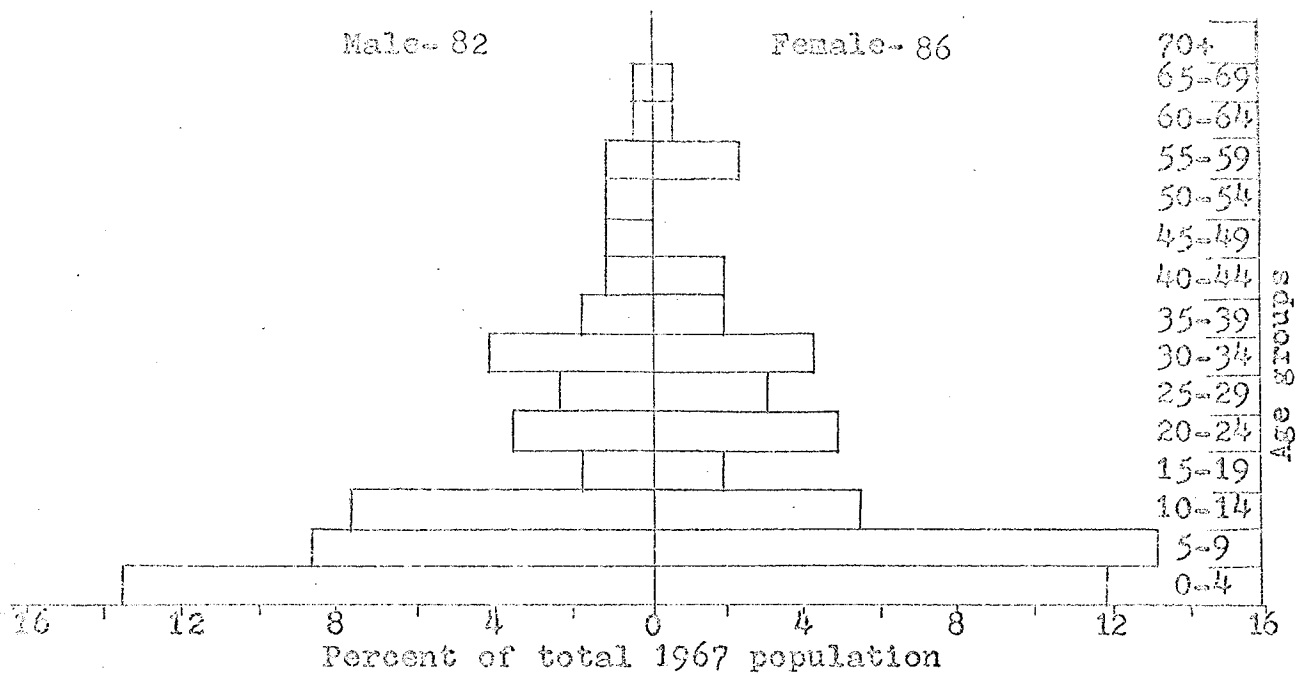


FIGURE 3

CHESTERFIELD INLET ESKIMO POPULATION

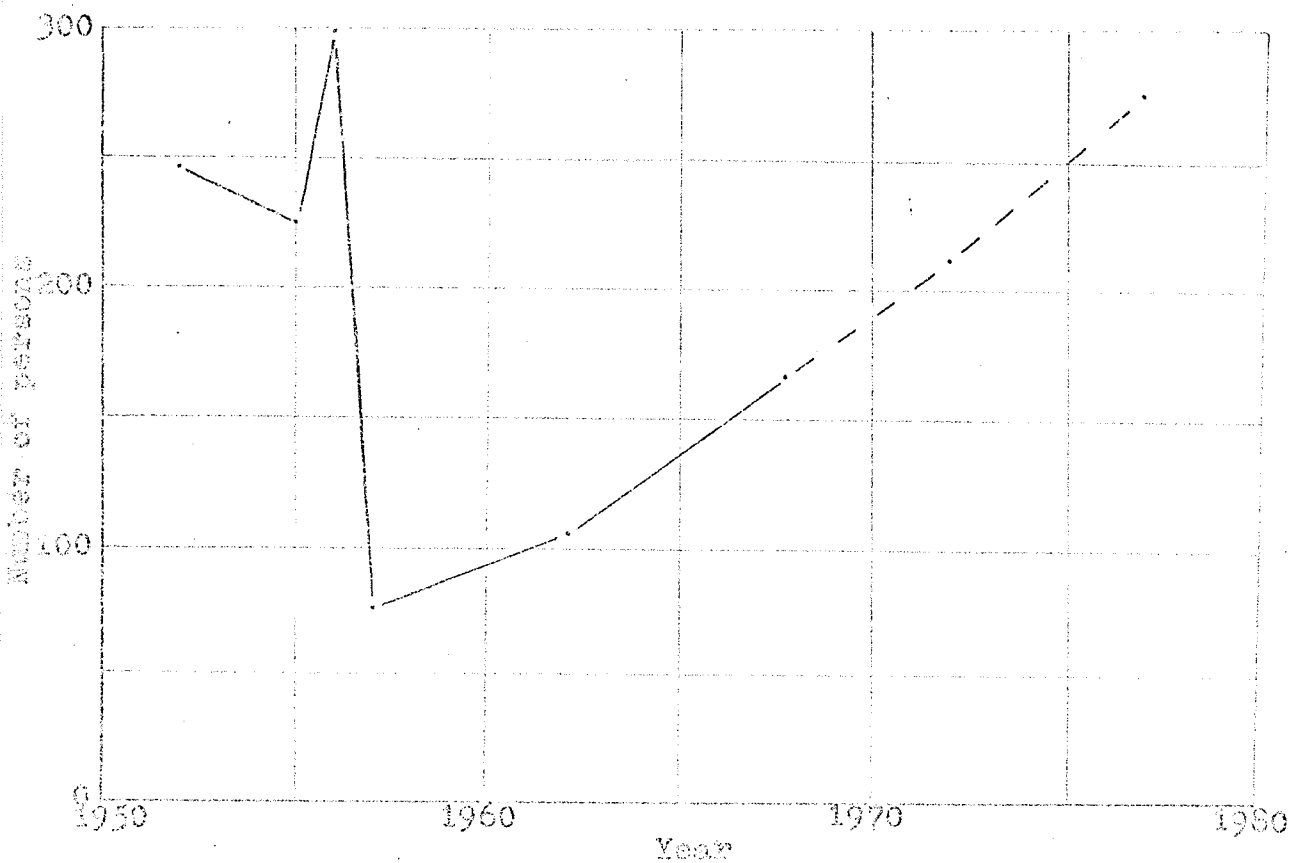


FIGURE 4

CHESTERFIELD INLET POPULATION
GROWTH AND PROJECTION

The increase which has been due to natural increase during the past year has been a more moderate four per cent. It is difficult to determine a reliable rate of future population change in view of the small total population and the effect which a movement of one or two families can have on the percentage change.

The projection, which is indicated on Figure 4, page 115 is essentially based upon an increase of four and one half per cent per year. This rate assumes that there will be no further movement of families into or out of the community and serves to give an indication of the growth of the population due to natural increase. Therefore, based on these assumptions, the Eskimo population will be about 210 and 250 persons in 1972 and 1977 respectively.

The total settlement population will include the addition of the number of non-Eskimo residents. Their number will depend upon government policies with regard to having people from the south continue to perform administrative duties, operate equipment and teach in the Arctic settlements. Assuming that the Eskimo will not undertake this work within the next ten years, there will be approximately an additional forty-five non-Eskimo people in the community to perform these duties. Therefore the total number of people living

in Chesterfield Inlet in 1972 can be expected to be 250, with 290 persons in 1977.

Economic Base

Natural Resources. Table V indicates the major means by which the Eskimo family head supports those people dependent upon him. Out of the total of twenty-five families only eight were considered to be living wholly "off the land" while three other families supplement their hunting and trapping with casual labour when it is available. White fox is the major source of income for the hunters with seals also being of major importance.¹³

The Daley Bay families, who have moved to the community most recently, are all hunters and continue to make use of dog teams as a means of travelling to their trap lines. Whales are common in the area, however due to lack of suitable boats they are seldom killed. Fishing provides a valuable source of food for the people and their dogs and fall fishing trips are usually made to good fishing grounds in the area of Daley Bay.

While some families depend exclusively upon hunting

¹³ Reliable figures concerning the relative amount of income from these sources were not readily available.

TABLE V

CHESTERFIELD INLET
MEANS OF LIVELIHOOD FOR ESKIMO FAMILIES

<u>Employment or Activity</u>	<u>Number of Family Heads</u>
Hunter, trapper and fisherman	8
Hunter, trapper and casual labourer	3
Craft work	3
Mission labourer	3
Hospital labourer	1
Hostel labourer	1
Hudson's Bay Company clerk	1
Northern Administration Branch labourer	3
Federal Day School labourer	1
Department of Transport labourer	1
Welfare or casual labourer	3
	<hr/>
	28

as a source of livelihood, nearly all men take part in it as a form of recreation and as a means of providing supplementary food supplies. Although caribou are not plentiful in the area, the meat is a valuable contribution to the diet of the successful hunter. In addition, the skin is used to make craft articles which bring a cash income. Ducks and geese are shot during the summer and ptarmigan are obtained throughout the year. The hunting of seals on the adjacent sea ice or in open water is a popular activity which provides food for dog teams and hides for sale or for manufacture into articles of clothing.

A recent study has indicated that the theoretical population which the renewable resources in the Chesterfield area could sustain is about 230 people.¹⁴ This is the maximum number of persons who could live there if the resources were efficiently utilized. In view of the present lack of equipment to carry out the efficient catch of sea mammals and fish, it would appear that the estimate of the number of persons who can live at a satisfactory level from these resources is high.

¹⁴Brack and D. McIntosh, op. cit., pp. 114-115.

Craftwork and cash income. Thirteen families make their living from craft work or permanent employment, mainly as labourers for organizations operating within the community. Craft work consists of carving and clothing manufacture from furs or duffel.¹⁵ In addition to the permanent positions in craftwork, there are other supplementary employment opportunities. Five to fourteen people, usually women, are employed on a part-time basis to help fill large orders for goods.

Eleven men are engaged in wage work on a full time basis. Their activities range from that of general repair man to truck driver. Additional part-time work is usually available during the summer, particularly work on construction of houses and other buildings and the unloading of goods from the ships of the annual sea lift. During the two months of summer, there are usually ample employment opportunities for all able bodied Eskimo persons.

Only one family was entirely dependent upon welfare assistance. However this does not mean that other forms of

¹⁵ Items produced locally include slippers, hats, parkas, makluks, gloves, and carvings made from ivory, soap-stone and caribou antlers. Duffel for parkas and tanned furs must be brought in from southern centers.

economic assistance, in addition to national programs such as children's allowance and old age pension, are not needed for families of Chesterfield Inlet. The number of dependents, the amount of success in supplementing income by hunting or carving and the degree of proficiency in wisely using available income are all factors which influence the amount of additional assistance, if any, a particular family may need.

The Hudson's Bay Company post is the only retail store in the community at which supplies of food and other necessary items can be purchased. The Eskimo families buy their supplies as needed. This is a contrast to the non-Eskimo people who usually receive most of their goods during the sea lift and store them, on their own premises, to be used as required throughout the year.

Social Factors

Social Activities. Outside influence upon the Eskimo population of Chesterfield Inlet has been primarily through the institutions of church and school. Social interaction between non-Eskimo people and the Eskimos has been restricted, in large part, due to the existing language barrier, especially among the older Eskimo people. Lease boundaries and the

tendency for each organization to allow only those persons employed by them to live on their land has further restricted the degree of integration and communication between the two groups of people.

Visiting between the Chesterfield Inlet Eskimo people and those at Rankin Inlet is common. Travel is usually by boat or skidoo. During winter, the eighty mile trip along the sea ice can be made during one day with a skidoo. An alternative means of travel is by hitch-hiking a ride on an aircraft which may be travelling in the desired direction.

The Eskimo population is not highly organized. The majority of community activities are directed and initiated by other than Eskimo people, largely through the efforts of the mission Fathers, school teachers and the local administrator. The recently established Local Housing Authority is an organization designed to encourage the the Eskimo population to take a greater part in initiating and carrying out functions of community concern. Through this organization, the native people are given an opportunity to influence the manner and style in which their community is to be built. This is in contrast to prior practice in which the outsider has directed and supplied nearly everything.

The Joseph Bernier school and the Mission common room

are used for group gatherings. Movies are shown twice a week and other activities such as dances and bingo are held twice monthly during the winter and less often during the summer. All activities are well attended by both Eskimo and non-Eskimo members of the community.

The Hudson's Bay Company store, despite its off-center location, was observed to provide the residents with a meeting place as well as a center in which to purchase goods. Most Eskimo family heads reported that they or their wives visited the store at least once a day.

The lives of many of the people of Chesterfield Inlet are not as closely tied to the land and the water as in prior years due to the dependence on steady employment by many of the families. However some of the families still depend upon hunting to a large extent and in a land which yields relatively little within a small unit of area, the hunter must travel great distances and roam large areas to find sufficient game. The hunters' movements are governed by a number of factors including the habitat of the animal concerned, the nature of the terrain, the seasons, the mobility of the hunter and his inclinations and traditions.

Those families which are dependent upon the wildlife of the area for their major food supply lead a life which is

largely governed by seasonal considerations. Movements of whole families come about during the spring and fall when hunting seal at the edge of the floe ice and fishing at the mouths of small rivers and inland lakes occurs. During other periods, only the men move out of the community to tend traplines in winter or to hunt seal on the open sea in summer. For the wage labourer, hunting takes on a role of secondary importance and can be indulged in only during the evening and on weekends.

Religion. About seventy-five per cent of the Eskimo population are of the Roman Catholic faith with the rest being Anglicans. The Oblate Fathers have considerable influence on the people through the varied church sponsored activities. By virtue of close contact through many years of local missionary work, they are accepted as leading members of the community in contrast to the "transient" government employees. The church influence extends to the hostel and the hospital, each of which it operates under government sponsorship. During the past year, three of the teachers in the Federal Day school were Sisters of the Grey Nuns order.

Education. The Federal Day school provides the formal education facilities for the area. It is equipped with five

classrooms and a sixth is under construction. One hundred and thirty-five students attended classes in 1966-67.

Instruction was given in grades one to six. Those students wishing to continue their education past this level must attend the high school at Churchill, Manitoba. Turquetill Hall, a residence for school children airlifted from other communities, can accommodate up to 100 students.

Health Facilities. A thirty bed hospital operated by the Mission Sisters is presently used for the treatment of mentally ill patients and also serves as a home for the aged and destitute. The hospital also serves as a residence for the Sisters.

A doctor is not resident in the community, however first aid and treatment of minor illness can be carried out. Those patients requiring operations or more intensive care are flown to the hospital in Churchill.

Semi-annual health check-ups are carried out by the Department of National Health and Welfare as part of the Northern Health Services Program. General health check-ups, chest X-rays, immunizations and dental care form the major portion of this groups activities. Hygienic practice is encouraged through school instruction while literature and

pamphlets concerning personal health are distributed to the adults.

Administration. For purposes of administration, the community is under the direction of the Repulse Area Administrator who is resident in Chesterfield Inlet. As a representative of the Federal Department of Indian Affairs and Northern Development, he is involved in the supervision of existing government facilities and the implementation of departmental policy.

The Royal Canadian Mounted Police post is presently closed. The community and surrounding area is administered by the detachment in Rankin Inlet.

CHAPTER VII

REPULSE BAY

The settlement of Repulse Bay is situated on the northern shore of Repulse Bay near the northwesterly end of Hudson Bay. Its geographical location is approximately $66^{\circ} 32'$ north latitude and $86^{\circ} 15'$ west longitude which places it nearly on the Arctic Circle. Although physically located outside of the political boundary of the District of Keewatin, Repulse Bay is included within the Keewatin Region for administration purposes by the Federal Government. The position of Repulse Bay is shown on Map 5, page 71. It is one of the smaller communities in the Arctic with a present population of 164 people.

The living conditions in the settlement, as found during the June, 1967 survey, will be set out in this Chapter.

I. THE EXISTING SETTLEMENT

Historical Background

The Eskimos lived in the Repulse Bay area many hundreds of years before the arrival of the European whalers in the 18th Century. Contact between Eskimos and whalers was frequent and continuous for over 150 years.

In 1846 Dr. John Rae, physician, scientist and fur trader for the Hudson's Bay Company sailed to the Repulse Bay area and established there a base from which to carry out exploration and mapping work on the northern coast. He and his men travelled overland by dog team and were among the first to obtain their food and shelter from the land resources in a manner similar to the Eskimos.

The American, Captain Charles Hall, lived with the Repulse Bay Eskimos from 1864 to 1869 and carried out further mapping and exploration activities. He also lived off the resources of the area in contrast to those who explored from ships and depended upon food and materials carried on board.¹

The first permanent buildings were erected at the present site of the Repulse Bay community during the early 1920's when the Hudson's Bay Company and their competitors, the Revillon Freres, both established trading posts. After the Hudson's Bay Company obtained control of the rival company, in 1926, the Repulse Bay post of the Revillon Freres was closed. The Roman Catholic Church also established a mission in the vicinity during the 1920's.²

¹R. A. J. Phillips, Canada's North (Toronto: Macmillan of Canada, 1967), p. 56.

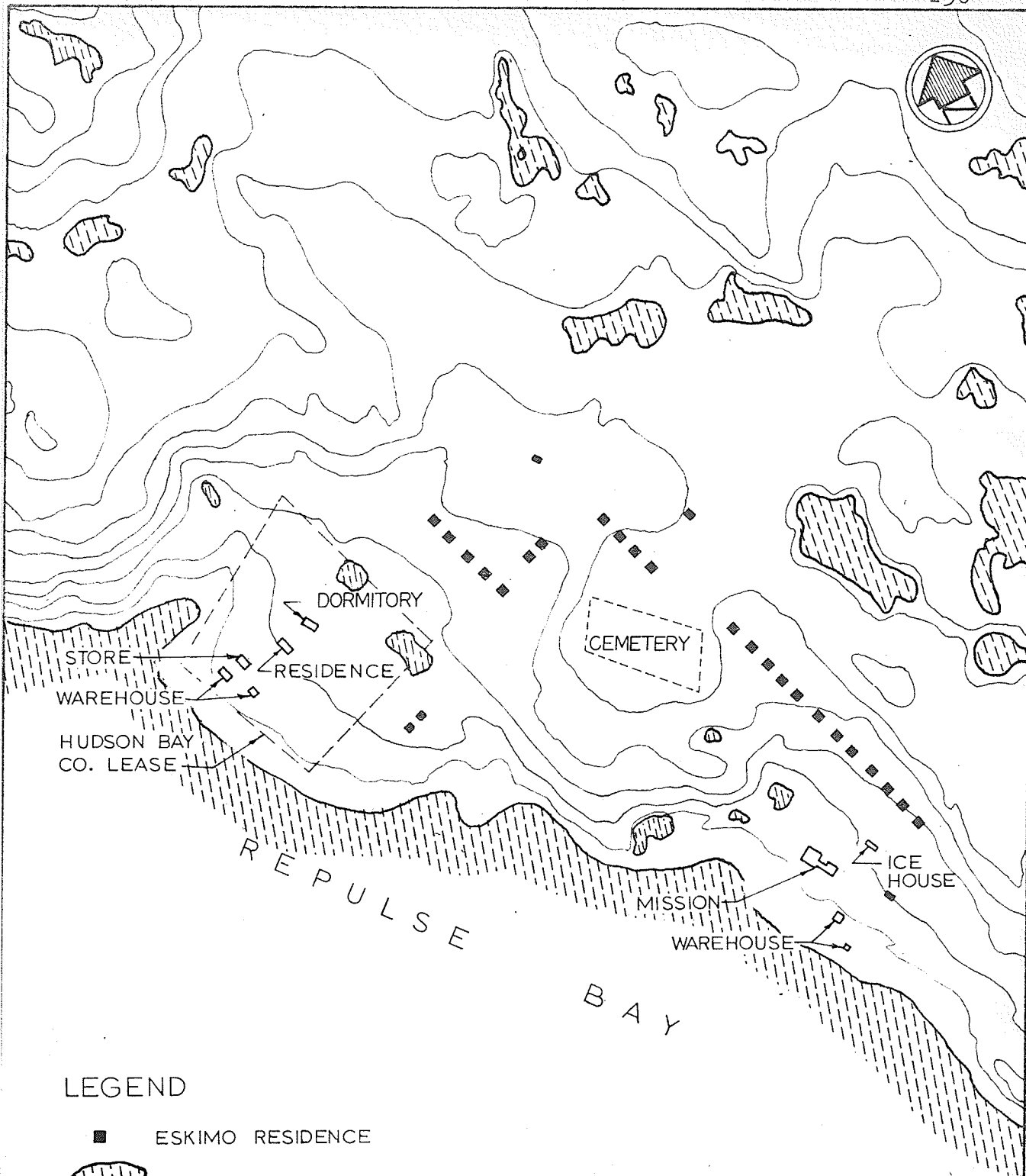
²Father Revoire, Roman Catholic priest, Repulse Bay, Personal Communication.

During the past fifteen years there has been a gradual movement of the Eskimo people from coastal camps to the vicinity of the post and mission. At present all of the people in the area consider Repulse Bay to be their permanent home while continuing to travel from the settlement to hunt and trap in the surrounding region. Initially they lived in igloos, tents or shacks, however within the past three years, twenty-three prefabricated dwellings have been constructed by the Federal government. Map 9 shows the distribution of the buildings in the community area. It will be considered further on page 135.³

Environmental Aspects

Land form. The land form at Repulse Bay as indicated on Map 10, page 131, consists of exposed rock outcrop with intervening lower areas of silty, sandy till and numerous boulders. Along the shore are areas of beach deposits consisting of sand and gravel with some boulders up to two feet in size. Numerous lakes, ponds and small streams occur throughout the area.

³The maps and much of the statistical data contained in this Chapter appeared in a different form in: Underwood McLellan & Associates, Planning Study Report for Repulse Bay, N. W. T., 1967. (Mimeographed.)

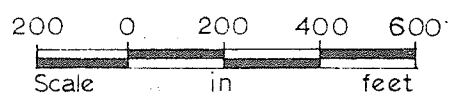


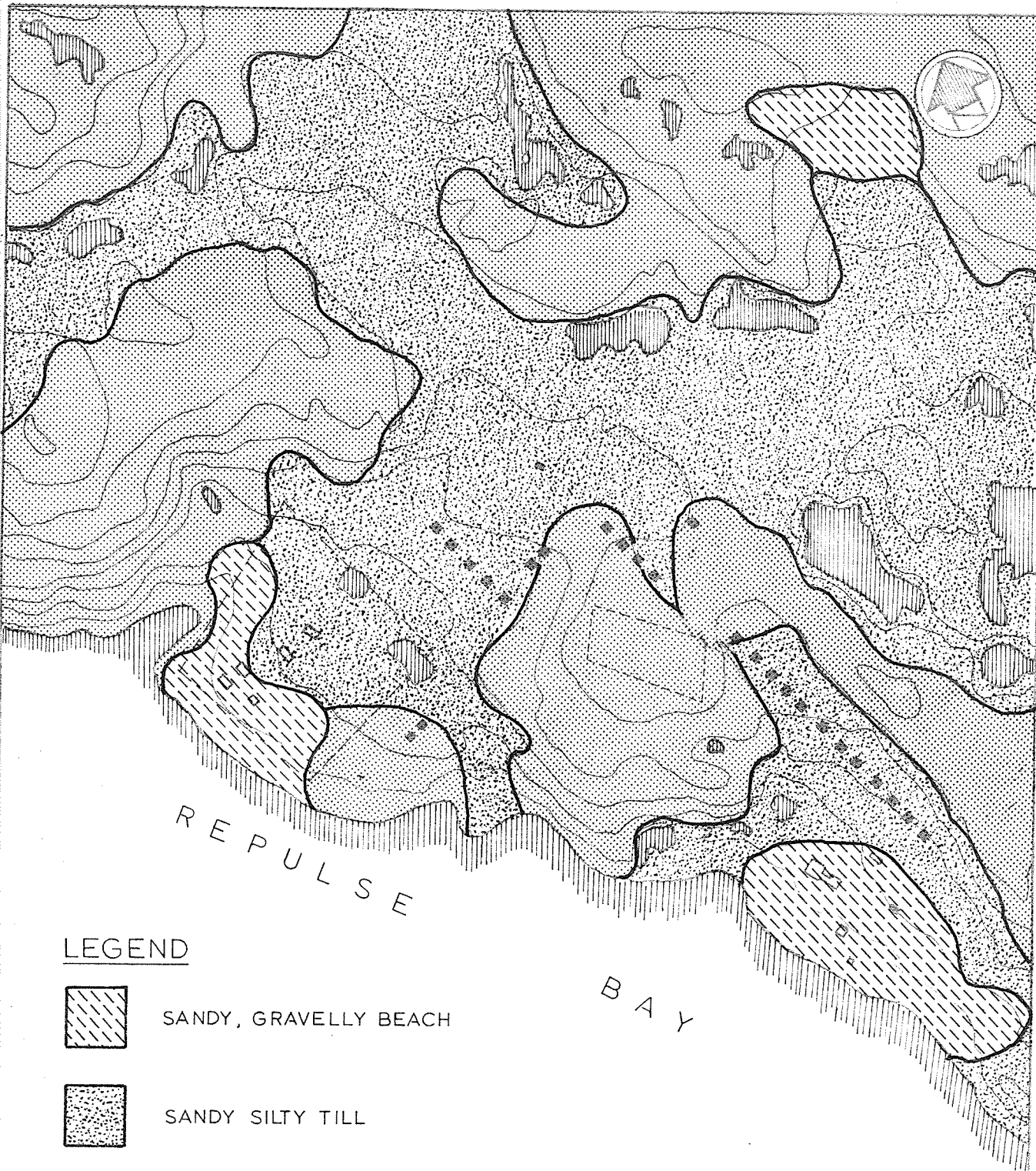
LEGEND

- ESKIMO RESIDENCE
- LAKE OR POND
- CONTOUR - 10 FT. INTERVAL

MAP NO. 9

REPULSE BAY
EXISTING LAND USE



LEGEND

SANDY, GRAVELLY BEACH



SANDY SILTY TILL



ROCK OUTCROP

MAP NO. 10

REPULSE BAY
TOPOGRAPHY

In the settlement area, the rocks rise to about seventy feet above sea level. The sides are steep and fragmented. The sandy beaches slope gradually from the shore and are generally firm and well drained. The till plain is relatively flat and poorly drained, due mainly to the permafrost condition which underlies the entire area and hampers drainage. The active layer is approximately thirty inches deep in the till material.⁴

Climate. The mean daily temperature for January is -25°F. and for July it is $+45^{\circ}\text{F.}$, with an annual mean temperature of $+8^{\circ}\text{F.}$ Precipitation is approximately eight inches, half of which falls as rain and half as snow. The prevailing wind is from the northwest and gust speeds up to 90 miles per hour can be expected. Calm periods seldom occur.⁵

The photographs in Figure 5 indicate some of the environmental features of the area. Snow drifts around the majority of the Eskimo dwellings, particularly those in the

⁴Robert M. Bone and Victor W. Sim, "Terrain and Site Analysis of Repulse Bay, N.W.T." Unpublished report of the Geographical Branch, Department of Mines and Technical Surveys, Ottawa, 1962, pp. 2-4.

⁵Morley K. Thomas, Climatological Atlas of Canada (Ottawa: National Research Council, 1953), pp. 75-96.



Snow drifts block the house entrance
and limits the view from the window.



Eskimo houses located on the till
plain between the rock ridges.

FIGURE 5

REPULSE BAY 1967

low area to the east of the cemetery. Access is difficult and the view from the windows is severely limited. The lower photograph indicates the same general location as the upper photo and shows the contrast between winter and summer conditions.

The location of the settlement on the Arctic Circle means that on June 21st the sun does not set and on December 21st it does not rise. During summer the maximum sun elevation, above the horizon, is $47^{\circ}.$ ⁶

Ice cover. Ice cover on the sea does not break until July and normally the bay is clear by August. Freeze-up begins during early October and ice cover is complete by November. Thus a period of about one and one-half months is available in which supply ships can safely reach the settlement. The maximum depth of ice on the sea is about nine feet and occurs by March. The tide, which has a maximum range of about fifteen feet, forms ice ridges reaching to a height of ten feet along the shore and hampers access from the settlement on to the sea ice.

The lakes tend to break-up and freeze-up about two

⁶Ibid., pp. 187-188.

weeks earlier than the sea. All lakes within two miles of the settlement freeze to the bottom during the winter.

Vegetation. Natural vegetation is typical of the barren lands, consisting of small willows, mosses, lichens and grasses. The mission has a small greenhouse in which lettuce, onions and similar green vegetables are grown during the warmest summer periods.

Present Land Use

The existing use of the land within the community has been shown on Map 9, page 130, with the main function of each building or particular area indicated. With the exception of the Hudson's Bay Company lease, all of the land is under the exclusive control of the Federal Government. The lease covers approximately six acres of land on which are situated structures for residential, warehouse storage and retail sales use. The lease area covers a portion of the till plain and the well drained beach deposits.

The Roman Catholic Mission building contains a church, a residence and a recreation hall. Warehouses, fuel stock-piles and a permafrost cellar are located nearby. A cemetery is located on the highest rock point midway between the mission and the trading post. Some graves, which consist of

stone mounds covering a wooden casket, are within one hundred feet of existing dwellings. A new cemetery has been established on a rock hill about one half mile to the east of the community.

The Eskimo residential area is located on till plain between the rock outcrops. In addition to providing shelter, in which the usual home living activities are carried out, the residence also provides a place of work for many Eskimo people while in the settlement. It is in, or adjacent to, the dwelling that skins are stretched and dried, that carving and craftwork is carried out or that boats are made and sleds repaired. The dogs are tied near the house. Items such as sleds, tents, gasoline drums and traps which are required for hunting and trapping are also kept near the houses.

Beach areas, suitable for drawing up canoes, float planes or landing barges are located adjacent to the Hudson's Bay Company lease and also near the Mission buildings as indicated on Map 10, page 131.

Housing

In June 1967, there were thirty dwelling units in Repulse Bay. In addition, four canvas tents were occupied.

Eskimo houses include ten type "370" models built in 1964, thirteen Angirraq models built in 1965, and five other units built of miscellaneous wood and cardboard materials.⁷

The Hudson's Bay Post manager's residence, built in 1956, consists of a seven room wood frame structure. The Roman Catholic missionaries reside in the Mission building, a wood frame structure covered with aluminum siding, constructed in 1966.

Other buildings in the settlement are two warehouses and a permafrost cellar belonging to the Mission, and a store, two warehouses and an old residence belonging to the Hudson's Bay Company.

Thirteen of the Eskimo prefabricated houses are considered to be in good condition and ten considered to be fair.⁸ The condition of the miscellaneous units are judged bad. The non-Eskimo housing units are considered to be in good condition.

Overcrowding within the Eskimo dwellings was found to be severe, especially in summer when the school children

⁷Refer to page 102 for a description of standard house models.

⁸Refer to page 88 for condition rating criteria.

return from Chesterfield Inlet. The number of persons per house averaged 5.5, ranging from a minimum of three to a maximum of nine. The average floor area, based on outside house dimensions, was sixty square feet per person. Table X, appendix C, gives further details of housing conditions and number of occupants for each dwelling.

The photographs in Figure 6 indicate some of the particular features of the housing conditions. During winter, many of the buildings are completely snow covered, while others are surrounded with drifts of varying depths. The lower photo indicates the makeshift porch which has been added to each of the basic prefabricated housing units. The roof is often used for storage of non-perishable goods and is also often used by the dogs.

Utilities and Services

Water supply. Water is obtained from ice blocks or snow during the winter. The ice, cut when about twelve inches thick from nearby lakes, is transported to the settlement by dog team and sled and stored outside for future use. The blocks are initially used to build an outside porch at the house entrance in which non-perishable goods may be stored. The porch deflects the full strength of the wind away from the



View of the Mission building.
Houses in the foreground are
covered with snow.

Model "370" dwellings
in the flat area to the
west of the cemetery hill.



The roof of the house is
used for storage purposes
as well as a sleeping place
for dogs.

FIGURE 6

REPULSE BAY JUNE 1967

doorway and is in a convenient location for easy access during stormy periods.

During the summer, water is carried in pails from local ponds and streams. The supply of water is not on an organized basis and individual families must depend on their own initiative to provide for their needs. There is no treatment of water for purification purposes before it is used.

Sewage and garbage disposal. Bucket toilets, lined with plastic bags, are used in all of the houses. Human excreta, as well as other wastes and garbage, is carried away from the immediate vicinity of the dwellings on an individual basis. The major disposal site is on the sea ice to the west of the mission buildings. This location is not a sufficient distance from shore, with the result that in the summer the beach becomes littered with refuse and bags. Throughout the winter, dogs tend to rummage through the garbage and drag the bags back to the residential area, thus contributing to insanitary surroundings. During summer, the wastes are deposited directly into the sea or along the shore. Empty 45 gallon gasoline drums are used for temporary storage of garbage and as incinerators in which paper and other burnable material may be disposed.

The Mission utilizes a 450 gallon indoor tank in which all toilet and water wastes are collected. The tank is drained, through a two inch plastic hose leading directly to the sea, when required. It appears to be a satisfactory method of disposal for the small amount of wastes concerned.

Insanitary conditions are created by the large number of dogs tied near dwellings. During winter the drifting snow covers the accumulating bones, fur and wastes and provides relatively clean surroundings. With the start of the spring thaw, this material is rapidly exposed and spread throughout the area by the runoff water.

Heat and electricity. The source of heat is fuel oil which is brought to the settlement during the sea lift. A cook stove is the combined heating and cooking facility for the majority of houses. The Hudson's Bay Company and the Mission utilize space heaters for their larger buildings in addition to cook stoves in their kitchens.

Electrical energy is supplied by two gasoline powered generators of 1.5 kilowatt capacity each. The Hudson's Bay Company and the Mission each own a unit and the electrical power generated is for their own use. The Hudson's Bay Company owns a small wind generator which is used to charge

batteries for radio communication purposes in the summer. The Eskimo residents utilize gasoline lamps for lighting purposes.

Transportation. Local transportation in winter is by dog team and sled. About twenty-eight individual teams, totalling from 175 to 200 dogs, are used. One skidoo is owned by the Mission. Thirteen canoes and outboard motors are available for summer travel. There are no motor vehicles in the settlement and no improved roads.

Residents depend upon aircraft for most of their contact with people from the south. The sea is generally utilized as a landing point. Aircraft equipped with pontoons are used for open water and with ski-wheels for ice and snow. During the latter half of June and the first half of October, the community is isolated from outside assistance because of unsafe landing conditions on the ice.

The majority of supplies are brought in by the annual sea lift, which usually consists of a yearly trip by two ships. They are scheduled to arrive during early September, however ice floe conditions control the actual arrival time.

Communications. Radio communication between the settlement and other Arctic points is limited to two sets.

The Hudson's Bay Company and the Roman Catholic Mission maintain scheduled contacts with their respective organizations. In addition, the Hudson's Bay post manager transmits daily weather information to the Department of Transport weather station at Chesterfield Inlet.

II. SOCIO-ECONOMIC FACTORS

Population

The number of residents in Repulse Bay, at the time of the June 1967 survey, was 164 persons. The Hudson's Bay Company post manager, his wife and two Roman Catholic priests were the only non-Eskimo people living in the community. Because of their small number, the non-Eskimo people will not be included in the following analysis of the population structure of Repulse Bay.

The 1967 Eskimo population of 160 persons represents an increase of approximately six per cent per year from the 1962 figure of 121 persons.⁹ This increase is higher than the per cent rate of increase of population in the Keewatin

⁹ Population figures were obtained from the Roman Catholic Mission records and from an enumeration of residents. Actual birth and death records obtained from the Mission have substantiated this to be the rate of natural increase and not the influence of movements of people to the settlement from other areas.

region as a whole, which is about 4.5 per cent.¹⁰

Figure 7, page 146, shows the percentage distribution of population by age group and sex. The population size is too small to make a definite analysis upon which to base future expectations for settlement needs, however one of the striking features of its structure is the large number of children. Slightly over one half of the population is under the age of fifteen years. This factor gives an indication of increasing requirements for education facilities, food supplies and economic opportunities as these people grow older and form families of their own. The number of persons in the older age groups is small with only six persons over the age of fifty-five years, all of whom are male.

The average family size has increased to 5.0 persons per family from the 1962 figure of 4.5.¹¹ The 1967 family sizes are indicated in Table VI. Only two families consist of nine or more persons.

¹⁰Refer to page 80.

¹¹D. M. Brack and D. McIntosh, Keewatin Mainland Area Economic Survey and Regional Appraisal (Ottawa: Northern Affairs & National Resources 1963) p.135.

The majority of families have always lived in the community or have voluntarily moved there from camps previously in the immediate area. One family came from Pelly Bay and one from Igloolik. Of the other families, most marriages have been between couples resident in the community. Three women came from Igloolik and one from Coral Harbour.

TABLE VI

REPULSE BAY ESKIMO FAMILY SIZE

<u>Persons per family</u>	<u>Number of families</u>
1	0
2	2
3	5
4	8
5	3
6	7
7	5
8	0
9	<u>2</u>
Total :	32

The past population statistics are indicated in Figure 8. It also shows the future growth pattern which can be expected over the next ten years. Reliable population figures were not available for the period before 1962, however since that time there has been a steady increase in the number of people living in Repulse Bay.

The projection is intended to give a general indication

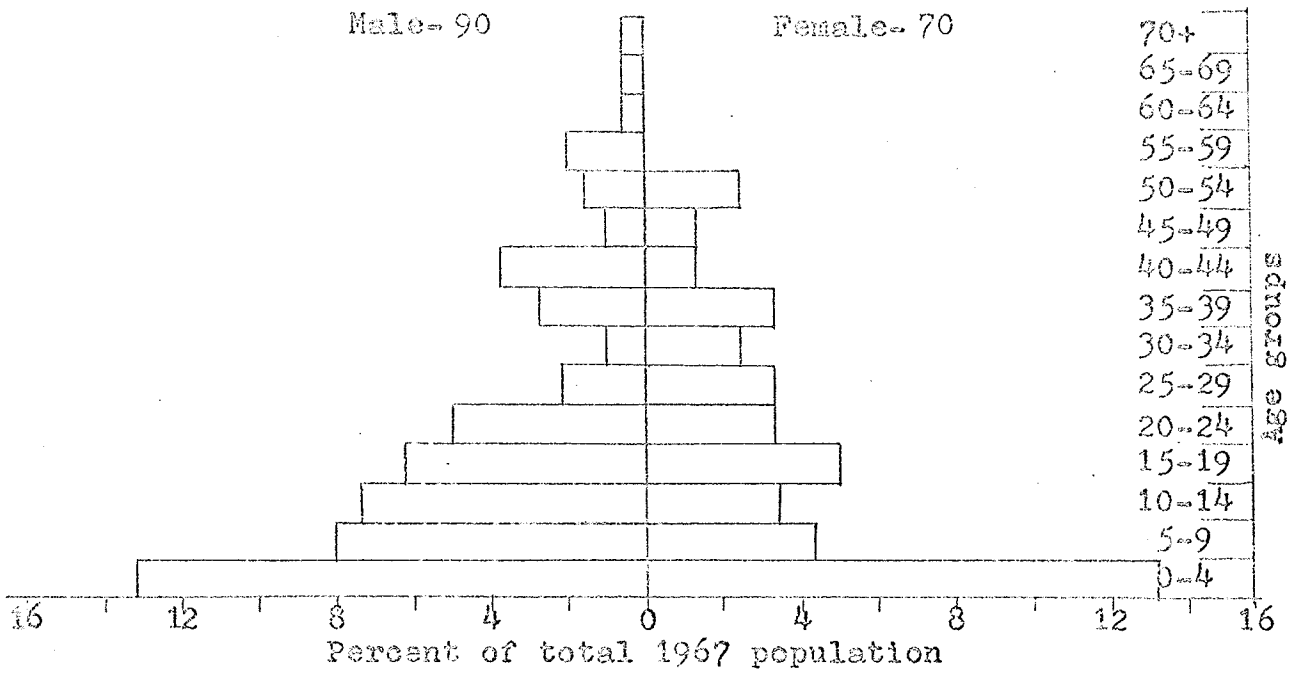


FIGURE 7

REPULSE BAY ESKIMO POPULATION

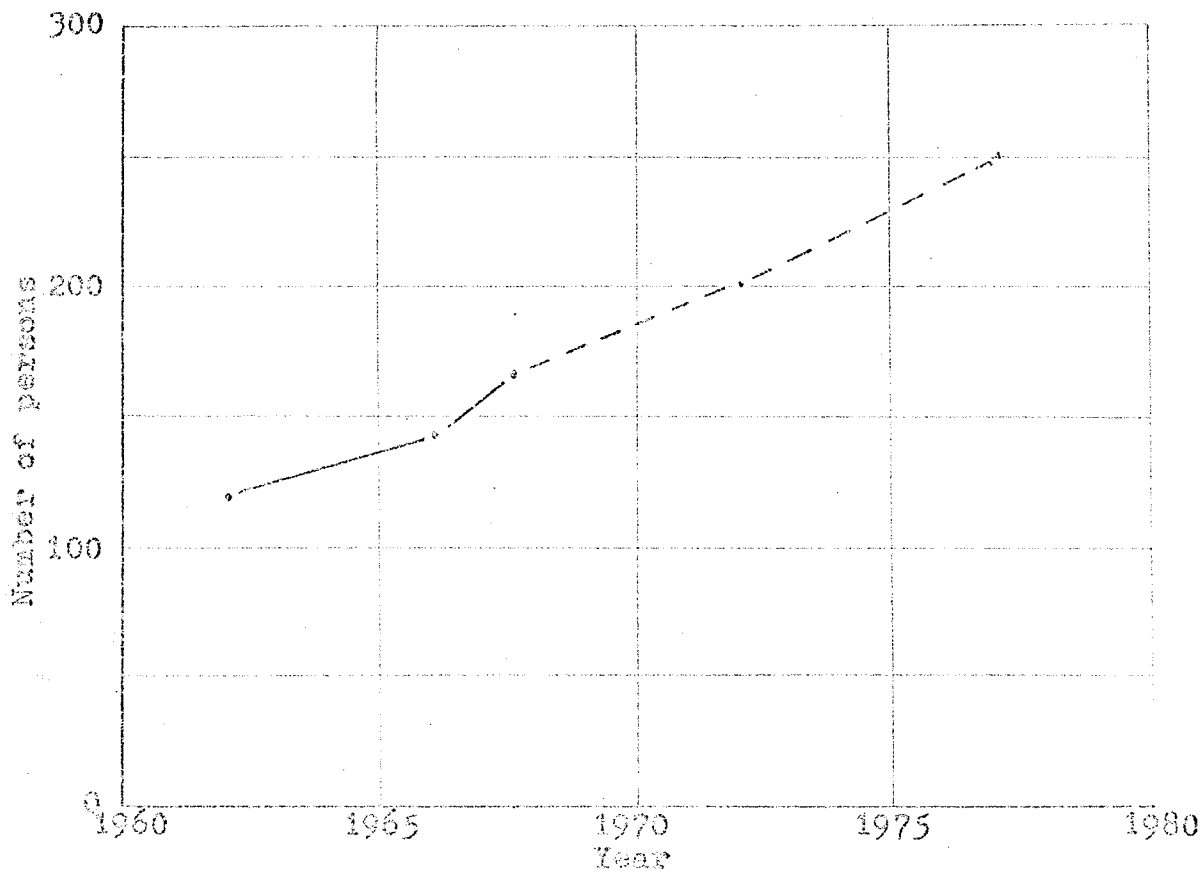


FIGURE 8

REPULSE BAY POPULATION
GROWTH AND PROJECTION

of the probable growth of the community due to natural increase. It is essentially based on an annual rate of increase of 5.0 per cent. This indicates a population of 265 people by 1977. The small size of the population and the unknown influence of future regional economic policies do not allow a more meaningful estimate, based on migration factors, to be made. However, such factors may be taken into account as they become established. The most important realization is that the population has been, and is expanding rapidly, even in an area where living conditions are harsh and difficult. There is no clear reason to foresee any change in the high birth rate in the immediate future. A continuing need for accommodation, services and opportunity for economic advancement will develop on a parallel with the population rise.

Economic Base

Natural resources. In the relatively isolated community of Repulse Bay, the residents depend primarily upon the natural resources of the area to provide many of the basic necessities of life. Caribou, seal, fish and whale are important sources of food for the people, as well as for their dogs. Hunting, fishing and trapping are the predominant

occupations of the area with every able-bodied person actively participating. Some clothing is still made from skins, but only for winter use. Furs are sold or traded at the local Hudson's Bay Company post to obtain goods, such as food, clothing, ammunition and household items, brought in from southern centers.

The theoretical population which can be largely self supporting from resource based activities in the immediate area has been estimated at about 200 persons.¹² However this presupposes the acquisition of additional capital equipment and increased leadership and organization. Even with these additions, the standard of living would be at only a subsistence level. Increased population above that number would create a need for additional sources of livelihood for the people of Repulse Bay.

Craftwork and cash income. Soap-stone and bone carving is a major source of cash income. Both men and women take an active part in this work, presently on an unorganized basis. Outlets for craft work are the Hudson's Bay Company post, for retail sale, and the Roman Catholic Mission, which purchases for distribution through the Department of Indian Affairs and

¹²D. M. Brack and D. McIntosh, op. cit., p. 114.

Northern Development.

Only two Eskimo men are actively engaged in wage work, both with the Hudson's Bay Company. One is a full time clerk while the other is a part-time assistant. Further part-time work generally becomes available during the sea-lift unloading operation in the late summer. However, this is of short duration and provides work for all able-bodied men for only a few days during the year. The figures for individual or total settlement income obtained from trapping or craft work were not readily available. Therefore an estimate could not be made of the relative dependence on these various sources of income.

Social assistance figures were not available, however most families have received some form of economic aid, in addition to national assistance funds such as childrens' allowance and old age pensions, during recent years.¹³ The requirement for welfare payments will therefore increase unless other economically suitable activities can be successfully introduced into the area to supplement the limited renewable resources which presently exist.

¹³ Henry Voisey, Hudson's Bay Company post manager, Repulse Bay, Personal Communication.

Social Factors

Social activities. Social contact between people of the settlement and people from outside is limited. Visitors seldom come to the settlement and when they do they seldom meet with the Eskimo residents, mainly because of the language barrier. Few of those over the age of twenty years are able to communicate in other than the Eskimo language.

The transistor radio provides a source of outside influence and entertainment for the residents, with musical programs providing the greatest enjoyment. Younger family members may benefit from the English short wave programs. Every family appeared to own a transistor radio receiver.

Organized community activities are carried out under the leadership of the Catholic priest. Dances, bingo, movies, and similar gatherings are commonly held in the Mission hall. This room is also used for nightly gatherings of a less formal nature during which cards or pool games are played or discussions held. All residents of the community participate in these functions, either actively or as spectators satisfied to sit and watch the surrounding activities.

In contrast to other communities, the Hudson's Bay

Company store was not observed to be a primary gathering place for the residents. It has been suggested that, since the original store was small, it became too crowded if many people attempted to stop and visit within it. The people therefore tended to buy their supplies or trade their goods and return home as soon as possible. Although the present store is larger, the people have not broken their habit of transacting their business and leaving immediately.¹⁴

There appeared to be much visiting between families, particularly during June and July when daylight is continuous. It was possible to find people moving about the settlement and carrying out some activity at any time of day or night during this period. Because of the dependence on wildlife as a source of food and income from fur sales the activities of the residents are somewhat organized on a seasonal basis. During spring, seals are hunted in the open water at the edge of the floe ice, which may be a distance of up to eight miles from the settlement. When hunting trips are made to the seal hunting area, all members of the family go along regardless of the number or ages of the children. Accommodation is in canvas tents, set up on the sea ice, and the length of stay

¹⁴ Ibid.

may be up to a week at a time. Transportation is by dog team and sled. Boats are carried out from the settlement and used to retrieve seals which have been shot in the water. Travel is generally in groups, with up to ten families packing up and leaving the settlement within a two hour period.

In summer there is little movement far from the community. Canoes are used to hunt seal in the open water in the immediate vicinity of the settlement. Narwhals and white whales are often killed in the Bay area. Caribou are hunted on foot and dogs are used to pack food and equipment. All families tend to remain close to the settlement to be able to take part in unloading ships when the sea lift arrives in the late summer. During fall, fishing trips are made to areas as far as fifty miles away in an attempt to catch enough fish to supplement store bought food during the winter. Again all members of the family take part in these trips. In the winter, trap lines are generally tended by individual hunters.

Religion. Two religious denominations are represented in the settlement. Twenty-seven Roman Catholic families form the largest group while five families are of the Anglican faith. Although there appears to be no social division along religious lines there is some division in existing housing

arrangements. The Anglicans prefer to be more distant from the Mission and at present are occupying the houses closest to the Hudson's Bay Company post.

Administration. The normal day-to-day administration of the settlement is carried out by the manager of the Hudson's Bay Company post who is acting area administrator for the Department of Indian Affairs and Northern Development. He is responsible to the Repulse area administrator who is located at Chesterfield Inlet.

The Eskimo population does not appear to be organized on a community basis. A local Housing Authority, as required under the Eskimo Rental Housing Program, has not yet been formed although community representatives have attended a recent Housing Education Conference at Igloolik. Interest in the housing program is high and could be a starting point to encourage the personal involvement of most of the residents in the betterment of their community.

Education. School facilities are not provided at the settlement. The children wishing to attend classes are airlifted to the boarding school at Chesterfield Inlet. Approximately thirty-five children obtain their education outside of the settlement and away from their families' influence in this

manner.

Health facilities. Health care in the community is provided by the Roman Catholic priest who acts as lay-dispenser and provides first aid treatment. Persons with a serious illness or those requiring an operation are airlifted to the hospital at Churchill, Manitoba when weather and ice conditions permit. Semi-annual health check-ups are carried out by the Department of National Health and Welfare as part of the Northern Health Services program. General health check-ups, chest X-rays, immunizations and dental care form the major portion of this group's activities.

CHAPTER VIII

PELLEY BAY

The community of Pelly Bay is located on the western side of Simpson Peninsula near the south-eastern end of Pelly Bay. It is situated on the south shore of the Kukadjuk River. The geographical location of the community is approximately $68^{\circ} 53'$ north latitude and $89^{\circ} 52'$ west longitude. The position of Pelly Bay in relation to the other settlements in the Area has been indicated on Map 5, page 71.

This Chapter will describe the physical facilities located within the settlement area and outline other factors which effect the conditions under which the 150 residents live.

I. THE EXISTING SETTLEMENT

Historical Background

The Pelly Bay area of the Northwest Territories has never been readily accessible by ships travelling from the east because of the hazardous ice conditions in the Gulf of Boothia to the north. Consequently the Eskimo people living in the region were never in contact with the early European

explorers nor with the whalers who frequented the Arctic waters farther to the east. It was only after exploration parties moved overland that contact between the Pelly Bay Eskimos and the white man began. So powerful was the environmental control over life in this part of the Arctic region, that the explorers were forced to adapt many of the Eskimos traits and depend almost entirely upon their assistance for survival.

Among the first to visit the area was Dr. John Rae in 1846 and 1854. Enroute from his base at Repulse Bay to explore the Arctic coast, he visited with the Eskimos and depended upon them to assist him in his travels. During the period 1864-69 Captain Charles Hall continued exploration of the northern coast and also lived with the native people.¹

The mouth of the Kukadjuk River was a popular gathering point for the Eskimos because of the good fishing it provided. It was at this location that the first permanent buildings were erected. They were built from local stone by the Roman Catholic missionary Father Vendevelde, in 1936.²

¹R. A. J. Phillips, Canada's North (Toronto: Macmillan of Canada, 1967), pp. 55-59

²Father Goussart, Pelly Bay, Personal Communication, August 1967.

Buildings of wooden material were not constructed until 1960, when a new mission and two warehouses were built. In 1961 a Federal Day school and a powerhouse were built by the Federal Government. Five prefabricated houses were built for the Eskimos in 1965 and three more in 1966.

Supplies and materials from the south were always difficult to obtain due to the lack of sea access. The original supply route was over-land by dog team from Repulse Bay, which was the nearest point the sea lift could reach. Aircrafts were not available nor sufficiently developed to carry goods to the area in the years before World War II.

In the latter half of the 1950's a radar station, which is part of the Distant Early Warning Line network extending along the Arctic coast, was constructed twelve miles to the southeast of the settlement.³ Since then, supplies have generally been flown to the radar station air strip and hauled over-land, the much shorter distance to the settlement. In more recent years, aircraft have utilized the ice of the bay to bring many supplies directly to the settlement.

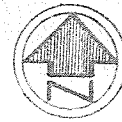
³ Map 5, page 71 indicates the general location of the D.E.W. Line stations in the area under consideration.

Land Use and Environmental Aspects

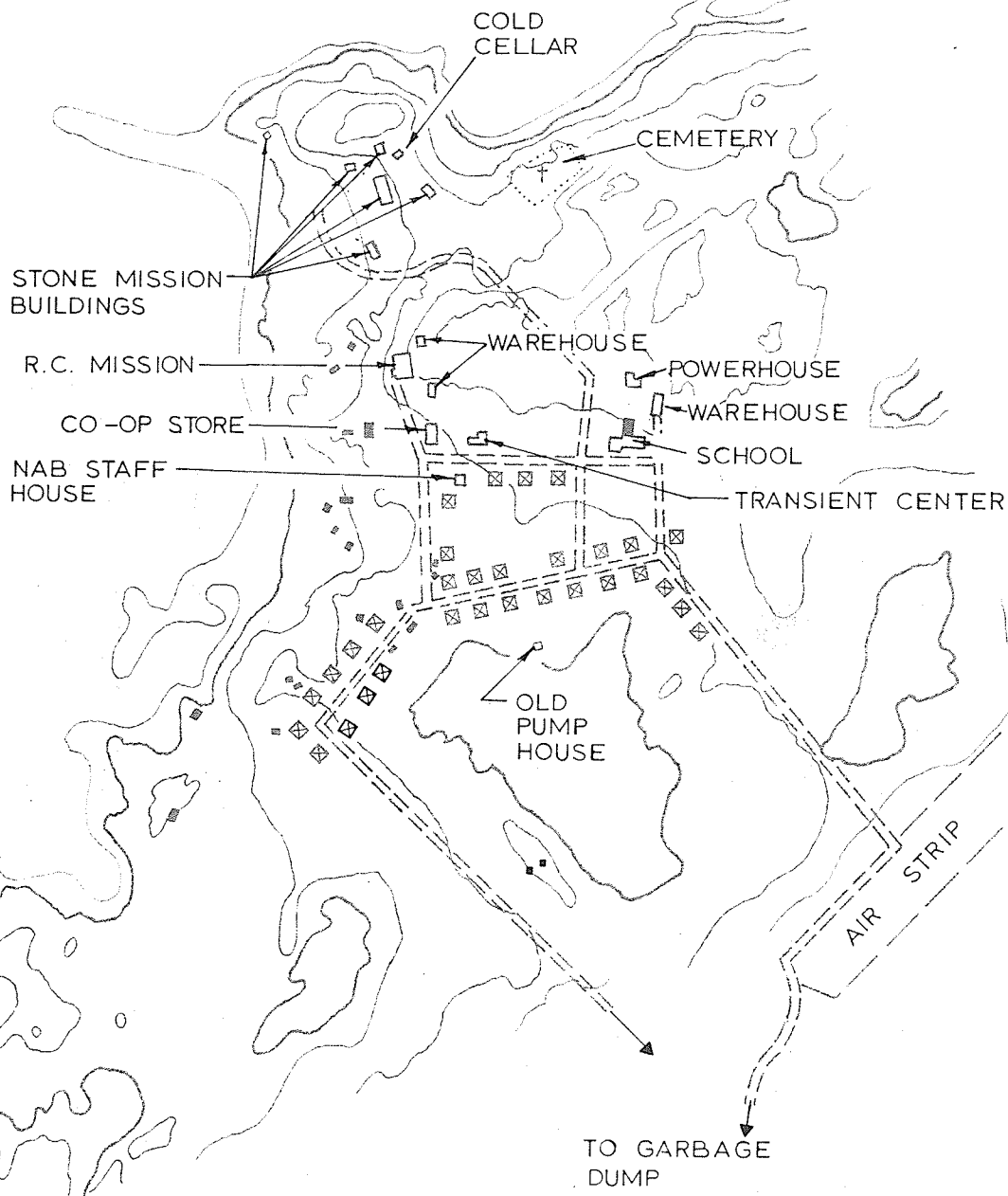
The present land use is shown on Map 11, with the topography indicated in Map 12, page 160.⁴ A comparison of the two maps indicates that initial construction of the stone buildings took place on the steep sandy beach area close to the sea. The school and powerhouse are located further inland and on the more level till plain which surrounds the longest pond in the immediate vicinity. The new mission is the only major building located on the rock outcrop which covers much of the settlement site. The Eskimo's old houses and tents are scattered along the shore for a distance of about 1,000 feet. Some are located on sandy beach material and others on rock surfaces. The thirty-two new houses, which were ready for occupancy in the fall of 1967, are located on the till plain.

The till plain is relatively level. Several ponds are located on it, leaving an effective building area of about fifteen acres. Permafrost conditions, which underlie the

⁴The maps and much of the statistical data contained in this Chapter appeared in different form in Underwood McLellan & Associates, Planning Study for Pelly Bay, N.W.T. 1967. (Mimeographed.)



KUKADJUK RIVER

LEGEND

- ☒ NEW ESKIMO RESIDENCE
- ESKIMO RESIDENCE
- NON-RESIDENTIAL & NON-ESKIMO RESIDENTIAL
- == EXISTING ROADS & TRAILS
- ~ 15 FT. CONTOUR INTERVALS

MAP NO. 11

PELLEY BAY
LAND USE



KUKADJUK RIVER



PELLEY BAY

LEGEND

TIDAL ZONE



ROCK OUTCROP



SANDY SILTY TILL



SANDY GRAVELLY BEACH

MAP NO. 12

PELLEY BAY
TOPOGRAPHY

entire settlement, impede subsurface drainage and keep the area wet and soft all summer. Gravel fill is required to raise the buildings above the wet surface, to provide dry surroundings and to provide a stable foundation for building support. The airstrip, which is under construction, is also built with fill material placed over the permafrost, as are the improved roads which provide a basic circulation pattern for the settlement.

Figure 9 indicates some of the terrain features of the settlement area. Rock ridges rise to a height of about one hundred feet in the area south of the airstrip. The till plain contains many boulders which hamper movement over the area. Extensive gravel filling is necessary to provide a more amenable community site. A supply of gravel adequate for this purpose is located along the sea-shore about two miles south of the settlement.

The climate of the area is harsh, with a mean annual temperature of $+6^{\circ}$ F.⁵ The mean daily temperature of the coldest month is -25° F and of the warmest month is 45° F. Precipitation averages about eight inches per year with half

⁵ Refer to Morley K. Thomas, Climatological Atlas of Canada (National Research Council, Ottawa, 1953), for reference to climate data.



View south from the school entrance. Bedrock and boulder strewn till plain cover the area away from the shore.



Gravel fill is required to provide roads and also to level off the area surrounding the houses.

FIGURE 9

PELLEY BAY TERRAIN CONDITIONS

falling as rain and the other half made up of about 45 inches of snow.

The location of the community above the Arctic Circle means that the sun remains above the horizon continuously for about six weeks in summer, with its maximum elevation being about 45° . In winter the sun remains below the horizon for about three weeks and there is only twilight during this period. Refraction of light is the reason why the sun does not appear to remain below the horizon for the same length of time that it remains entirely above.

Ice forms on the sea, river and lakes during late September and by early October freeze-up is complete. All lakes in the immediate vicinity freeze to the bottom, however there is water flow in the river throughout the year. Break-up occurs during the months of July and solid ice is usually melted by early August.

Housing

A wide variety of housing types were found in the community of Pelly Bay. Table VII lists the housing available and also indicates the condition rating which they were given. The houses under construction were being built as part of the Eskimo Rental Housing Program with occupancy

TABLE VII

PELLEY BAY HOUSE SUPPLY

House type*	Size in feet	Number	Condition**
Ukuvik	20 x 32	16	Under construction
Urquaq	24 x 28	16	Under construction
Anguirraq	16 x 24	3	Fair
Model 370	12 x 24	5	Fair
Mission stone	variable	2	Poor
Misc. shacks	variable	18	Poor
Tents	variable	17	Poor
School residence	30 x 24	2	Good
Mission residence	45 x 12 (2 storey)	1	Good

*Refer to page 102 for description of standard house types.

**Refer to page 88 for description of criteria used for condition ratings.

expected for the fall of 1967.⁶ The miscellaneous shacks were built of wood obtained from packing crates or other scrap materials and had little or no insulation. Canvas was used to provide the roof of many homes and to cover holes. Tents also accounted for a substantial number of summer dwellings and took the place of the igloos that had been used for winter shelter.

The Mission residence, combined with the Roman Catholic Church, is a wood frame structure built on a concrete foundation. The exposed bedrock upon which it is constructed provides a solid base. The school is built on a gravel pad. It is a prefabricated structure and, in addition to two dwelling units, it contains one classroom.

The Local Housing Authority, in cooperation with the other residents of Pelly Bay and the Department of Indian Affairs and Northern Development, have allocated the rental houses to the families of the settlement.⁷ It is proposed to use thirty-one of the new houses and two of the Angirraqs

⁶Refer to page 89 for details of this program.

⁷The Local Housing Authority is considered further on page 185.

as Eskimo dwellings. One new house is to be used as a staff-house for government employees and one Angirraq would therefore be vacant. The type "370" models are to be rebuilt and converted into transient quarters or storage units. The shacks are to be utilized as storage buildings for hunting and trapping equipment.

The following analysis of Eskimo housing space is therefore based on the use of thirty-three dwellings, as indicated above, to shelter the 148 Eskimo residents of the community. Table XI, Appendix C contains details of the size of the families expected to live in each individual house and the living space which will be available.

It was found that the average number of persons per dwelling would be 4.5. The overall floor area per person averages 169 square feet and ranges from 64 square feet to 384 square feet per person.⁸ The housing space available to the residents of Pelly Bay is substantially greater than that available to the residents of Chesterfield Inlet and Repulse Bay.⁹

⁸These calculations are based on outside building dimensions.

⁹Refer to pages 103 and 138.

The occupancy rate is 1.1 persons per room, a figure which compares favourably with the southern desirable standard of 1.0 person per room.¹⁰ Although overcrowding is still excessive in individual cases of large families, it is low on an overall settlement basis. In addition, there are several instances of under occupancy, in which three or fewer persons live in a three room house. For the most part these situations occur with young couples and an increase in family size can be expected. However this factor does indicate a need for a greater variety of house sizes to adequately accommodate the wide variations in existing family size.

The photographs in Figure 10 indicate some of the houses and facilities existing in the community. The brightly coloured buildings provide an interesting and desirable contrast to the otherwise bleak and dark landscape.

Utilities and Services

Water supply. Water supply depends upon a system of haulage using a 500 gallon tank drawn by a tracked motor vehicle. In summer a small lake about three quarters of a mile southeast of the settlement is used as a water source.

¹⁰ Dominion Bureau of Statistics considers overcrowding to occur when the number of persons per room is greater than one. Refer to Dominion Bureau of Statistics, Census of Canada, Bulletin 7.2-3 (Ottawa: Queen's Printer, 1961)



The school complex is at left center with a warehouse farther left. New houses are visible to the right.

General view from the north. The transient shelter is in the center foreground.



Colourful houses fronting on an improved road.

FIGURE 10

PELLEY BAY AUGUST 1967

During winter river water is hauled from a site above tide water, about two miles from the settlement. The Cooperative organization is responsible for the delivery of water to the community. During winter, snow is also melted to provide additional water for washing purposes.

The water supply for the school is stored in a 1,000 gallon aluminum tank installed in a shallow basement. Distribution throughout the building is by means of a pressure system. Water supply for the rest of the dwelling units is stored in plastic containers, having a capacity of about thirty gallons, or pails located in the kitchen room. There is no treatment for purification of water supplies at the present time.

Sewage and garbage disposal. Waste water is generally disposed of in the immediate vicinity of the dwelling. It is either collected in pails and then thrown outside or drained directly outside through plastic pipe. Only the school has facilities for collecting waste water in a holding tank. The water is periodically pumped to a location which drains away from the settlement area.

Plastic bags are provided for use within bucket toilets and for collection of other garbage. Temporary disposal is into 45 gallon steel drums placed adjacent to each dwelling.

The refuse is periodically collected and hauled, by tractor and sled or wagon, to a permanent disposal site on the sea ice in winter and on the land during the summer. Disposal areas are over a mile away from the settlement. This distance seems to be great enough so that neither tides nor dogs return garbage to the settlement.

Individual use of the bags appeared satisfactory, although there was extensive littering of refuse around the collection barrels. This was attributed mainly to scavenging by dogs.

The shore adjacent to the old mission buildings was littered with parts of seal and fish bodies. This area is the main sea access point and it is here that the seals are butchered after being brought to shore. Skins, fat and bones are discarded in the area and left to decompose, creating unsanitary conditions in addition to an unpleasant odour.

Fuel. Fuel oil is used for heating and cooking purposes as well as for the generation of electricity. Supplies are flown to the settlement, in 45 gallon drums, and stored in the area to the southeast of the school. Individual families obtain their fuel supplies from this common storage area. The majority of buildings have 250 gallon outside tanks, which feed directly into the stoves.

With the exception of the school, all dwellings use oil-fired stoves for cooking and heating and also oil space heaters for additional heat. The school residences are equipped with electric stoves for cooking and an oil-fired hot water system is used for heating purposes.

Electricity. Electrical energy is provided by diesel generators owned and operated by the Department of Indian Affairs and Northern Development. Two 40 kilowatt units are in operation with two 15 kilowatt units on standby. A third 40 kilowatt generator is on the site and is to be installed before fall so that sufficient electrical energy will be available to supply all of the requirements of the settlement.

Transportation. The major means of transportation to the settlement from southern centers is by aircraft. Regular schedules are not maintained and all trips must be on a charter basis. During winter the sea ice is used as a landing strip. Large aircraft are used for the airlift which usually takes place during the month of May when the ice is still strong enough to support heavy loads and when daylight conditions permit flying and loading operations to be carried

out on a twenty-four hour per day basis.¹¹ In summer, aircraft equipped with floats may utilize the water in the bay for landing purposes.

A 5,000 foot land strip, which is under construction, will help to eliminate the isolation of the settlement during the break-up and freeze-up period.¹² This will enable medical services to be readily available. It will also permit supplies to be brought in on a regular basis and therefore lower the expense associated with the storage of a year's supply of goods and also reduce the waste which accompanies such a long storage period.

The main direction of air access to Pelly Bay is from Cambridge Bay. The D.E.W. Line radar stations, which form a line of communications along the route, can be utilized for weather information or as emergency stopping points.

¹¹During May of 1967 a Hercules aircraft, capable of carrying a 25 ton load, was used to airlift the prefabricated house materials from Churchill, Manitoba to Pelly Bay. Other supplies are also flown in direct from Yellowknife by DC-3 aircraft. Father Goussaert, Personal communication.

¹²An interesting insight as to priorities and values of the people occurred in connection with the airstrip construction. When it appeared that there would be insufficient fuel available to complete the airstrip construction and to heat the houses during the coming winter, the people informed the Regional Administrator, by telegram, that they would rather live another winter in igloos than do without the airstrip for another year. Father Goussaert, Personal Communication.

Local transportation is by a variety of means.

Twenty-five canoes with outboard motors are owned by individual families. They are used for summer fishing and hunting trips in the immediate area and up to about ten miles out to sea. Two 35-foot inboard motor boats are also owned by individual families. They are used for trips to more distant hunting and fishing areas.

Dog team and sled is still an important means of winter travel. Twenty-five families have teams and there are about 175 dogs in the settlement. Their role in travel is gradually being taken over by the skidoo, eight of which are already in use.

Several motor vehicles are available for summer and winter use. A G-5 tracked tractor, a snowmobile and a tracked trailer are owned by the Cooperative. These units are used mainly for the supply of water and sewage services in the community. The Department of Indian Affairs and Northern Development have three D-8 Caterpillar tractors and two twelve-yard scrapers at the site. This machinery has been used for airstrip and road construction and also for hauling gravel fill to improve the settlement roads and to provide gravel pads for house foundations.

Most of the heavy equipment has been obtained from the nearby radar station. During the past three years the equipment has become surplus to the needs of the station and has been sold to the Cooperative and to the Federal Government.

During the summer of 1967 a warehouse was constructed by the Federal Government for the shelter of goods and equipment. The 60 by 32 foot steel structure is covered with aluminum siding and insulated. It will be heated during the winter and the vehicles which are required to provide community services can be stored inside so as to reduce the difficulty of starting in cold weather.

Communications. Two radio sets are available for maintaining contact with other communities in the Arctic. The Mission maintains a scheduled broadcast with missions in the area and during periods of good reception can reach as far as Churchill, a distance of about 650 miles.

A radio set, owned by the Department of Indian Affairs and Northern Development and kept in the school, provides contact with the Canadian National Telecommunications operator at Cambridge Bay, 370 miles to the west. Connections can then be made with the national telephone network. Radio contact can also be maintained with other government offices in settlements to the west of Pelly Bay. There is no radio contact

between the settlement and the nearby radar station.

II. SOCIO-ECONOMIC FACTORS

Population

The population of Pelly Bay, at the time of the 1967 summer survey, was 148 Eskimo people plus three non-Eskimo Roman Catholic missionaries.¹³ During the school term a non-Eskimo teacher is also resident in the community. In the following analysis of the population structure of the community only the Eskimo people will be considered.

The distribution of Eskimo population by age groups and sex is indicated in Figure 11, page 178. The number of children under the age of fifteen years is 58 persons or about 45 percent of the total population. This figure is somewhat lower than that for the other communities which were studied, however it does infer the future need for increased educational facilities within the settlement. In the zero to four age group, there are nearly twice as many boys as girls, an occurrence which has been attributed to chance.¹⁴ The small

¹³Population statistics have been obtained from the records kept by the Roman Catholic mission in Pelly Bay.

¹⁴Dominion Bureau of Statistics, Canada Year Book 1966 (Ottawa: Queen's Printer, 1966), p. 249 states that "The smaller the total number of births the greater the chance of wide sex ratio variations from year to year."

number of persons in the age categories over fifty years can be attributed largely to the difficult conditions of life during past years when modern medical assistance and care was not readily available in the community and when food was obtained entirely from the limited renewable resources of the area.

A total of thirty-five individual Eskimo family groups reside in the settlement, and Table VIII indicates the span of family sizes. The average size is 4.2 persons per family with only two families made up of 8 or more persons.

TABLE VIII

PELLEY BAY FAMILY SIZE

Persons per family	Number of families
1	1
2	3
3	11
4	8
5	4
6	4
7	2
8	1
9	0
10	1
Total	<hr/> 35

Figure 12 indicates the past growth characteristics of the population and also shows a projection of the future

settlement size.¹⁵ The increase in numbers of people has been marked by a number of setbacks due to sickness, the most drastic occurring in 1960-61 when an epidemic of Asiatic flu killed over twenty persons.¹⁶ In the five year period preceding 1963 the population increase was a moderate two per cent per year. It is only after 1963 that growth in excess of five per cent per year is indicated.

A population projection, which is essentially based on an annual rate of growth of 5.5 per cent per year, has been made for the next ten years. It is assumed that the present rate of increase will be exceeded slightly because the improvement in aircraft landing facilities will permit an improved standard of health services to be provided. This projection, which also assumes no in-migration or out-migration of families, gives an estimated 1972 population of 190 persons and a 1977 population of about 250 Eskimo persons. Assuming an average family size of five persons, there will be forty-five individual families living in the

¹⁵ Population figures prior to 1965 refer to those people who attended the church at Pelly Bay and gathered there for festive activities. They may have been living in camps in the area or in the settlement itself.

¹⁶ Father Goussaert, Personal Communication.

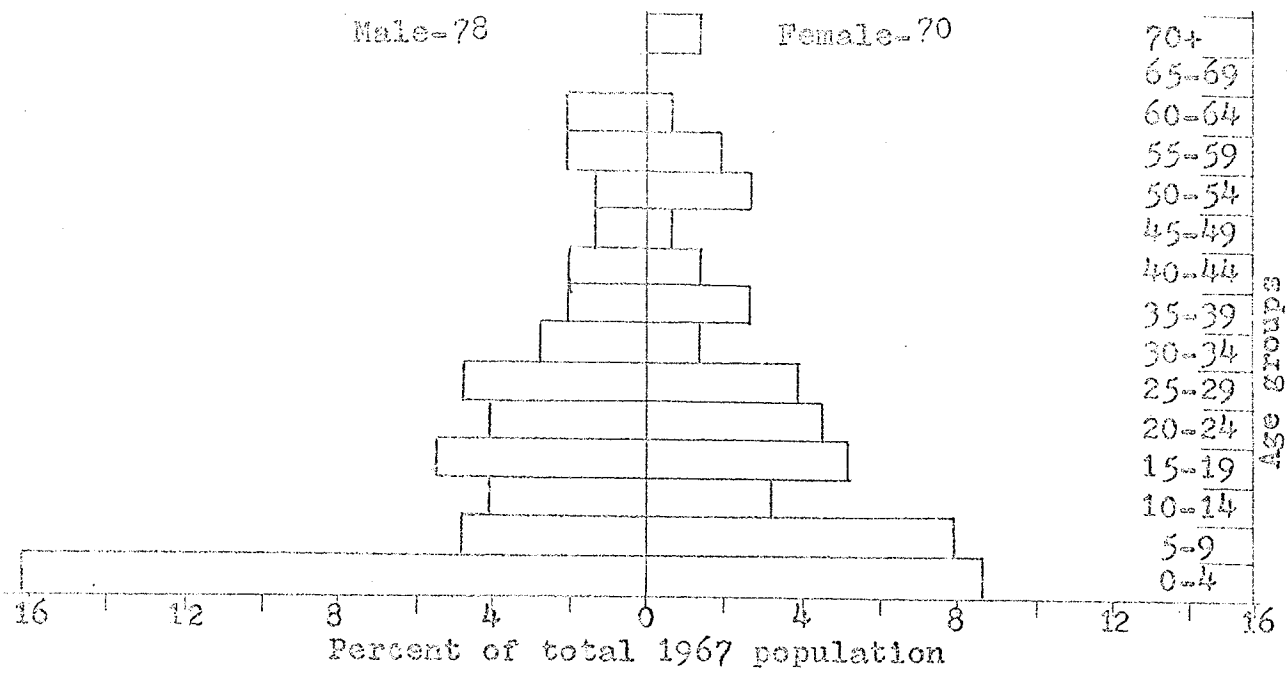


FIGURE 11

PELLEY BAY ESKIMO POPULATION

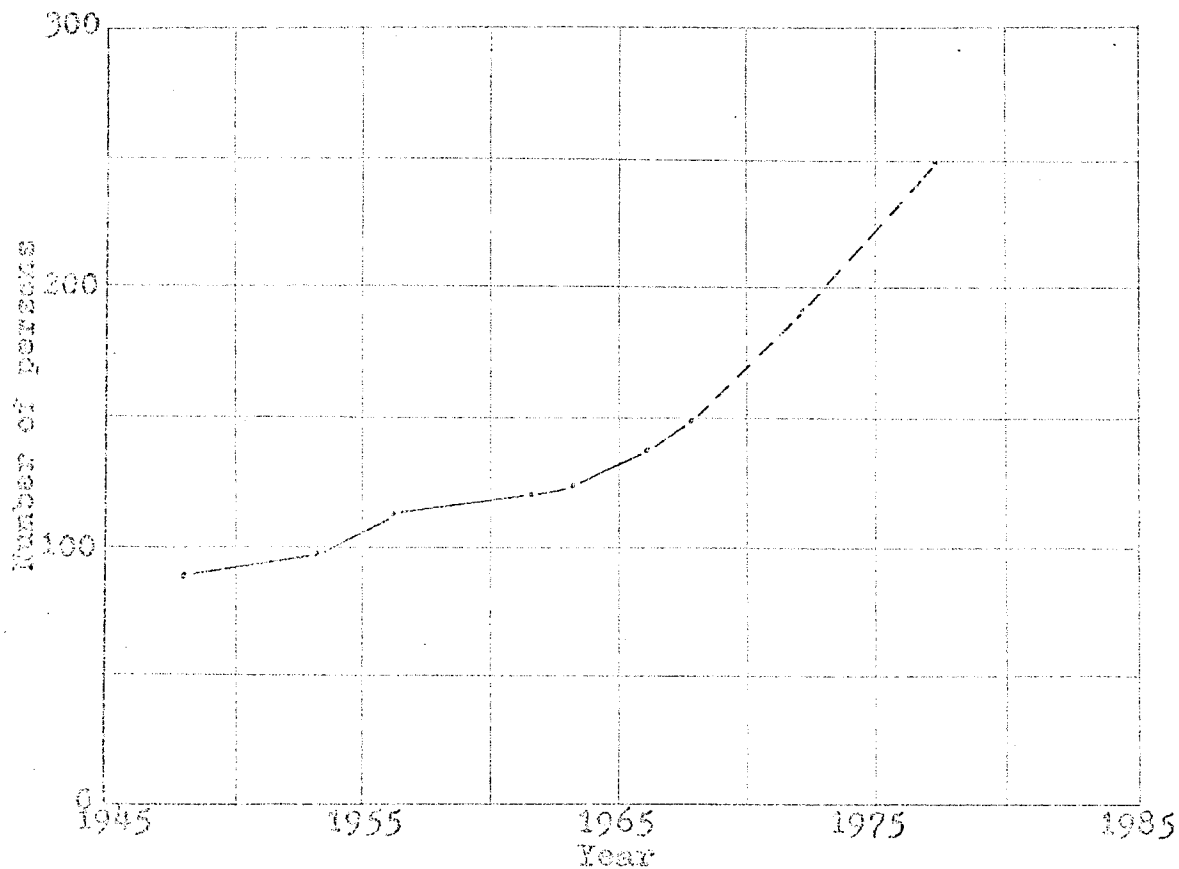


FIGURE 12

PELLEY BAY POPULATION
GROWTH AND PROJECTION

settlement in 1977. This indicates a need to provide accommodation for about one additional family per year throughout the entire period of consideration.

Economic Base

Natural resources. The natural resources found in the region of Pelly Bay still supply a large portion of the food which the people depend upon for their livelihood. Caribou and fish are the most important sources of food from the land. Seal and polar bear provide food, mainly for dogs, as well as cash income through sale of their furs. Caribou skins are important also for use as winter clothing suitable to combat the cold and wind.

While all able bodied persons take part in some hunting activities, only two families can be considered to depend entirely on hunting and fishing for all their needs. About fifteen families take part in hunting, fishing, carving and wage work in some combination to provide themselves with food and cash income with which to buy goods imported from the south. The Cooperative store is the commercial outlet through which furs are sold and imported goods are bought. It was estimated that the total cash income obtained from the sale of furs during the 1966-67 season amounted to eight thousand

dollars. This is an average of about \$360.00 for each of the twenty-two persons who took a major part in hunting activities.¹⁷

Due to limitations on the time available for on-site investigations and the lack of reliable information concerning the utilization of the renewable resources, it has not been possible to evaluate the efficiency with which they are presently being used. The resources, both renewable and non-renewable, in the Pelly Bay area have not been investigated on a regional basis. Research concerning the economic potential of the area is required before a reliable estimate can be made concerning the degree of self-sufficiency that the residents of the community will be able to maintain.

Craft work and cash income. A substantial proportion of the community's cash income is derived from ivory and bone carving and other craft work.¹⁸ This work is carried out on

¹⁷Files of the Department of Indian Affairs and Northern Development.

¹⁸During the past year seventeen males had an average income of \$245.00 from craft work, while twenty women had an average income of \$254.00. The highest craft work income received by a male was \$444.00 while a woman received \$883.00. Files of the Department of Indian Affairs and Northern Development.

an individual basis and sold to the Cooperative organization which sells the items to southern distributors.

In addition to the fifteen families whose income is obtained from a combination of hunting, carving and wage work, there are seven families who depend upon carving and wage work only for their income. Wage work has been readily available for all able-bodied persons during the past summer. The construction of an airstrip, thirty-two houses and a warehouse has provided ample employment opportunities, although only of a temporary nature. The provision of a community water supply and the collection of refuse also requires part-time work by two or three Cooperative employees.

The only full time employment opportunities presently available to the Eskimo residents are those of school janitor, Cooperative manager and medical lay-dispenser. Total settlement income has been estimated at about forty-six thousand dollars for 1966. This indicates an average family income of approximately \$1,400.00.¹⁹

In addition to the national assistance payments such as childrens' allowance and old age pensions which are paid

¹⁹Ibid.

to all eligible Canadians, welfare payments are made to disabled males and widows in the community. All able-bodied family heads are apparently capable of providing a satisfactory level of living without direct welfare payments. Social assistance in the form of groceries and clothing issues have been made to about three families. The total amount of assistance has averaged about \$400.00 per month.²⁰

Cooperative activities. The economic advancement of the settlement is assisted through the cooperative organization in the community. The Koomiut Cooperative, which obtained its charter in 1966, encourages group efforts in an attempt to utilize the natural and human resources of the area for the benefits of the community as a whole. Through its contact with southern organizations, it is able to obtain supplies at wholesale prices and also to obtain the best prices possible for goods such as furs and craft work which the residents export. The Cooperative is made up entirely of Eskimo members. It is engaged in the following activities:

1. Retailing of food and dry goods;
2. Encouragement of local industry by the purchase of craft articles and skins;

²⁰Department of Indian Affairs and Northern Development, Welfare Branch files.

3. House, road, and airstrip construction;
4. Provision of water and sewage services;
5. Maintenance of ice airstrip;
6. Development of commercial fishing and other resource harvesting activities; and
7. Establishment of tourist and transient facilities.

The Cooperative has given the residents an element of control over their economic position. The provision of supervisory services, as well as labour, gives the people of the community a feeling of taking part in the decision making process. This is necessary to encourage further development of individual incentive and and thus continue to improve existing conditions. Profits, which are realized from the activities in which the Cooperative is engaged, are distributed to the members and are not taken out of the community.

Social Factors

Social organization. The opportunity for social contact between the people of the settlement and outsiders has been limited, due to the isolation of the area and the difficulty in travelling to it. The main visitors to the settlement are government employees and, mainly due to the language barrier, the greater part of their contact is only

with the younger members of the community who understand English, or the non-Eskimo residents. There has been little contact with the people of the D.E.W. Line station and the Pelly Bay Eskimos. None of the local people have been employed at the station and they have gone there in the past only to obtain supplies flown to the site, or to pick up scrap lumber from which to build houses. With the completion of the airstrip in the settlement, there will probably be even less contact with the D.E.W. Line personnel.

Transistor radio receivers, which are owned by nearly every family, are further important sources of outside influence. Short wave reception is generally good, however standard broadcast is difficult to receive due to static interference.

The Federal school is the present social center for the community. Its facilities are used for movies, dances, bingo, and similar activities. The school is presently small and cannot satisfactorily accommodate a larger population. The Mission is also an important gathering place. In addition to religious services, it is often used for general meetings to discuss community matters.

The Koomiut Cooperative appears to be the greatest generator of community spirit and cohesion. Every family is

a member and all decisions are made by the Eskimo officers and directors, who are elected by the members. The organization is instrumental in encouraging individual involvement and interest in community activities.

A Local Housing Authority has also been organized, as required under the Eskimo Rental Housing Program. Its five members, made up of two women and three men elected by the adult members of the community, actively participated in organizing the housing construction program and in setting rental rates.

The continuing dependence on hunting and fishing to supply a substantial portion of the Eskimo's food necessitates that the way of life be still characterized by annual cycles of movement. However, modern boats and motors, skidoos and better camp equipment have assisted in lessening the hardships associated with such activities.²¹

During the fall the majority of families move to the fishing grounds at the mouths of the many rivers flowing into the sea, particularly along the coast to the north of the community. All members of the family participate in

²¹Asen Balikoi, Development of Basic Socio-Economic Units in Two Eskimo Communities (Ottawa: Queen's Printer, 1964), pp. 1-78, describes in considerable detail the way of life before the establishment of the mission in 1935-6 as

catching the Arctic char and storing it for winter use.

After freeze-up the families move back to the settlement.

In winter the men trap on their own, or in groups of two or three. They also hunt for polar bear at this time. In the spring, seal hunts are carried out at the edge of the ice floe. Again the entire family may take part in this activity and live in tents near the open water.

In summer seal hunting and fishing in the sea and river near the settlement are the major activities of the resource oriented families. Hunting is often limited to evenings and week ends since it is during summer that part time construction work becomes available. Caribou, which may have migrated into the area from the south, are also obtained during the summer period.

Administration

For governmental administration purposes, Pelly Bay is under the direction of the Spence Bay Area Administrator. He lives at Spence Bay, a community located about 110 miles to the northwest of Pelly Bay. He, in turn, is responsible

well as the more recent changes which have taken place as a result of the centripetal forces which have brought the natives together into the present community.

to the Regional Administrator at Yellowknife. The day-to-day administration of the community is carried out by the school teacher or, in his absence, by one of the missionaries. Periodic inspections by the Area Administrator are made.

Education and religion. Education facilities consist of a one room school erected in 1961. It includes residential accommodation for the teacher and the janitor. Attendance is limited to the school capacity of about twenty students with classes of instruction given to grade six. About ten additional students are annually air-lifted to Chesterfield Inlet for the school term.

The Roman Catholic mission is the only religious institution in the settlement and all residents are of the Catholic faith. The missionaries, in addition to their religious teachings, assist the people in the physical and social development of their community. They are experienced carpenters and have contributed greatly to the construction of the new houses and transient quarters.

Health care. Minor health care is presently provided by the priests. A recently appointed lay-dispenser is

expected to arrive in the fall. Cases requiring intensive treatment are flown out to nursing stations at Spence Bay or Cambridge Bay or to hospitals at Yellowknife or Edmonton. A medical team from the Department of National Health and Welfare make annual visits to provide immunization, chest X-rays, dental treatment and general health check-ups.

PART C

COMMUNITY PLANNING IN THE ARCTIC ENVIRONMENT

CHAPTER IX

THE NEED FOR COMMUNITY PLANNING

The content of this thesis has thus far indicated the concept and purpose of community planning and also described the Arctic environment within which people carry out their living activities. An assessment of this information, as briefly outlined in this chapter, has indicated that community planning has been neglected in the past. This lack of planning has led to a situation in which improvement would seem to be most desirable.

I. THE EXISTING SITUATION

The development of communities in the Arctic has been characterized by either an unco-ordinated and random pattern of growth or by partial planning based on design principles more characteristic of southern latitudes. Little or no heed has been paid to the special physical, socio-economic and technical requirements peculiar to the environment. The random distribution of buildings in widely separated locations, as in Chesterfield Inlet, cause the residents unnecessary exposure to the severe climatic conditions and make it overly

difficult to provide adequate water and sewerage facilities. The standard layout of a subdivision with the street system determining the orientation of buildings, as in Pelly Bay, will create problems due to snow drifting and poor sun lighting and view for many of the dwellings. The location of small buildings in a valley, as in Repulse Bay, causes them to be completely covered with snow, resulting in physical harm to the structure in addition to creating a fire hazard by blocking exits.

In the absence of conscious planning, the location of buildings appears to have been considered on an individual basis only and their relation to health conditions, grouping of facilities, climatic and terrain peculiarities of the area and other developmental activities have not been fully recognized.¹ In effect, man has exaggerated Arctic hardships by inadequate siting of community facilities. Consequently facilities which are required to improve conditions within the community will be more costly and difficult to provide in later stages.

¹The confusion in allocation of land-use throughout the entire Northwest Territories is exemplified by the following questions, concerning the rights of Indians and Eskimos, raised by a member of the Council of the Northwest Territories.

Since community planning is concerned with a particular area or community, it cannot be divorced from the local scene. Local participation is required to ensure that the values and priorities which the people hold are translated correctly into an action program which will have an adequate balance between physical efficiency and human satisfaction. There is little evidence of such participation by local people in past developments within the Keewatin Arctic. Only in Pelly Bay is there a local organization which can be assumed to have some influence over community affairs. In other communities the majority of decisions were made by non-Eskimo people, either residing in the community or at southern centers. The growth of the communities has been influenced mainly by outside forces and not as a part of an on-going social and cultural adaptation by the local people.

"... in a settlement how are rights to land decided? Who decides where the Co-operative wharf should be and where the road is to their land and so on? There must be some kind of process in the allocation of land. How about the allocation of rights of land to Eskimos in these settlements?" It is interesting to note that these questions were considered to be a statement and discussion passed on to other matters without further clarification of these points. F. Vallee, Council of the Northwest Territories Debates, 29th Session (Ottawa: 1965), p. 92.

There is a lack of co-ordination of activities between the various organizations within the community. Each has developed as a relatively complete entity, with consequent duplication of services and facilities, rather than combining to create a better community. The existence of leases, covering the best land, has been a restraining factor in the growth of compact, functional communities. Overcrowding in some dwellings, particularly Eskimo residences, and under use of others, belonging to outside organizations, indicates further need for overall planning and co-ordination.

Community planning is concerned with physical development which follows a pre-conceived or consciously derived "plan." Such a plan is usually drawn up with consideration of the influences of social and economic factors and with consideration of the priorities which the local people may desire. The complete absence of a development plan is a further indication of the lack of planning under which existing Arctic communities have grown.

Inadequate planning is evident in areas other than the physical development of the community. Health care appears to be mainly concerned with curing the illness only, not going further and also removing the causes of illness,

such as poor housing, inadequate services or inadequate food. Educational instruction does not adequately prepare the people for earning a living under Arctic conditions but rather for a southern oriented way of life dependent upon wage work, which is available in only a limited way. The lack of instruction concerned with how to harvest the resources of the area more efficiently or how to repair skidoo or canoe motors leads to inefficient use of modern equipment with consequent waste in time and energy.

The provision of individual services, resulting in the attendant insanitary surroundings, the scattered, inadequate dwellings, the lack of local organizations to deal with community problems and the lack of meaningful employment opportunities are but some of the adverse results of uncoordinated, piecemeal planning carried out by the many individuals and agencies which together form the Arctic communities. Communities have developed as a result of a largely unconscious evolutionary process. This way of life may have been suitable in the early days before the contact between the Eskimo and white cultures. However the mixing of the two ways of life has resulted in a changing situation in which the process of natural adaptation by the people

living in the north cannot keep pace with their needs and desires. It is necessary, in order to provide a more satisfactory living environment for all Arctic residents, that future developments be guided in a conscious, purposeful direction which can be understood and appreciated by all persons concerned.

II. COMMUNITY PLANNING

When considering community planning in Arctic communities, two basic questions present themselves. First, is there a need for comprehensive planning in the Arctic environment, and secondly, how can community planning contribute to improvement of the existing situation?

Planning, in the sense of anticipating and attempting to exercise some influence on the direction of future events, is an important human process. There is an element of planning in every rational action and we plan some phase of our life all the time, whether we recognize it or not. The Arctic environment is a situation in which planning is required, not only to provide a satisfactory level of living but even for survival. For example, the distances between communities are so great and the means of travel so expensive,

and often so hazardous, that elaborate plans must be made for even a trip to a neighboring community. Planning is of basic importance for developing communities which provide a satisfactory environment for northern living. The need for planning is felt as much in the Arctic as in any other particular location in Canada.

The foregoing Chapters have indicated that past activities have not brought a high level of living to the majority of northern residents, have not created the most pleasant surroundings in which to live and have not brought all of the benefits of national life to the Arctic. There is an evident need to reconsider the variety of activities which are carried out in each community on a more comprehensive and rational basis. More than the physical aspects of the situation should be considered since the form of a new or expanding community is influenced by the people living there. The equipment which the people use and the ideas and values which individuals live by are often as important as the areas that are improved. Good features should be preserved. The existence of adverse conditions call for the serious consideration of their fundamental causes and the determination of responsibilities for both alleviating them

and preventing their recurrence in the future. Community planning provides a means in which to improve the situation in a logical co-ordinated manner.

It can be assumed that successful planning tends to make people's lives happier because it results in a physical environment which is conducive to health, which provides for convenient and safe passage from place to place, which facilitates social exchange and which has visual attractiveness. The economic results of good planning also produces increased happiness but not quite so directly. A proper spatial relationship between the constituent parts of a community and an efficient arrangement of communication routes all result in human activities being carried on more efficiently and less wastefully; but the results are not always clearly evident so far as they affect the welfare of a particular individual at a particular moment in time.

From the foregoing, a third question arises concerning the manner in which community planning can be carried out in the Arctic communities. Possible solutions to this problem are taken up in Chapter X which outlines, in broad form, a number of principles, the consideration of which can point the way to the attainment of better Arctic communities in which to work and live.

CHAPTER X

PLANNING PRINCIPLES FOR ARCTIC COMMUNITIES

The following principles, which form guidelines for community planning in the Arctic, emerge from an analysis of the information set out in the preceeding pages. This Chapter will consider some of the basic ways in which these planning principles can help to improve the existing situation. Because these principles are shaped and limited by reference to the communities which have been studied, it is not possible to propose final solutions to specific problems in the development of Arctic communities.¹ It is intended to set out a framework within which solutions may be sought, based upon a full realization of the variety and complexity of relationships which exist in all phases of life in the Arctic environment.

The consideration of planning principles is divided into two broad categories. The first is concerned with

¹The term "principle" as used in this thesis is not intended to convey a meaning of finality concerning general Arctic development insofar as such a brief study does not allow a rigorous evaluation and proof of the statements. The propositions are presented in a tentative state and in the form of hypothesis based on the information as set out in the existing work.

physical problems of the environment and the second with the socio-economic difficulties and needs. This is not intended to indicate that the two are not related, for they are. It is but an arbitrary division to create manageable units in order to see more clearly the overall relationships which need to be considered.

I. PHYSICAL PROBLEMS

Basic Considerations

Coinciding with the growth of communities in the Arctic there has also been a growth of associated problems. Fresh water supplies suitable for a few people can become too limited for a population of several hundred persons. There may be few suitable building sites, a poor harbour, a difficult airstrip site or the disposal of sewage may become so complicated that serious health problems are presented. These difficulties may be so expensive to overcome and so acute that the best solution from a physical and health standpoint may be to move to a better location. Such a move is hard to decide upon, since growth is generally gradual, and less expensive and less drastic measures can usually be found to meet immediate needs.

The site requirements for the present and anticipated

future function of the community should be a fundamental consideration when planning in the Arctic. The original reasons for the location of a particular community may no longer be relevant to its needs. A consideration of both the physical and social costs should be made before improved facilities are constructed at the site. Such construction will involve a capital investment which will really mean a decision to stay whether it is based on sound judgement or on an unwillingness to initiate action which will change the existing situation.

The idea of flexibility and adaptability must also be a foremost principle in planning for improvement. The ability to successfully provide for inevitable growth and change is particularly important in the Arctic where communities are small and the standard of living desired by the residents is continually rising. The degree to which adaptability might be required is indicated by the past movement of over one-half of the population of Chesterfield Inlet to Rankin Inlet in response to the opening of the nickle mine. Changes in numbers of people have been less dramatic in other communities, such as Pelly Bay, where the population number has been relatively stable for several years. However other less noticeable social changes have occurred as the Eskimo men began to

operate mechanical equipment and carry out construction work, in addition to their traditional hunting and fishing activities. Community planning which considers the need for physical adaptability should therefore anticipate both stable and changing factors in the lives of the coming generations and provide the means for the best accommodation of these changes.

Physical Planning

Although the majority of communities in the Arctic are small it is just as important that they function in a co-ordinated and organized manner as it is for communities several times larger. Individuals and families are the basic elements which make up all sizes of communities and they have several basic and common needs, even though the physical environment may differ. As growth and change takes place the arrangement of facilities to accommodate it must follow some plan, even if it does so unconsciously. The action of setting down principles which can guide such planning indicates, in an explicit manner, the way it is intended that development should occur.²

²This is contrast to development which occurs in a haphazard manner. The principles which guide such development are evident only in an implicit manner and can be exposed for examination only after the action has taken place.

The environment created within an Arctic community should reconcile the maximum opportunity for individual choice, in living and working and whatever else is done, with the protection of the individual from the adverse effects caused by the action of others and by the action of the elements of the natural environment. The following principles are therefore consistent with this general requirement.

1. The functional parts of the community should be arranged so that each part can perform its function with a minimum of costs and conflict. It is important that the physical positioning of elements is not only functional in the sense of working but that it also be comfortable and pleasant, that it have amenities and that it provide opportunities for visual enjoyment.

2. Each part of the community should be developed according to sensible standards consistent with building requirements, sunlighting and views, climatic determinants and open space needs.

3. Schools, recreation facilities and other community services should be provided at a high standard of size, location and quality.

4. A circulation system should link each part of the community. Links between the community and outside centers should provide for the physical movement of people and goods as well as for communication of ideas and entertainment by radio, television or other communication media.

5. Housing which is safe, sanitary and pleasant should be provided. A variety of dwelling types to meet the needs of all the kinds and sizes of families, in all their varieties of different desires, and to effectively meet the difficulties imposed by the harsh climate and land form is required.

6. Water supply, sewerage and other utility and public services should be provided in an adequate and economic manner for all residents of a community.

Site planning. The physical condition of the site and the pattern of development which grow on it has a direct influence on the efficient functioning of the community. Although the existing Arctic communities are small and contain few activities of a commercial or industrial nature, the need for a functional pattern of building distribution based on residential, commercial and industrial needs is no less important than for any other community.

The major feature of the site design of an Arctic community should be its compact framework. Development at relatively high densities is desirable in areas of rugged terrain, adverse climate and isolation. The planned community should therefore be consolidated and broad, rather than long and narrow in strip formation. A high density of buildings will solve problems of moderating the micro-climate and reduce the walking distance between functional areas. It can also serve to help reduce costs of providing adequate water and sewerage facilities and create maximum protection from the adverse effects of the severe external environment.³

³Considerable experimentation with compact building layouts carried out in Russian towns has indicated that they

The community center should be established as supreme and include such facilities as administrative offices, schools, community hall, retail stores and other office and service structures. The residential buildings could then be grouped in proximity to the center in order to conveniently share the services and facilities which would fulfill the requirement for meeting places in which the social life of the community could develop. This would provide an alternative to the privacy of the home. The degree of density of building development which would be desirable, from a sociological or physiological standpoint, has not as yet been determined for the northern areas. Much research into the needs of the Eskimo family, as well as the non-Eskimo people moving up from the south, is required to determine realistic limits. Research is also required to determine the basic economic relationships between large multi-story buildings and the existing small units in order to help determine the types of structure which are most desirable.

have advantages over small scattered structures. Refer to: B. V. Murov'ev and T. V. Rimskaya - Korsakova, "Town Construction and the Acclimatization of People in the Far North," Problems of the North, No. 6, 1962 (Translated by N. R. C.), pp. 83-90.

Orientation of buildings should be such that all favourable views, particularly of the sea or lake areas, are used to advantage. Sunlighting aspects require particular emphasis because of both the low angle of the sun and the large horizontal angle during which it is continuously above the horizon in the summer. This allows deep penetration of sunlight into buildings and necessitates the accurate placement of windows to provide the greatest benefit. The lack of sunlight during the winter requires that artificial lighting facilities be adequate for the needs of the residents.

Doorways should not face into prevailing winds, nor should they be on the lee side because of the snow drifts which occur there. Snow, while it does provide some insulation and shelter during the winter, makes movement difficult and is slow to melt in the spring. Therefore snow fences or other controls are required to keep its adverse effects within the community at a minimum. Narrow valleys which often fill with snow are to be avoided for building use unless multiple story structures can be used.

In a small community the need for specific use zones is limited. However, it would be advantageous to have some degree of segregation between nuisance functions and

residential areas. For example a specific location for a dog compound would be more desirable than allowing them to be tied adjacent to dwellings where they add to insanitary conditions. Oil storage tanks and power houses should be located on high ground on the down wind side of the community so that noise and fumes are not so readily carried into the area. Because the communities are generally small and the surrounding area provides a nearby unlimited expanse of open space, there is no pressing requirement for large parks within the community itself.

The circulation pattern forms the basic framework upon which the community will grow and develop. Foresight in adapting the community plan to the natural site will accommodate the economic installation of services with no major movement of existing structures nor excessive road crossings. The road pattern should take a form that is suited to the topography. It should slope in the direction of natural water flow so that drainage is not blocked along upper road edges and the need for culverts can be kept to a minimum. In view of the prevalence of permafrost conditions and rock, it is generally not economically feasible to carry out extensive earth movement to drastically alter a difficult site. In general all earth work requirements should be based

on the use of fill material only.

Within the community the main mode of movement will be by walking or by over-snow vehicles and trucks. Roadways therefore need not be extensive in width nor in standard of construction to fulfill their basic requirements. A good road is required between the beach docking site and the storage facilities, in order that material brought by sea lift can be placed in shelter as quickly as possible. Similarly, adequate access is required between the community and the aircraft landing areas.

Housing

The housing problem in the Arctic is characterized by several important elements. Firstly, there is the need to provide higher standards of living accommodation for the native people both in terms of more space and better facilities. New standards arise and conditions which were acceptable in earlier generations are no longer tenable. Secondly, there is the growing demand for new housing caused by the steadily increasing population. Thirdly, there is the need to prevent deterioration of existing structures and ensure that the best and most efficient use is made of all facilities. The problems associated with Arctic housing is a field to which a short study of this nature cannot do justice, however a consideration

of some of the more important factors can be made.

Factors which make housing adequate or inadequate for human living are essentially health factors.⁴ A home should provide a physiological environment which regulates illumination, moisture, sound, temperature and ventilation, and also a social environment which promotes emotional security and ensures the opportunity for privacy for the individual. Adequate dwelling space, properly organized, is essential for the well being of the family. Crowded quarters are difficult to keep clean and make proper care of infants or the ill and infirm an impossibility. Crowding increases the danger of spreading communicable disease and may also produce nervous situations as detrimental to mental health as infection is to physical health.⁵

Decent accommodations in a satisfactory environment, designed for people as individuals and families, is as desirable for the Eskimo population in the Arctic as it is for other Canadians. Suitable housing must serve the basic

⁴Health is considered to be a state of physical, social, and mental well being and not merely the absence of disease or infirmity.

⁵American Public Health Association, Planning the Home for Occupancy (Chicago: R.R. Donnelly & Sons, 1950), p. 1.

human needs. It is influenced by the social and cultural customs of the people it is to serve. The way of life, values, motivation, beliefs, education, income, occupation, health, age, and degree of conformity which characterize the residents will shape answers to how people live and want to live. Many of these characteristics have not been determined for Eskimo people and some are presently undergoing rapid changes, particularly the way of life, education and occupation.⁶

In considering Arctic housing needs there are three relatively distinct groups which must be looked at. Firstly, there are those people who have come from the south and who demand, and get, housing and service facilities which are not far below the level which they were accustomed to in the south. In general, these facilities are supplied by the organization for whom they work and they pay only a nominal fee for its use, thus the high cost of shelter does not adversely affect them. Secondly, there are those Eskimo people who depend mainly upon steady work within the community for their livelihood. The third group are those Eskimos who still

⁶ This is not to imply that all of these factors are known and understood about non-Eskimo people. However there is little evidence to show that there has been adequate study of and concern for these factors in the design of existing facilities for Eskimo people.

obtain their livelihood from the wildlife of the country and spend some time during the year away from the community while hunting and trapping. The latter two groups are fully responsible for their own costs related to the provision of a satisfactory living environment.⁷ These two groups, who require the greatest improvement in present housing conditions, are the ones for which least is known about their values and needs.

Although standards by which to design and to judge the adequacy of housing for non-Eskimo people have been developed, there is no assurance that similar standards will be acceptable for Eskimo families.⁸ For example, cultural and economic differences may mean that only one person per room may not be a desirable standard or that more than one family may satisfactorily share a dwelling unit. Similarly, the need for adequate storage and work space associated with fur preparations and butchering activities may mean that space and room

⁷ Government assistance in the form of financial assistance, loans for housing or rental subsidy are provided only after there is indication that the individual cannot maintain a desirable level of living for himself and his dependents.

⁸ For a comprehensive treatment of housing needs see: Glenn H. Beyer, Housing and Society (New York: Macmillan Co., 1965).

utilization should not be the same for both a family who lives by hunting and trapping and one who is employed on wage work. What the desired standard might be has not yet been determined, for it would appear that all dwellings are much below an adequate size in terms of space and room separation. Utilities are much below the level which would be considered adequate for healthful living in the south.

The standard which is provided in the south will undoubtedly also become that for the north as well.⁹ Continued contact with southern people, the use of more modern facilities in public buildings, such as pressure water systems and hot water tanks, the increased dependence upon canned or otherwise prepared foods imported from other areas and increased radio communications will also increase the desire for better facilities by all residents of the Arctic. The independence which wage work gives to individual family members can be expected to increase the desire for greater privacy and independence within the home. Cultural and economic factors may limit the capacity of families to improve housing, but their desires and needs can be expected

⁹It is relatively easy to adjust to facilities or services which are of a higher standard of convenience than one has been used to, but very difficult to adapt to a lower level. Therefore it seems reasonable to assume that the standard of facilities which are presently made available to

to continue to rise above the present stage of development.

A brief analysis of the housing and building problems of the north indicates that planning should consider the following criteria if improved conditions are to be provided. The environment requires that shelters be simple and constructed of light weight material, but well insulated to conserve heat and reduce drafts, ventilated to control condensation and fitted with facilities which will provide comfortable living. There must be adequate storage space, for clothing and provisions, and adequate sleeping space to meet the requirements of large families.

The creation of compact development is desirable for the reduction in cost of servicing, lessening of exposure to the harsh climate and improvement in microclimate conditions. By utilizing varying set-back distance, units could be linked into rows without greatly reducing privacy. This would permit centralized services and allow efficient heating units and other utilities to be used. The use of apartment blocks

the non-Eskimo people will be maintained, or improved, in the future and the Eskimo will be exposed to services and ways of life which he will deem to be more desirable than that which he now has. Whether or not he will be able to attain similar facilities will not diminish his desire for the improvements they can bring.

would appear to present the most benefit in terms of servicing from a central core. Multiple family dwellings would be most efficient for non-Eskimo people and those Eskimo families employed at wage work. Families engaged in hunting activities require a large amount of equipment and are better located at ground level with adequate outdoor space for storage and other uses associated with their work.

Where separate houses are necessary, the two storey dwelling has certain advantages. Heating and servicing facilities and storage space could be placed at ground level. This would help to eliminate cold floors in the living areas above. Interiors should be efficiently designed since, in the Arctic, space is not only expensive to enclose but also to heat. The architectural treatment of this type of building must ensure that the ground floors of buildings along Arctic streets do not become characterized by storage areas and sheds.

It is essential that all structures be easily and economically adaptable to the Arctic environment.¹⁰ The predominant building material presently used in the Arctic is wood, even though it all must be imported. The main reasons

¹⁰It should be noted that "economical" does not mean closeness of expenditure or stinginess, but the efficient management of money. For example it is not sound economy to reduce the size of a dwelling below the point at which the efficient management of the household is a possibility.

for the extensive use of wood are its high strength to weight ratio, its ease of cutting and fastening, its rigidity and its good thermal properties. Limitations arise due to its susceptibility to fire, the low number of stories which can be erected with it and difficulty in making windproof buildings.¹¹ The high cost of transportation suggests possible savings in using other light weight materials. Weight reduction can be achieved by the use of plastics which have a high strength to weight ratio, resilience, good thermal properties and a high resistance to water vapour transmission and water absorption.¹² Aluminum siding is also useful as a light weight wind proofing material.¹³ Stone or gravel is the only permanent building material locally available, however poor insulating qualities and difficulty in handling make it economically unsuited for building purposes, other than for foundation material.

¹¹R. F. Legget and H. B. Dickens, Building in Northern Canada (Ottawa: National Research Council, 1959), pp. 23-28.

¹²Refer to R. E. Platts, The Role of Plastics in House Structures (Ottawa: National Council, 1964), for an analysis of the future role of plastics in the construction field.

¹³Several of the government buildings in Rankin Inlet make use of metal siding. The Mission at Repulse Bay is also covered with this material. Personal Observation.

Foundations of heated buildings may conduct heat to permafrost strata and melt them. Structures then settle unevenly and fail. Insulation, vapour control and venting of structures should be co-ordinated to provide stability as well as comfort. Methods and techniques have been developed to provide stable building foundations in permafrost areas, however they are expensive, mainly due to the large margin of safety which must be incorporated.¹⁴ Continued research is required to provide a satisfactory answer to the problem of building on permafrost material.

Utilities

As soon as the standard of housing is raised from the temporary snow house or tent to more permanent buildings, services and utilities should be provided to maintain a consistent standard. The use of snow and ice for winter water supplies and the hauling of water by bucket during the summer cannot be deemed compatible with community living. The placing of sewage and garbage just outside of dwellings or in areas where dogs can dig through it can only be considered a temporary measure until improved facilities and methods of disposal are

¹⁴Legget, op. cit., pp. 10-12 contains a description of the various methods currently used to provide stable building foundations in Arctic areas.

developed.

Community planning in the Arctic is more concerned with utilities than would otherwise be the case in the south because service lines are generally placed on or above the ground surface rather than below. Such a situation creates problems in appearance of the community and with traffic circulation. If only certain groups of people are supplied with the utilities the lines thus form a highly visible sign of class distinction and segregation according to economic criteria. If haulage systems are used, adequate vehicle access must be provided to the building units throughout the year necessitating large expenditures for road construction and snow removal. Solutions to these problems lie in the application of modern technology to make adequate facilities available to all residents. In view of the desirable influence which a high level of services has on the health of community residents it is necessary to examine in some detail those services which may be provided. Because the method of servicing influences the layout of the community it is important to have an understanding of the requirements of the various systems which can be used. Therefore, Appendix D contains a concise documentation of the service systems presently in use in the Arctic and of methods which can possibly

be developed further.

II. SOCIO-ECONOMIC CONSIDERATIONS

The nature of the physical arrangements of a community will affect all levels of the environment. The addition of greatly improved physical facilities are needed in Arctic settlements, but these improvements can be only considered as a part of the solution to a broader problem. The social, cultural and economic forces which exist within the community will be reflected in the level of services which are desired and the priorities which are given to each. This section will consider these aspects which bear so heavily on the creation of better Arctic communities.

The following principles have meaning for the attainment of this objective.

1. Planning should grow out of the expressed interests and needs of the people and not be imposed by persons from outside locations.

2. The persons who will be directly affected by the results of planning should have a share in the making of the plan if democratic values are to prevail. The meaning of planning in terms of its implications for the people affected by it is an important consideration.

3. Planning should be carried out by a process which combined informal meetings and discussions with the more formal methods of committee work. An attempt should be made to reduce to a minimum the objections and resistance to planning during the planning process rather than during consultation at the end of the plan.

4. A full consideration of the rapid and recent changes in the way of life of the majority of northern residents should be made during the planning process. The values attributed to the existing institutions should be investigated to determine influential factors in controlling future changes. The planning process should be carried on in such a manner that it is an educational process familiarizing the Eskimo people with the values and ways of southern people whom they must deal with in order to obtain greater benefits.

5. The economy of the community should be carefully evaluated in order that planning can be carried out on a realistic basis.

6. The pressing need for gainful employment, in jobs socially defined as useful and productive, means that plans should provide for the fulfillment of this requirement in the most efficient manner possible. An adequate economy is required to support the population in accordance with the more modern standards which they have been taught.

7. The implementations of planning programs or proposals should be carried out with the help of the resources and skills embodied in the residents of the area and not only by people from outside southern locations.

8. The need for improved methods of administration and local government organization should be considered in order that plans may be implemented in an efficient and effective manner.

9. Planning should be guided by a professional who is familiar with the many diverse relationships which develop within a community and which need to be properly understood in order to plan effectively with the people.

Social Factors

In the northern isolated communities the main contact with the dominant white culture has been through the work of store managers, missionaries or government officials.

Although the desire for the goods and facilities from the south is strong, the values which the white man holds for work, time or savings may be partially alien to the Eskimo way of life. Very often the things in life which are important to the native may be difficult for the white man to understand. It is unacceptable to impose standards and facilities which are not understood or that are out of harmony with life in the community. Therefore, unless improvement programs are tied closely to local educational and employment opportunities, dramatic changes based on unfamiliar concepts may not be effective. This does not mean that larger and better homes, for example, are not required, but it does mean that the process which is used to achieve their most efficient use may require extra-ordinary care in formulation.

Community development should be linked to educational programs carried out in the area. The schooling of indigenous children is necessarily oriented to opportunities for participation in a modern life different from that which their parents can understand and in which the English language predominates. Unless some unusual factors operate, the parents will never acquire the needed skills and knowledge to reach, or even accept, the goals towards which the children are oriented.

Either a gap, fostered by the school, will continue to grow between the child and the family and community, or else the child will be unable to embody the whole program of social change and his schooling will be unsuccessful. Community development, which must form a part of successful planning in the Arctic, should aim to bring the whole group into the modern world, avoid the split between the generations and also avoid the ineffectiveness of teaching merely the child.

The decisions which have a possibility of influencing a community's future positively are those which emerge from values shared by a sufficient number. The possibility of such influence is greatest if the mode of arrival at the decision commits people to it. People will receive their benefits gladly, perhaps even use them well, if they can be brought to see the undertaking as their own endeavour and if they can have an opportunity to participate in the formation and development of plans. In this respect it is therefore important that the native people have an opportunity to participate in effective local government, rather than continue to be administered by people from other locations.

Community participation in the process of decision making needs to be achieved for success in implementing change and bringing about improvement in the level of living, better

education and better working methods. Ideas are as important in cultural change as are materials, but if ideas are to bear fruit they must reside in the minds of the people, not merely in the mind of a planner or administrator. They must become a part of the culture of the people and in the process, become integrated with the original ideas of the people.¹⁵ The distinction between plans and quick building or construction on one hand, and ideas and their slow nurture and unfolding on the other, is fundamental. It seems more relevant to consider planning activities which deal with cultural and value changes as a process of refinement rather than change.

The need for local participation in community planning activities is inconsistent with control from central offices outside the Arctic, particularly in view of the poor communication and transportation facilities which presently exist. The basic danger is that lack of local cooperation, support and morale may obviate any advantage which central control may have over local participation. If communities

¹⁵See: Murray G. Ross, Community Organization: Theory and Principles (New York: Harper & Brothers, 1955), for one view of the need to develop the capacity of the people to deal with their own problems and the assumption that for a "project or change to be meaningful, and fully used and valued, it must be an object of identification for the people who are to use and value it."

are not now sufficiently vocal and powerful enough to demand a place in administration and planning, continued disregarding of them will certainly not strengthen them.

Economic Considerations

The economy of any region is based, fundamentally, on the satisfaction of major needs of the inhabitants, notably the needs for food, clothing, and shelter. In the Eskimo economy of the Arctic communities, the satisfaction and fulfillment of these needs is characterized by a lack of a division of labour, which means a lack of exchange of goods and services within the community. The economic potential and the possibility of a steady income for all employable persons will be a major determinant of the level and type of facilities that are feasible.¹⁶ The critical problems, such as over-crowding, which often results, may be unacceptable from a health standpoint but it may be satisfying some of the immediate economic needs of the group, such as reduced heating costs and sharing of food or utensils.

For the majority of Arctic communities, the economic

¹⁶ For a brief review of several ideas concerning the economic potential of the Keewatin area, refer to John R. Hecht, The Keewatin Area of the Northwest Territories and the Economic Development of that Area, 1967. (Mimeographed).

future is very uncertain. With existing unemployment, rapid population growth and depletion of natural resources, the problems of realistic and functional community development will depend upon governmental policies which involve utilization of local manpower to the utmost. An extensive regional development program that stimulates activities in one area can also have dramatic affects in other areas. Therefore, as noted previously, the degree to which flexibility has been built into the communities will allow for their economic adaptation to a changing situation. In this respect the use of demountable or easily moved buildings may well determine the ease with which the Arctic communities can adapt to a changing economic environment.

The economic influence of Arctic life is evident throughout all phases of community planning activity but mainly felt in the need for improved housing conditions. Suitable housing and improved standards are essential if other programs such as education, health and employment are to be effective. All aspects of northern life and poverty are closely inter-related. Poor housing is instrumental in preventing adjustment to new ways of living in that it hinders the attainment of higher levels of education and contributes to poor health. An improved physical environment is essential if the economic and social

climate is to be enhanced and sustained.

Undoubtedly there is a need for improvements, but the major stumbling block is the lack of funds to finance them. Facilities in a large city are less costly because they are shared by a large number of consumers. In small Arctic communities, the combination of high costs and low income has created a situation in which the individual is hard pressed to provide for the needs of his family. There is no indication that mineral production will provide this generation with a source of income alternate from the declining renewable resources. Other sources do not appear to be able to provide an income which will finance the facilities needed to raise the standard of living nor to fill other needs of the expanding northern population. In view of this the federal government will be required to accept responsibility for the major portion of the northern economy, as it has in the past.

All Canadian residents should have access to full participation in all the opportunities that Canada affords her people. Because of the remote geographical location and the hurdles of language and cultural differences, the Arctic residents need a measure of extra assistance. Planners should realize the inter-relatedness of man's needs.¹⁷

¹⁷ Charlotte Towle, Common Human Needs (New York:

Frequently basic dependency needs must be met first in order that man may utilize later opportunities for independence. However such assistance should be accompanied by a vigorous, well-designed and comprehensive program of economic development so that complete and continuous dependence is not encouraged.

Administration

Planning is completed with the enlistment of extensive public support and understanding. The preparation of specific plans constitutes only a part of the planning effort. A large part of planning is devoted to the determination of guiding principles and the communication of them to the people concerned in order that if they understand the goals the product will be reasonable and desirable.

While the preparation of a physical plan is of great importance, it should not be limited to these features which can be drawn on paper. It should be supported by careful analysis and documentation of data collected at the community. The control of planned development should be expressed in regulations and ordinances which will ensure that both public and private development follows the plan. A method by which

this can be carried out within the framework of a local government organization is desirable in order that those who will be most affected by the plan will have an opportunity to take effective action concerning it.

Planning should be guided by a professional person who is familiar with the local situation and the relationship between physical, social and economic problems which will arise. His role can best be considered as that of a guide in helping the community establish and find means of achieving its own goals. He is required to give help and not be a passive follower. A successful planner helps the community to choose wisely about many factors, some of which he brings to light because of his expert experience, which influence development. His role is one of planning with the people of the Arctic, rather than planning for them.

There are professional people in Canada technically capable of carrying out most of the duties required to guide the residents of Arctic communities towards a better way of life. However there are few who have actually lived in the Arctic for any extensive period in order to personally experience the problems imposed by the environment. This currently makes it difficult to carry out meaningful planning because the realities of the situation are often not properly understood.

CHAPTER XI

CONCLUSION

The purpose of this study has been to examine, in some detail, the Arctic environment as exemplified by specific areas of the District of Keewatin and to attempt to determine how community planning can help to improve the existing living conditions. The relationships between the environment and the way of life of the Arctic residents were found to have changed rapidly, particularly during the past fifty years. It is in this rapidly changing and on-going process of life in the Arctic that planning can help to organize and give direction to otherwise unco-ordinated activities for the benefit of all Canadians.

The Keewatin District contains many anomalies. The majority of the people living there are descendants of the country's oldest inhabitants, but in speech and culture they must be counted among the newest Canadians. There are no true immigrants who have come with their families from outside areas to settle on this land. There are only those who stay a few years to make extra money or those who are dedicated to helping less fortunate people.

They live in communities scattered along the sea shore while the interior lands are unpopulated. The natural resources of the area around the communities can adequately support only a part of the total population. In other parts of the Keewatin District the resources have hardly been touched but distances are so great and modes of travel so expensive and hazardous that these resources are not being successfully utilized.

Despite the problems which face the Arctic residents, public financial assistance and health care has given them a level of living good enough to have a high rate of annual increase. At the present time the greatest number of persons are in the age group under twenty years. These people will be moving into marriageable ages and forming families during the next two decades. Because the present communities are not well developed, it therefore seems important to realize that now is the time to assess the needs of these expanding families and communities in order to find solutions to the future problems of Arctic communities. The application of modern medical knowledge can endow a stone age people with a relatively low death rate without waiting for the slow process of economic development or social change.

This does not solve the problems associated with the change but merely increases the urgency with which solutions are required.

The lures which have led to the development of the north have been exploration, economic profit, missionary interest, government sovereignty, social interests and welfare. In this era it seems necessary to come back again to economic aspects in order to develop a satisfactory level of living. Through the process of community planning it is possible to provide functional communities which will accommodate, in the best manner possible, the activities that occur within them. Good living conditions are required for all residents of the Arctic, not for just those who come from the outside.

Modern machines have had little effect on the natural landscape of the Arctic. However, modern civilization has had a great effect upon the social environment. The natural environment is slow to change and man adapts to it automatically. Man-made environment is subject to more rapid changes and there is no time for slow biological adjustment to new conditions which become technologically feasible. The differential in the speed of these two processes is filled with dangerous friction. In areas remote from industrial and

cultural centers the adjustment to a changing situation must depend upon the initiative of local people.

Efficient and economical transportation holds the key to much of the improvement in northern living conditions. Greater communication is required between northern residents and the rest of the Canadian population if they are to share equally in the benefits of the country. In addition, the specific requirements of sanitation and hygiene should be taken into account in the planning of communities. It is inadmissible to plan modern communities without service installations. Plumbing, heating and electrical installations are expensive and impractical in buildings not designed effectively for the environment.

Land now vacant in the Arctic is usually so because of the marginal nature of its ability to support life. With increasing population, the expansion of communities will have to be undertaken with caution. Development of new areas should therefore be a guided or planned movement of people, rather than a spontaneous one, to ensure permanence. Such guidance may require government participation. Methods to expand the economy of the Arctic are required if a viable situation is to endure. Single enterprise region residents

suffer because of the decline of that industry but also because they are unable to adjust readily to other occupations. The problems are most acute when few alternate occupations are available to the residents in the area. The failure of the fur trade, which was the major source of income for the Eskimo people for many years, provides an example of the precarious economic situation which exists in the Arctic. Employment in satisfying enterprises is required if welfare assistance is to be kept to a minimum in the future. Activities such as arts and crafts are desirable because both men and women can be producers, thus two people are available to support large families.

The physical development of Arctic communities should be based upon a sensitivity in design of buildings so that they are sympathetic to the natural surroundings which cannot be changed. The use of single family houses is based on an assumption that people prefer them, however there appears to be no proof of this. Multi-family structures have several virtues which could be used to advantage in the Arctic environment. However, research is required in order to determine how people want to live since there is little knowledge about values, biases and prejudices in predicting

human response to social and environmental change.

Much work is required in searching out the best methods by which life can be made more rewarding in the Arctic. New and revised solutions for the design of communities, as well as for family and individual living, are required. The planning process, with its careful structuring of information requirements and analysis, provides the means by which such solutions may be obtained. It is planning as an on-going process that is stressed, not a planned society. Growth and the interplay of functions in a community calls for planning as a continuing function. Through this process, concepts can be derived which will assure that future communities in the Arctic can provide a more satisfactory place in which to live and work.

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APPENDIX

APPENDIX A

THE DEVELOPMENT OF GOVERNMENT IN THE NORTHWEST TERRITORIES

In 1870 the Northwest Territories made up the major portion of the continent west of Hudson Bay. From this area, the District of Keewatin was created in 1876. The Province of Manitoba, formed in 1870, was further expanded in 1881. The formation of the Yukon Territory in 1895, the Provinces of Alberta and Saskatchewan in 1905, and the northward extension of the boundaries of Manitoba, Ontario and Quebec pushed the boundaries of the Northwest Territories to their present location in 1912. In 1920 the subdivision of the Northwest Territories into the Districts of Mackenzie, Keewatin and Franklin was carried out and the existing boundaries of today were finally determined.¹

Government in the Territories began in 1875 with the passing of the Northwest Territories Act. It placed the administration of the Territories in the hands of a Lieutenant-Governor and council resident in Fort Garry. With the frequent confinement of the region, the political

¹For further details see: Norman L. Nickolson, "Some Aspects of the Political Geography of the District of Keewatin," The Canadian Geographer (No. 3, 1953), pp. 73-83.

policies of the Dominion Government were altered to provide increasingly effective administration. In 1905 provision was made for an appointed commissioner and a council of four members, which was increased to six in 1921. Partial representation on council was effected in 1951 with three members being elected in the Mackenzie District.² It was not until 1966 that all Districts received elected representation on the council of the Northwest Territories.³

²Department of Northern Affairs and National Resources, The Northwest Territories Today (Ottawa: Queen's Printer, 1965), pp. 79-82.

³Commissioner of the Northwest Territories, Annual Report 1966-67, p. 3.

APPENDIX B

HEALTH CONDITIONS OF NATIVE PEOPLE

The following extracts indicate the relationship between poor health and poor living conditions under which many of the Canadian native people in the Northwest Territories have lived during recent times. There has been little change in the past five years, as will be noted from the information contained in Chapters VI, VII, and VIII.

In 1962 an infant mortality rate of 50 per 1,000 live births was reported for the Eskimo and Indian people in the Northwest Territories, a rate three times higher than the comparable white rate. This was attributed to the fact that the

environment reaps a harvest of death in Eskimo and Indian infants between the end of the first month of life and the end of the first year. Undoubtedly the causes are;

- i) poor housing, lacking in shelter and inadequately heated,
- ii) lack of sanitary facilities which encourage the spread of gastro-enteric disease and infections;
- iii) exposure to new strains of bacteria and viruses as the Eskimo family comes into increasing contact with the white man from many parts of the continent and even the world;

- iv) ignorance of the parents as to the principles of hygienic living on a fixed site and ignorance of modern infant care; and
- v) lack of the means to communicate with the nearest physician or nurse quickly when illness strikes.

The Indian and Eskimo rates for gastro-intestinal disease were five times the white status rates. This reflects:

- i) the difference in housing;
- ii) the relative lack of adequate sanitary facilities;
- iii) the difference in knowledge with respect to household hygiene; and
- iv) the difference in degree of personal conviction that hygiene is important to health.¹

In 1962 it was reported that:

gastro-intestinal, infectious and parasitic disease accounted for sixteen deaths and all occurred among the native population. These diseases are intimately associated with the living conditions of the population concerned and will remain prevalent until housing and sanitation standards in the Territories are improved.

In Eskimo Point an outbreak of tuberculosis affected eighty-two people out of the total population of 548.

It was reported that:

¹Extracts from: Council of the Northwest Territories, Report on Health Conditions in the Northwest Territories, 1962, 25th Session, Sessional paper number VII, (Hay River, 1963), pp. 234-242.

this outbreak, which was the worst in Canada in recent years, is a prime example of what happens when you get a combination of inadequate housing, overcrowding, lack of resistance and the tubercule bacillus. Improvements required:

- 1) more frequent X-ray;
- 2) stepping up immunization;
- 3) improving housing and sanitation standards and reducing overcrowding; and
- 4) improving nutrition of native people.²

In 1968 Dr. Butler of the Northern Health Service, Department of National Health and Welfare reported that

"the Eskimo who is living on the land is a healthier person ... but once you bring him into a settlement, once you introduce him to flour, sugar, and candy and pop, then you start getting quite extensive dental caries and you also start getting eye conditions."³

² Council of the Northwest Territories 27th Session, Sessional Paper Number IV; Report of Health Conditions in the Northwest Territories 1963 (Ottawa: 1964), pp. 360-364.

³ G. C. Bulter, Council of the Northwest Territories Debates, 36th Session (Yellowknife, Feb. 23, 1968), p. 868.

APPENDIX C

HOUSING SUMMARY TABLES

TABLE IX

CHESTERFIELD INLET

ESKIMO HOUSING SUMMARY JUNE 1967

House Number	Adults	Occupants Child	Total	House Type	No. Rooms	Size in ft.	Sq. Ft. Per Person	Year Built	Condition
1	3	6	9	Old frame	1	20x12	26.6	1917	poor
2	2	7	9	Rigid fr.	1	16x12	21.4	1957	poor
3	2	5	7	Rigid fr.	1	16x12	27.4	1957	poor
4	2	3	5	Rigid fr.	1	16x12	38.4	1957	poor
5	2	2	4	Rigid fr.	1	20x16	80.0	1957	poor
6	2	0	2	Old frame	1	14x12	84.0	1947	poor
7	3	7	10	Old frame	3	24x16	38.0	1947	fair
8	2	6	8	Old frame	3	16x16	30.0	1942	fair
9	2	5	7	Ukuvik	4	32x20	91.0	1966	good
10	2	3	5	Old frame	1	20x16	64.0	1957	poor
11	2	5	7	Old frame	3	15x24	52.0	1957	fair
12	2	4	6	Misc.	4	32x16	86.0	1962	fair
13	5	2	7	Misc.	4	32x16	73.0	1962	fair
14	2	6	8	Misc.	4	48x24	144.0	1964	good
15	2	6	8	Misc.	3	16x26	52.0	1955	fair
16	2	2	4	Misc.	1	16x16	64.0	1960	fair
17	3	5	8	Misc.	1	16x16	32.0	1962	fair
18	2	4	6	370	1	12x24	48.0	1962	fair
19	2	5	7	370	1	12x24	41.2	1966	fair
20	2	2	4	370	1	12x24	72.0	1962	fair
21	2	1	3	370	1	12x24	96.0	1964	fair
22	2	3	5	370	1	12x24	57.0	1964	fair
23	1	6	7	Angirraq	2	16x24	54.8	1966	good
24	2	6	8	370	1	12x20	30.0	1964	fair
25	vacant	-	-	Shack	1	-	-	-	poor
26	2	7	9	Old frame	1	14x18	28.0	1933	poor
27	4	1	5	Misc.	3	32x14	89.6	1952	fair

TABLE X

REPULSE BAY HOUSING SUMMARY JUNE 1967

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House Number	Adults	Occupants Child	Total	House Type	No. Rooms	Size in ft.	Sq.Ft.Per Person	Year Built	Condition
1	3	2	5	370	1	12x24	58	1964	fair
2	1	3	4	370	1	12x24	72	1964	fair
3	3	1	4	370	1	12x24	72	1964	fair
4	2	4	6	370	1	12x24	48	1964	fair
5	2	5	7	370	1	12x24	41	1964	fair
6	3	3	6	370	1	12x24	48	1964	fair
7	2	3	5	370	1	12x24	58	1964	fair
8	2	2	4	370	1	12x24	96	1964	fair
9	2	2	4	370	1	12x24	72	1964	fair
10	2	7	9	370	1	12x24	32	1964	fair
11	2	5	7	Angirrraq	2	16x24	55	1965	good
12	3	1	4	Angirrraq	2	16x24	96	1965	good
13	3	5	8	Angirrraq	2	16x24	48	1965	fair
14	2	3	5	Angirrraq	2	16x24	77	1965	good
15	2	2	4	Angirrraq	2	16x24	96	1965	fair
16	2	5	7	Angirrraq	2	16x24	55	1965	fair
17	2	7	9	Angirrraq	2	16x24	43	1965	fair
18	2	1	3	Angirrraq	2	16x24	128	1965	fair
19	2	2	4	Angirrraq	2	16x24	96	1965	fair
20	2	1	3	Angirrraq	2	16x24	128	1965	fair
21	5	5	10	Angirrraq	2	16x24	38	1965	fair
22	2	7	9	Angirrraq	2	16x24	43	1965	fair
23	2	5	7	Angirrraq	2	16x24	55	1965	fair
24	2	2	4	Angirrraq	2	16x24	40	1945	poor
25	2	2	4	Frame	1	10x16	--	--	poor
26	2	4	6	Tent	1	--	13	--	poor
27	2	4	6	Shack	1	8x10	--	--	poor
28	2	4	6	Tent	1	--	--	--	poor
29	1	4	5	Tent	1	9x14	--	--	poor
30	2	0	2	Tent	1	--	--	--	poor
31	2	0	2	Frame	7	51x23	550	1956	good
32	2	2	4	Frame	5	84x12	500	1966	good
				Shack	1	9x11	27	--	poor

TABLE XI

PELLY BAY HOUSING SUMMARY FALL 1967

House Number	Adults	Occupants Child	Total	House Type	No. Rooms	Size in ft.	Sq.Ft. Per Person	Year Built	Condition
1	2	5	7	Urquag	4	32x20	92	1967	good
2	2	4	6	Ukuvik	4	28x24	112	1967	good
3	3	7	10	Urquag	4	32x20	64	1967	good
4	vacant	-	-	Ukuvik	4	28x24	-	1967	good
5	1	1	2	Urquag	4	32x20	320	1967	good
6	3	1	4	Urquag	4	32x20	160	1967	good
7	2	3	5	Urquag	4	32x20	128	1967	good
8	1	2	3	Ukuvik	4	28x24	224	1967	good
9	2	6	8	Urquag	4	32x20	80	1967	good
10	2	4	6	Ukuvik	4	28x24	112	1967	good
11	2	2	4	Urquag	4	32x20	160	1967	good
12	2	2	4	Ukuvik	4	28x24	168	1967	good
13	2	1	3	Urquag	4	32x20	213	1967	good
14	1	2	3	Ukuvik	4	28x24	224	1967	good
15	2	5	7	Ukuvik	4	28x24	96	1967	good
16	2	3	5	Urquag	4	32x20	128	1967	good
17	3	2	5	Ukuvik	4	28x24	134	1967	good
18	2	1	3	Urquag	4	32x20	213	1967	good
19	2	2	4	Ukuvik	4	28x24	168	1967	good
20	2	2	4	Urquag	4	32x20	160	1967	good
21	2	2	4	Ukuvik	4	28x24	168	1967	good
22	2	1	3	Urquag	4	32x20	213	1967	good
23	4	1	5	Ukuvik	4	28x24	134	1967	good
24	2	1	3	Angirraq	2	24x16	128	1966	good
25	1	0	1	Angirraq	2	24x16	384	1966	fair
26	2	2	4	Ukuvik	4	28x24	168	1967	fair
27	2	4	6	Urquag	4	32x20	107	1967	good
28	1	2	3	Ukuvik	4	28x24	224	1967	good
29	2	1	3	Urquag	4	32x20	213	1967	good
30	2	4	6	Ukuvik	4	28x24	112	1967	good
31	2	3	5	Urquag	4	32x20	128	1967	good
32	2	2	4	Ukuvik	4	28x24	168	1967	good
33	2	1	3	Urquag	4	32x20	213	1967	good
34	4	1	5	Ukuvik	4	28x24	134	1967	good
35	vacant	-	-	Angirraq	2	24x16	-	1966	fair
36	3	0	3	Frame	5	45x10	300	1960	good
37	Fed. School-vacant(2 Apt.)	-	-	Prefab.	4	32x24	-	1961	good
					3	28x24	-	1961	good

APPENDIX D

UTILITIES AND SERVICES FOR ARCTIC COMMUNITIES

In Arctic communities the systems required for water supply and sewage disposal differ from those common in small communities in the south, where individual means, such as wells and septic tanks, are often adequate. In Keewatin one cannot drill wells for water and even the smallest settlement must depend upon surface water with its problems of contamination and of transport. This is due to the presence of bedrock and the permafrost layer, which also makes septic tanks with tile fields impractical. In winter the disposal of dirty water is difficult because wastes poured outside quickly freeze, then disperse only slowly in the spring. Conventional piped water supply and sewerage systems cannot be depended upon, for water in unheated and uninsulated pipes buried in the permafrost quickly freezes. Therefore the Arctic community is faced with providing an adequate level of services in ways which are almost always unconventional and which are usually very costly. This is required in a region where cash income is low and living costs are high.

Water Supply

As previously noted, the individual use of ice and snow is undesirable due to the potential contamination which may occur in areas of population concentration. If ice must be used as a temporary measure, it should be melted at a central location, such as the power house, where waste heat may be utilized and where quality control may be maintained and proper treatment given. Distribution to individual buildings can be carried out from central storage tanks.

The construction of reservoirs in the Arctic is an expensive operation but often necessary because of existing circumstances where natural water supply storage is not adequate. Due to permafrost conditions and the short summer season, earth work is difficult to carry out. By developing construction techniques which utilize such difficult conditions advantageously, savings in cost can often be achieved. For example, the core of a dam can be made impermeable by constructing it of ice blocks, or soil, frozen in place.¹

¹See: J. Hahn and Bert Saver, "Engineering in the Arctic," Engineering Journal (Vol. 51, April 1968), pp. 25-26, for a description of dam design based on this construction concept. It was estimated that the permafrost dam, 46 feet high and 250 feet long, would cost \$200,000.00 compared to about \$500,000.00 for more conventional construction methods.

Water can be distributed in four general ways within Arctic communities:

1. by tank truck;
2. by summer piping systems supplemented by cold weather tank truck delivery;
3. by utilidors; and
4. by recirculation pipe systems.

In addition to normal sanitary safeguards there are heating, insulation and circulation requirements needed to ensure adequate operation of the facilities which are used. Distribution by tank truck is expensive due to the high cost of capital equipment, high maintenance costs and high operating costs.² In addition, water consumption is low for those areas which depend upon haulage systems.³

²Estimated costs for water distribution, by tank truck, in a northern community of 500 persons is about one cent per gallon. This considers only the capital, operating and maintenance costs and not costs required to provide access to all buildings throughout the year nor storage tanks in buildings. For further details, refer to R. N. Dawson, Water Rates Schedule Development (Edmonton: Department of National Health and Welfare, 1967), pp. 20-25. This cost is at least five times more expensive than water rates for Manitoba communities of about 500 persons. See Department of Industry and Development, Community Reports, 1966.

³J. W. Grainge, Solutions to Northern Insanitary Conditions (Edmonton: Department of National Health and Welfare, 1967),

Piped systems are superior to haulage systems because there is less chance of contamination during distribution, water consumption is greater, interruption of services is less frequent, fire protection is available and inspection and control of water quality is possible.

Temporary piped systems may be laid on the surface of the ground for summer use. Lightweight pipes can be taken up for the winter; heavier pipes drained and left in place. However this system does not eliminate the need for haulage vehicles which must be operated during the most severe climatic conditions.

Utilidors are insulated conduits which house piping for water, waste water and sewage and, in some instances, steam lines.⁴ Heating of the system must be achieved either by supplying heat to the air within the utilidor or by

p. 1, reports that "surveys have shown that the daily percapita use of water when it is hauled is approximately three gallons."

⁴The system at Inuvik, in the Mackenzie District, has steam lines enclosed in the utilidors for distribution of heat to individual buildings from a central heat supply. The cost of this system is about \$200.00 per foot. For a description of its operation see: P. F. Cooper, The Mackenzie Delta - Technology (Ottawa: Northern Coordination and Research Centre, 1967), pp. 27-28.

heating the water which is circulated. Insulation is provided not only to protect water lines from freezing but to keep frozen ground, particularly permafrost, from thawing and thus weakening foundation supports. The lines are looped so that water can be continuously circulated when supplies are not being taken from the line.

Lines connecting individual buildings to the main circulation loop may be located within short sections of conduits, called utilidettes. Difficulties with freezing may be encountered due to the absence of continual flow in these lines unless special techniques are used. One solution is to use pitorifices to maintain the flow.⁵ Alternatively the connections can be protected by heavy insulation or windings of electrical resistance tape which is energized when the water temperature drops near the freezing

⁵In this system taps take off from the top of distribution mains where the water is warmest, conduct the water to the premises and return the unused, circulated water to the bottom of the main slightly downstream from the take off point. A short Pitot-tube is fitted to each connection within the main. At the take off, the tube is directed upstream; at the return downstream. A suitable pressure differential is created to provide circulation. For further details refer to: G. J. Habbs, "Water Supply Systems in Permafrost Areas," Proceedings Permafrost International Conference (Washington: Academy of Science, 1963), pp. 426-428.

temperature.

Recirculation systems may use single or dual mains. In both systems, the circulation must be of sufficient volume to prevent freezing or water heating must be carried out. With the single main, the short service lines can operate as outlined above. The dual-main system has service lines taking off from the distribution main and discharging to the return main. Determination of size of pipe and heating requirements depend upon heat losses, water use, and rate of circulation. An optimum solution can be worked out in these terms.⁶

Sewage Disposal

Sewage disposal is one of the major physical difficulties facing the Arctic communities. The need to maintain sanitary surroundings requires that the disposal system be on a community-wide basis since the lack of concern by even one family can create a potential health hazard for all others.

⁶Considerable study has been made of the heating requirements for pipe distribution systems in cold weather. See: J. W. Grainge, Solutions to Northern Insanitary Conditions (Edmonton: Department of National Health and Welfare, 1967), pp. 5-12.

The use of plastic bags for human wastes and the disposal of waste water in the vicinity of dwelling does not provide a satisfactory environment for healthy living. However, the provision of a system which is comparable to a southern level of convenience, in a form sufficiently cheap to be of wide application, is difficult.

Two general approaches can be considered for the solution to this problem. Firstly, to use tank trucks to remove sewage and waste water from household storage tanks and secondly to utilize a piped system of collection. Tank trucks are prone to similar problems as are found with hauled water distribution systems. Operating and maintenance costs are high. There is danger of spillage during pumping operations, service may be limited and sporadic due to adverse climate and valuable indoor space must be utilized for storage facilities.

The piped systems are not limited by storage problems and ultimately more satisfactory but much harder to justify on economic grounds. However, when used in conjunction with a piped water supply system, the same utilidor can be used to protect both pipes and the heat from the circulating water can be used to keep the sewer line from freezing. Heat from

waste water, if the pipes are properly insulated, will also assist to prevent freezing, particularly if snow forms an insulating cover over the lines.

Alternate systems to those described, which utilize indoor septic tanks and recirculation of sewage effluent, are available but require additional testing before becoming widely used.⁷ Isolation of communities is a major factor in the design, construction and operation of utilities. They must be complete and simple to operate. Duplication of essential parts is important.

Ultimate disposal of wastes can be into the sea in summer or on the ice in winter, if adequate dilution can take place and if currents do not return the material to shore. Alternatively disposal in lagoons, where anaerobic conditions can be maintained and natural decomposition can take place, may be adapted to Arctic conditions.⁸ Effluent may be drained

⁷Such a system removes the controlling factor of gravity flow from sewage disposal facilities. For a description of this, as well as other utility systems refer to: A. B. Yates, and D. R. Stanley, "Domestic Water Supply and Sewage Disposal in the Canadian North," Proceedings Permafrost International Conference (Washington: Academy of Science, 1963), pp. 413-419.

⁸R. F. Legget and H. B. Dickens, Building in Northern Canada (Ottawa: National Research Council, 1959), pp. 17-19.

into the sea or small drainage courses.

Heat

The provision of heat for dwellings and storage buildings is necessary for survival in the Arctic. Fuel oil is the basic source of heat and, although its cost is high by southern standards, it is presently the most economical for Arctic uses. However, the problem of reductions in cost is acute if suitable living conditions are to endure. Reduction can be made possible at two levels; costs of transportation and more efficient use of fuel.

Present methods of carrying fuel to many of the settlements, in 45 gallon drums, is inefficient since excessive handling is required.⁹ Bulk storage tanks, as at Chesterfield Inlet, require a minimum of equipment for unloading and the use of bulk oil tanks on ships increases the pay-load which may be carried.

In combination with bulk storage tanks, there should be a piped or haulage distribution system to each unit requiring fuel. The use of 250 gallon storage tanks

⁹The deposit of \$12.00 per 45 gallon drum increases the initial cost of fuel by about twenty five cents per gallon. The drums are often damaged or otherwise not returned, thus the deposit is lost and is really a part of the heating costs.

draining directly to the stove is more efficient than the use of small four gallon tanks which must be filled by transferring fuel by pail from 45 gallon drums. There is less chance of waste with the larger units and less opportunity to run out of fuel and have freezing conditions within the building.

Space heaters, while providing efficient conversion of fuel to heat, do not distribute it effectively throughout the building. Temperature difference of 50 degrees may be found between floor and ceiling of small buildings. The use of fans to circulate the air can be effective. The use of oil fired hot water heating systems can improve the heat distribution in large buildings containing several rooms.¹⁰ Heating by electricity does not appear to afford economies in use, particularly where it must also be generated from oil fuel.¹¹

Electrical Energy

In an area with several months of short winter days,

¹⁰There has been no comparison in costs between these two systems of heating small individual buildings. However, it would seem that the greatest advantage would occur with a central hot water heating core serving a group of attached units or an apartment.

¹¹Cooper, op. cit., p. 18.

it is important that electric power be available to provide adequate light and also to operate labour saving devices which are a part of modern community living. The size of most existing generator units precludes the use of electricity by all community residents and in addition, the use of small individual units does not allow economies available from production on a larger scale. Diesel generators offer the most efficient and economical means of providing electricity in small isolated communities, although costs will be at least double those in larger southern communities which are served by hydro-electric facilities or larger power units.¹² An alternate means of providing light in buildings is by means of gasoline lanterns. However this method of illumination is more expensive than electricity and also creates a greater fire hazard.¹³ Wind-power can be utilized for conversion to electrical energy. Because

¹²A comprehensive cost comparison for various forms of electricity generation is contained in Cooper, op. cit., pp. 19-24. Although this comparison is based on the Mackenzie River Delta area the costs for fuel and transportation to Keewatin communities will not be less than the figures used by Cooper.

¹³Cooper, op. cit., p. 21.

of fluctuations in velocity, wind cannot be relied upon as a continuous source of energy. It could be used to reduce power costs for installations requiring only intermittent use, such as charging batteries, pumping water to fill reservoirs or for supplying heat to increase water temperature for utility lines. The use of wind as a standby source of electrical energy would appear to warrant increased investigation as to its feasibility and economics in providing a more liveable environment for Arctic residents.