THE IRON MINING COMMUNITIES OF QUEBEC-LABRADOR: A STUDY OF A RESOURCE FRONTER.

by

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Submitted to the Department of Geography, McGill University, in partial fulfilment of the requirements for the Degree Master of Arts, April, 1968.

ABSTRACT

Iron mining in Québec-Labrador developed in response to the needs of the U.S. steel industry. The timing, organization and markets for the developments on this resource frontier reflect this. The communities needed to house the workers were constructed along southern lines and administered as company towns. The experiences of Schefferville, Gagnon, Labrador City and Wabush in physical planning and administration are reviewed. General principals which may be applicable in the establishment of new northern mining towns are put forward. Analysis of the labour force from Schefferville and Gagnon showed the majority of workers to come from Québec. Long service hourly paid men came primarily from the Gaspé-South Shore, the skilled and supervisory men have more diverse geographical origins. The size of the formative community, the socio-economic character of the source area together with the age and marital status of the worker affect the migrant's perception and adaption to the northern town. Schefferville has evolved into a stable subarctic mining community through a combination of the character of its labour force, company policy and town amenities.

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A thesis submitted to the Faculty of Graduate Studies and Research, McGill University, in partial fulfilment of the requirements for the degree of Master of Arts.

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CHAPTER ONE: INTRODUCTION

Purpose of the Study

It was hoped, through a study of Schefferville, Québec, with additional information from Gagnon, Québec, and Labrador City and Wabush in Newfoundland-Labrador, to learn if there has been any development of stability in the population and labour forces in these communities and to delimit any causal factors.

Although mining communities are traditionally ephemeral forms of urban expression, the link between the nature of the resource base and the instability of the community is a complex one. It is assumed that the factors behind such stability may be divided into two groups. Firstly, those connected with the migrant, i.e., his personal characteristics and the socio-economic nature of his previous formative environments. Secondly, those factors connected with the northern community itself and the degree of satisfaction given to the migrant by its physical and social facilities.

The study involves the following parts. Firstly, an introductory section on the physical and historical background of the Labrador-Ungava peninsula is presented as an aid to understanding the present state of the resource frontier where the physical environment until recently strongly inhibited man's appreciation and utilization of the area. Secondly, a review

of the iron ore mining is presented. Schefferville's experience as a single enterprise mining community is then reviewed, followed by analysis of the population and labour force in the town. Thirdly, similar, but less detailed, information is presented for the younger communities of Gagnon, Labrador City and Wabush. The whole problem of the existence and growth of stability and permanence of these communities in the context of this area's experience as a modern resource frontier will then be reviewed.

Much of the material presented is based on experience gained during two year's residence in Schefferville and on previously unreleased mining company data.

Relevance of the Study

Single enterprise communities are historically a significant settlement form in the exploitation of Canada's resources. Development of the 'Middle North', or subarctic zone, which will take place in the future, seems likely to be based heavily on the exploitation of non-renewable resources. The experiences of these four communities situated well to the north of the agricultural ecumene may therefore be useful in illuminating past mistakes in physical and community planning and in indicating what type of migrant stays longest. The waste and unhappiness caused by high turnovers of manpower is an additional deterrent to the development of the Middle North and a further cost increment to be considered

by the promoters of such communities. An understanding of the factors and relationships involved could be useful in planning future developments so that the quality of urban expression and life might be improved.

The specific area of Labrador-Ungava was chosen because the four settlements were conveniently situated for study from the McGill Sub-arctic Research Laboratory. They also occupy a similar geographical environment, are all engaged in iron mining but they are in different stages of development. Therefore in drawing conclusions, 'noise' from technological and environmental differences is reduced to the minimum. In the case of Schefferville, its 13 years of existence can usefully be compared with the younger communities, and lessons in physical planning and an understanding of what maturity involves in the community can be learned. In addition the communities are of such a restricted size that individual research is possible, and the presence of a sole major employer made the gathering of data on the migrant labour force possible. All four towns are also isolated from the Canadian road network. There is the possibility of this isolation ending, and with the changes in the regional labour pool consequent on the construction of the Churchill Falls power development, 1967 is an opportune. moment to review the situation on this resource frontier.

Previous Work

Although single enterprise mining communities have been a recurrent feature of Canada's industrial growth, the first major

work in the field was the Queen's University Institute of Local Government 1953 report on 'Single Enterprise Communities in Canada' (1). This reviewed the problems created by the dominance of the single company, the various companies' policies, and the differing provincial arrangements for the establishment of such communities and advocated the replacement of the company's role as town constructor by some other outside agency which would then transfer the operation of the community to the local inhabitants. Robinson in his 1963 book (2) on industrial towns on Canada's resource frontier followed much the same ground as the Queen's report but augmented it with case studies of four such communities; Kitimat, British Columbia, Drayton Valley, Alberta, Elliot Lake, Ontario and Schefferville, Québec.

Schefferville itself formed the major part of Langlois' 1957 thesis (3) on the establishment of single enterprise mining communities. This was strongly oriented towards the problems of physical planning and appropriate politico-administrative measures. Together with Humphrys' 1957 study (4) of mineral developments in Labrador - Ungava this represents the total of published work on Schefferville and this is now very dated. Humphrys wrote a number of papers on iron ore mining and Schefferville (5, 6) which were published later but these were not based on any additional field work. Derbyshire's paper (7) on amenities and the notion of permanence in Schefferville was interesting but qualitative. As far as the region as a whole is concerned such writers as Biays (8) and Bussières (9) have presented studies of the whole eastern section of the Canadian

Shield and the North Shore of the St. Lawrence respectively. Specific mention of the iron mining towns is rather limited but usefully places them within their regional context.

A number of Northern Co-ordination and Research Centre papers on northern Canada such as Bourne's study of Yellowknife (10) and Lotz' of Dawson City (11) have been published and taken together with such papers as Parker's on planned non-permanence in northern communities (12) they are useful reviews of the current situation in northern communities. However, geographical location and environment, the actual resource base for their local economies and the ethnic mixes of their populations are too different from those in Québec-Labrador to allow them to be relevant to the present study. Monahan's work on the Fairbanks area (13) is perhaps the most useful in showing how a subarctic mining community has, through diversification and improving communications, produced a more permanent community.

The characteristic population structure and internal economic status of mining towns has been examined by Wilson (14) and Webb (15) respectively, but lack of much statistical data and the performance of service and commercial functions by the mining companies made similar analysis in Labrador-Ungava of little use.

Definitions

The concept of permanence in mining communities, and even within urban society as a whole, is basically a relative one. In the

case of this study it is taken to mean a stay by the migrant for a longer period than the average for that community.

To expect anything more sophisticated is unrealistic and it is still too early to discover any second generation effects.

In the field of toponymy the following decisions were made. Schefferville is the name of the community built in 1954 by the Iron Ore Company of Canada. The name Knob Lake was originally applied to the settlement prior to its incorporation in 1955, when it was named after the late Bishop Scheffer. Knob Lake will be used in this study only in connection with the local area in order to distinguish it from the other mining areas. Burnt Creek was the name given to the exploration camp in the Knob Lake area from 1947 to 1953. Although the name commonly occurs on maps it ceased to exist in 1954.

The Québec Newfoundland-Labrador boundary was defined by the 1927 decision of the Privy Council, (the dispute was then between Canada and Newfoundland), as lying along the height of land between the Atlantic drainage and the Ungava Bay and St. Lawrence drainage in the central area of the peninsula. This boundary has not been accepted by Québec and is not monumented on the ground (16).

The peninsula of Labrador-Ungava is defined as the area lying to the north and east of a line joining the mouths of the Eastmain and Saguenay rivers. In this study Québec-Labrador is used to indicate that part of Labrador-Ungava lying between 51° north and 55° north and 65° west and 69° west. Labrador is used in the political sense to distinguish the mainland part of the Province of Newfoundland.

In connection with place names in the mining areas, those with general acceptance locally are used if no official names exist. Where the locally accepted name is different from that appearing on the topographic maps it follows the latter in brackets.

Gagnon occasionally appears on maps as Gagnonville or under the name of the mine site, i.e., Lac Jeannine. Labrador City is the name of the Iron Ore Company of Canada's town in the Wabush Lake area, it is physically and administratively separate from the town of Wabush built by Wabush Mines. The original name of the Labrador City development was the Carol Project and this term is used to distinguish this operation from the Iron Ore Company of Canada's Knob Lake mining division. There is no community at Carol Lake.

CHAPTER TWO: THE PENINSULA PRIOR TO IRON ORE MINING

The Physical Setting

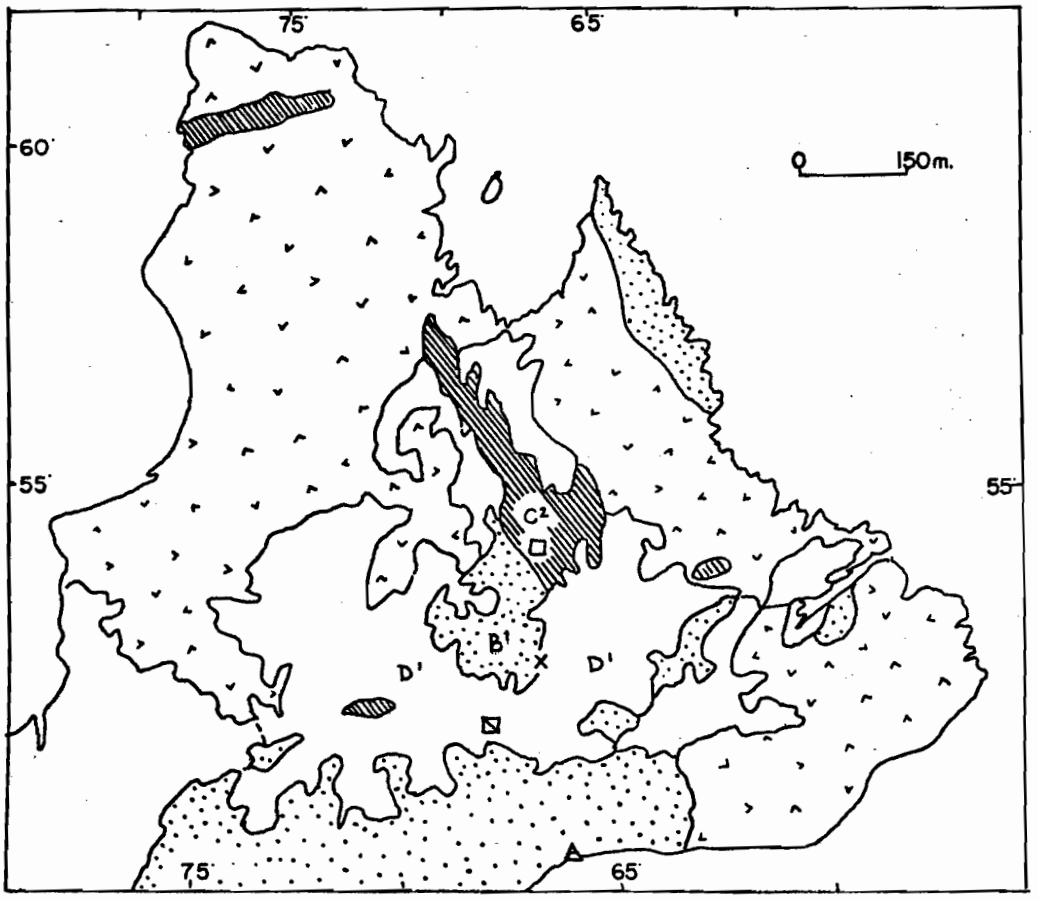
The physical environment of Labrador-Ungava is unattractive and Jacques Cartier's statement "l'estime mieux que aultrement, que c'est la terre que Dieu donna à Cayn" on first seeing the North Shore is echoed four hundred years later in the words of Gilles Vigneault "mon pays, mon pays ce n'est pas un pays, c'est l'hiver". The peninsula was one of the first regions of North America to be delimited but the fact that its 500,000 square miles, lying in the latitudes where Europe's population is densest, was only slowly explored and exploited shows the difficulties imposed by the physical environment. As Potzger and Courtmanche wrote "soil is still a hope and an anticipated geological happening" (17) in much of the peninsula and the consequent lack of any possibility of agricultural development goes a long way in explaining its neglect while the lands further west were being settled.

Physiography

The majority of the north, west and eastern parts of the peninsula is a featureless plateau at an altitude of 1,000 to 2,200 feet, sloping north from the Laurentian scarp and developed on massive crystalline rocks, whose predominantly rhomboidal jointing finds expression in the detailed relief (map 1). The Lake Plateau is a drift-strewn crescent of lake-studded terrain at an altitude of about

MAP 1

LABRADOR-UNGAVA PHYSIOGRAPHIC DIVISIONS



TOWNS :-

- SCHEFFERVILLE
- GAGNON
- WABUSH - LABRADOR CITY.
- SEPT-ILES

PHYSIOGRAPHIC DIVISIONS :-

- BEDROCK CONTROLLED PLATEAU ELEMENTS
- UPLAND AREAS : MASSIFS
  - B' *KANIAPISKAU MASSIF*
- UPLAND AREAS : APPALACHIAN TYPE
  - C² *LABRADOR TROUGH*
- DRIFT COVERED BELTS
  - D' *LAKE PLATEAU*

(after Hare)

1,500 feet where many late glacial features, eskers and drumlinized till testify to the recent glaciation. The Labrador Trough as a physiographic province is not as extensive as the geologic province[1] and characteristically gives rise to a pronounced linearity of ridges and lakes on the closely folded Proterozoic sediments. The southern rim of the plateau after Late Palaeozoic, Mesozoic and Tertiary subaerial denudation to a peneplain of polycyclic type was uplifted in the Late Tertiary (18). This rim of the plateau is thus dissected by many parallel streams which have interrupted profiles, e.g., the Peribonca, Outardes, Manicouagan, Moisie and Romaine. Although they proved a hinderance to early canoe travel their use as hydro-electric power sites today reflects the dynamic nature of resources.

Vegetation

In the south of the peninsula the forest subzone of Hare's (19) cover types, with its closed crown coniferous forest and mossy floor, covers the area (map 2). North of the Laurentide Scarp lies the woodland subzone, in which the four mining towns of Schefferville, Gagnon, Wabush and Labrador City are found. This subzone is dominated by three cover types, open water, especially on the Lake Plateau, muskeg and bog, and lichen woodlands. It is this latter which provides the immediate local environment for the communities and it consists of open crowned woodlands of black and

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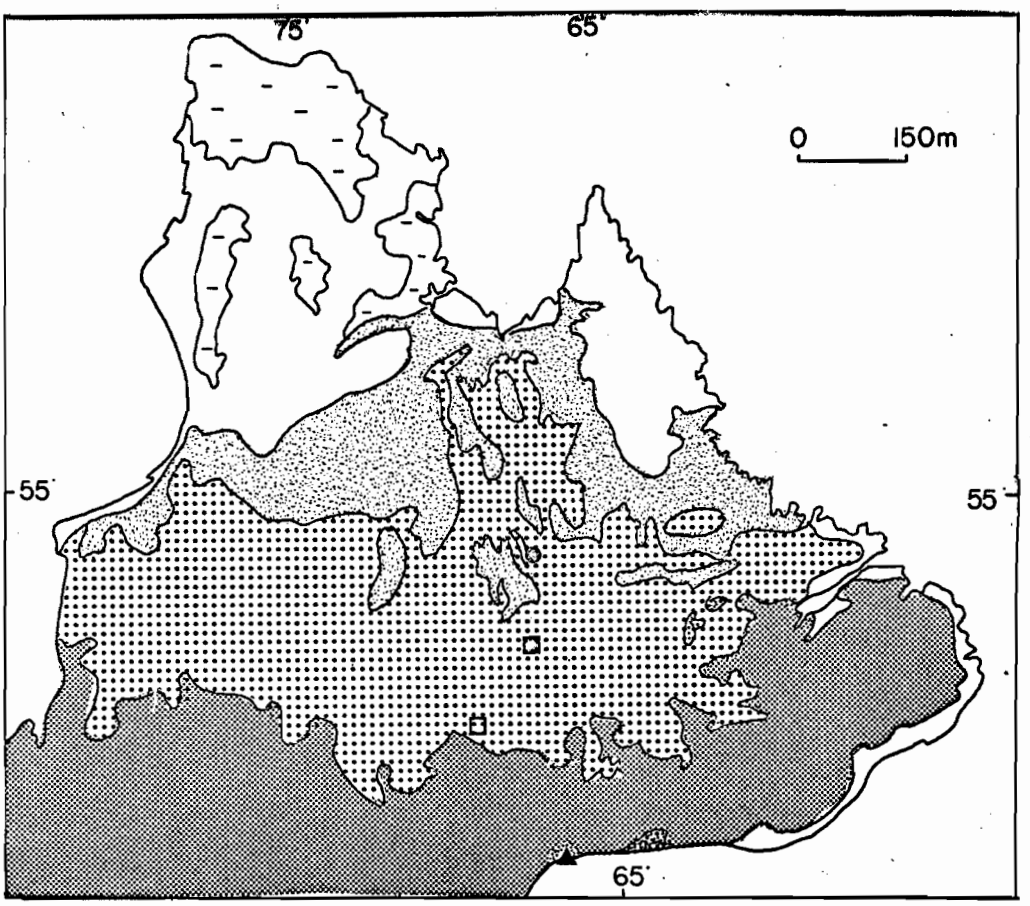
1. The Geology of the Labrador Trough is discussed in Chapter III.

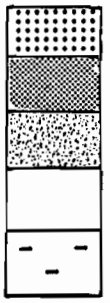
Map 2

LABRADOR UNGAVA
MAJOR VEGETATION ZONES



Schefferville ●
Gagnon □
Wabush - Labrador City ■
Sept-Iles ▲

Woodland
Forest
Forest Tundra
Lichen Dominated Tundra
Sedge Dominated Tundra



(after Hare)

white spruce, fir, birch and tamarack with a brightly lit lichen floor and a discontinuous shrub layer. Within this cover type, widespread bogs and scattered permafrost occurs. Latitudinally and altitudinally this woodland subzone gives way to the forest tundra subzone, where an interdigitation of tundra on ridges and forest on lower ground near water is found, as in the case of the Schefferville area. This forest tundra is underlain by general permafrost, as is the tundra occurring further north which is dominated by sedges, lichens and scattered shrubs.

Climate

The whole peninsula is abnormally cold for its latitude and Hare (20) indicated a mean annual temperature anomaly inland of -14°F. Certainly the impression in the interior is one of two seasons - winter and August - in the eyes of many residents.

During the summer mean daily temperatures in the interior (21) usually exceed 50°F. and snow and air frost is rare but over three inches of rain falls in each month of July and August. During September the mean daily temperature falls to 42°F. but the minima are not excessively low; rain days outnumber snow days and it is unusual if there is a snow cover by the end of the month. The onset of early winter follows in October and November; the snow begins to accumulate as mean daily temperatures drop below freezing. Snowfall is at its maximum prior to the freezing of Hudson's Bay in December and November is particularly dull with only 20% of the possible sunshine recorded.

The midwinter period of December, January and February has fairly uniform conditions of continuous frost with extremes to -55°F. under CPk anticyclonic conditions. Sunshine rises to 34% of the possible total. The late winter period of March and April is a period of gradual warming when the daily temperature ranges are highest. This is the driest season of the year and sunshine rises to 43% of the possible total. May and June are distinguished by a rapid temperature rise. The snow cover which had reached its maximum thickness in late March with a mean depth of 26 inches, thins rapidly although during May the number of snow days still exceeds the rain days. The lakes usually become free of ice in mid June.

The physiological and psychological effects of the long winter on people accustomed to more southerly climates is a factor to be considered in a study of the area's human occupance. As a result of its relatively low latitude the Québec-Labrador area has not the problem of winter darkness to contend with as have the Scandinavian mining towns of Kirkenes and Kiruna and such large Russian cities as Murmansk and Norilsk.

One of the more significant of the climatic elements in connection with human exploitation is the wind. In the past, being wind-bound whilst travelling by canoe via some of the larger lakes introduced a further degree of uncertainty to such travel. Today, wind, through its effects on human activity in the form of windchill and blowing and drifting snow conditions is still significant. Although Siple's (22)

windchill concept presents only a crude indication of cold, considering only a convective heat exchange, it is a useful comparative measure. Schefferville's mean wind speed varies little over the first eight months of the year (i.e., from 10 to 10.7 m.p.h.); however from September to December velocities exceed 12 m.p.h. (2). The direction is predominantly north west. If Thomas' map (23) of windchill in Canada is examined, Quebec-Labrador compares unfavourably with the Mackenzie delta but it cannot match the severity of the Keewatin Barrens. Locally within the area there would appear to be considerable differences between an exposed hill top and a wooded valley when considering the feasibility of outdoor manual work (24). From an examination of Table I, it is clear that December, January and February all lie below the 1,400 kc/m^2/hr. threshold when exposed flesh freezes. Such monthly means give only a crude indication of daily conditions and there are considerable yearly variations, e.g., in January, 1961, the mean monthly windchill reached 1,650 kc/m^2/hr.

Even at the end of winter the slush and mud offer poor consolation for the loss of the brilliant sunshine of late winter and the summer's low cloud, drizzle and the innumerable mosquitos and blackfly are a memorable feature of the interior at this season,

The technical disabilities due to the climate can be overcome with the application of sufficient capital and ingenuity. The effects of the sub-arctic climate on mining is discussed in Chapter III and Chapter VI.

TABLE I

SCHEFFERVILLE: MEAN MONTHLY WINDCHILL FACTORS

January	1,430	K. calories/m^2/hour
February	1,470	
March	1,300	
April	1,080	
May	890	
June	640	
July	590	
August	600	
September	780	
October	950	
November	1,190	
December	1,420	

period 1955-59

Source: McCloughlan, 1962 (24).

As a cost increment the winter heating bill is a significant factor. There are an average of 48 days with blowing snow each year in Schefferville (21) which creates snow removal problems for the mining company, community and transportation agencies.

Human Occupance

As an aid to an appreciation of the present pattern of human occupance and exploitation of Labrador-Ungava, a brief review of the historic background is presented.

The interior of the peninsula of Labrador-Ungava was originally occupied by two main groups of Indians, the Nascopie and Montagnais, both Algonkin stock and therefore a branch of the Cree nation. They broke off from the mass of the Algonkin at a relatively late stage and they moved further and further to the north-east. By the nineteenth century the Nascopie had come to 'occupy' most of the Labrador Lake Plateau and the Montagnais, mostly under pressure from the Micmac and Iroquois, occupied the area to the south. The culture of these Indians was based on the woodland caribou, whose migrations influenced their seasonal movements, and the other animal and fish resources of the forests (25). The numbers of these Indians probably never exceeded 2,500 (26).

The peninsula was one of the first areas of North America to be delimited by the Europeans. The shores of Hudson Strait and Hudson Bay were explored by, among others, Frobisher in 1578, Hudson in 1610 and Munk in 1619, during their search for the north-west passage. The southern shores and the North Shore of the St. Lawrence were also outlined at an early date, Cartier visited Sept-Iles Bay in 1535.

The North Shore or Côte Nord of the St. Lawrence has existed as a definite regional expression since these early days (27). The term has never been strictly a linear concept and it has always been associated with a far wider area than the actual shore itself. The shore in fact has rarely had a life of its own, so the activities of its inhabitants have not been influenced by the resources of the coastal tract alone. The key to man's response to the area has been its position in relation to the resources of the Gulf, on the one hand,

and the interior on the other. The changes since 1936 have been therefore not in its function but in the form of its development.

The fur trade began early in the sixteenth century as an adjunct to the fishing in the Gulf of St. Lawrence but by the seventeenth century it had grown to be the economic base of New France. As a consequence, this part of the peninsula was well known at an early date, e.g., in 1695 Jolliet and Bissot discovered Ashuanipi Lake, close to the present site of Wabush, and the 1733 declaration by the Intendant of New France declaring new boundaries of the Domaine du Roi showed a clear notion of the interior. This knowledge was a result of the travels of the coureurs du bois from Tadoussac and the journeys of priests (28).

During the second half of the seventeenth century the English began entering the fur trade and after 1670 the Hudson's Bay Company, trading into the Eastmain, began to affect the returns to the French along the St. Lawrence. After sporadic conflict the Treaty of Utrecht in 1713 confirmed the English claims in Hudson's Bay. Prior to the English conquest in 1763 the French king held the monopoly of the trade of the southern part of the peninsula through the leasing of the Postes du Roi, and the leasing of these trade monopoly points was continued by the British. The Eastmain fort of the Hudson's Bay Company, which was founded in 1684, was the only part of the peninsula to be exploited for furs and mica, until 1794 when Richmond Gulf and 1756 when Great Whale River were established. The Hudson's Bay posts were sited mainly at the river mouths and no interior travel was organized as the Indians were expected

to trade down to the coast and modify their nomadic hunters' existence to become trappers.

After 1783 with competition from the North West Company the Hudson's Bay Company was forced to cut its operating costs, raise fur prices, increase the quality of trade goods and to use force and legal repression to maintain its monopoly. By the time of the merger of the two companies in 1821, overtrapping and alcohol had ruined the fur trade in many areas. Expansion to new areas was therefore necessary. Among these new areas was the interior of Labrador-Ungava.

The Moravian missionaries came to the Labrador coast in 1752 and in 1811 two missionaries, Kohlmeister and Kmoch, travelling from Okkak to the George River, reported a good fur trapping area. They were refused permission to establish a post in the area and the Hudson's Bay Company decided to erect a line of posts in the interior to isolate the Moravians on the coast and to protect their monopoly. After an 1827 reconnaissance, the Bay, in 1830, sent Findlayson and Erlandson from Moose Factory to the Koksoak River to establish Fort Chimo in 1834, which was also the year of the establishment of the Nitchequon Lake post in the southern interior. In 1834 McLean was sent to the area to supervise the venture in the interior and after travelling overland from Fort Chimo to North West River during the winter he reported to Governor Simpson that interior communication was impossibly difficult. However in 1838, Erlandson established on Lake Petitskapau, some 12 miles south east of Schefferville, the Fort Nascopie post. The yearly supply of this post was to prove difficult until the Hamilton River route was discovered in 1841.

McLean had earlier reported to Governor Simpson that Fort Nascopie was a suitable post in spite of the difficulties of supply because the abundance of fish made its maintenance cheap. In 1841 McLean reported however

> Having now visited the country in every direction the appearance it presents is far from warranting the expectations formed of its riches. Even where I had expected the country to have proved extremely well wooded vast sections of it have been ravaged by fire to the entire destruction of the small animals (29).

The area around this interior post was trapped to the limit by Nascopie Indians and in 1845 there were approximately 250 of them trapping into this post. The transfer of twenty families from Rupert House caused the situation to deteriorate further and there were reports of widespread starvation amongst the Indians at the interior posts at this time. There certainly appears to have been a decline in the caribou at this time and the Indians became heavily dependent on the fur trade. Fort Nascopie, situated in a small clearing close to the lake, appears to have consisted of three small buildings, the largest, twelve by eighteen feet, built of squared logs with board roofs (30).

The Fort Chimo post was closed between 1842 and 1866 and it seems probable that the interior post was abandoned shortly after 1870, after which time the Indians dispersed to Fort Chimo, North West River and Sept-Iles. The closure seems to have been due to the difficulty of annual supply from North West River, a shortage of canoe men for such work and a scarcity of food combined with poor trapping (31).

The first attempt at utilizing the renewable resources of the interior of Labrador-Ungava thus met with failure as a consequence of the poor fur resources and technological difficulties imposed on the annual re-supply of a post on the Lake Plateau.

The next stage in the growth of knowledge of the interior, in this case the re-exploration, for the coureur du bois of the seventeenth century left no records, was in 1853 with Father Arnaud's journey to the Manicouagan. Between 1853 and 1900 the Oblate Fathers made 25 trips into the interior but it was only Arnaud and Babel in 1866-68 who travelled with the Indians. It is to Babel that we owe the first report of the iron formation in the interior at Petitskapau Lake.

The interior of Labrador-Ungava at this time was of peripheral interest to the countries which ruled it and because of difficulties of travel and technology its resources were unknown and unwanted. The transfer of the Hudson's Bay Company's Rupertsland to Canada in 1870 and the final northern extension of Québec's territory in 1912 and the subsequent delimitation of the boundary between Canada (Québec) and Newfoundland, then a separate Dominion, have been affected by this lack of knowledge. The Québec Government has never accepted the 1927 decision of the Privy Council on the part of the boundary lying along the height of land between the Atlantic and the Ungava Bay and St. Lawrence drainage (16). The border did not achieve practical importance until the mineral wealth of the interior began to be exploited.

The first major scientific exploration of the interior was made between 1884 and 1900 when A.P. Low of the Geological Survey of Canada began to make his series of canoe traverses of the interior. In 1894 he made the first report of iron ore in the interior (30), and much of his work was the initial survey the geologists in the 1940's had to work with. D'Aigle prospected in the central interior between 1914-18 with the aim of discovering gold, the only metal which could have warranted exploitation at this time. He did discover iron ore and used this to obtain financial backing for further work (4).

With the development of bush flying after the first World War few people again bothered to make arduous canoe journeys. At the same time there began a number of expeditions as increasing demand for industrial raw materials encouraged surveys of the mineral resources. As Hare stated in 1964 (32) the exploration and re-exploration of Quebec has been pursued with two ends in view, namely, "economic profit and scientific information with the results of financial reward and the advancement of knowledge". The results of the last twenty years have shown the success of this co-operation.

In 1929 W.F. James and J.E. Gill working for the New Québec Company discovered three iron ore bodies, one of which the Ruth Lake near Schefferville was to be exploited by the Iron Ore Company of Canada twenty five years later. However, the depression of the 1930's which followed was marked by a retrenchment and only gold and silver were then of interest. As a consequence of this interest geological reconnaissance was continued along the whole length of the Labrador Trough as far as Fort Chimo, but

none of the quartz viens investigated showed promise. In spite of the technological advance at this time the overall affect of this mineral exploration in Labrador-Ungava had been slight. Air transport, photogrammetry and geophysical surveys were in their infancy and the potential markets were small.

The position of Labrador-Ungava in 1936 was therefore a reflection of the position of the area, the state of technology and economics which combined to influence man's evaluation of the area. The initial explorers who gave us the first impressions of the peninsula's natural aspect painted a grey picture before moving on to the south and west or to the search for the North West Passage. The early efforts of the fur traders were the first attempts by outsiders to utilize the area's resources, but they were not interested in the area's permanent settlement. Agricultural settlers were confined to the area from Tadoussac to Baie Trinité on the Côte Nord. The Moisie Iron works at Sept-Iles, had lived between 1867 and 1874 using the iron rich sands of the Moisie close to Sept-Iles and died when United States' tariffs rendered it uneconomic. During the later half of the century the industrialist, through the activities of lumbering companies, came to exploit the resources of the lower Côte Nord up river from Ste. Marguerite. After 1900 the demand for pulpwood increased, plants were established at Clarke City, Shelter Bay, Franquelin, Godbout and Baie Trinité.

The situation in 1936 was therefore one of a threefold division of the Côte Nord into a fishing and hunting east, an industrial centre from Bersemis to Clarke City and an agricultural west. The interior remained unaltered.

CHAPTER THREE: THE GROWTH OF IRON ORE MINING

The Early Stages

1936 was a significant year for the peninsula, for in that year the newsprint mill at Baie Comeau was built and the Labrador Mining and Exploration Company was formed. The former was the pioneer in the realm of high speed, low cost operation and its opening reflected the growing awareness of the value of the peninsula's resources and their position in relation to the markets of North America and Western Europe. It marked the beginning of the industrial transformation of the North Shore, as did the development set in motion by the Labrador Mining and Exploration Company which eventually led to the growth of iron ore mining in the interior.

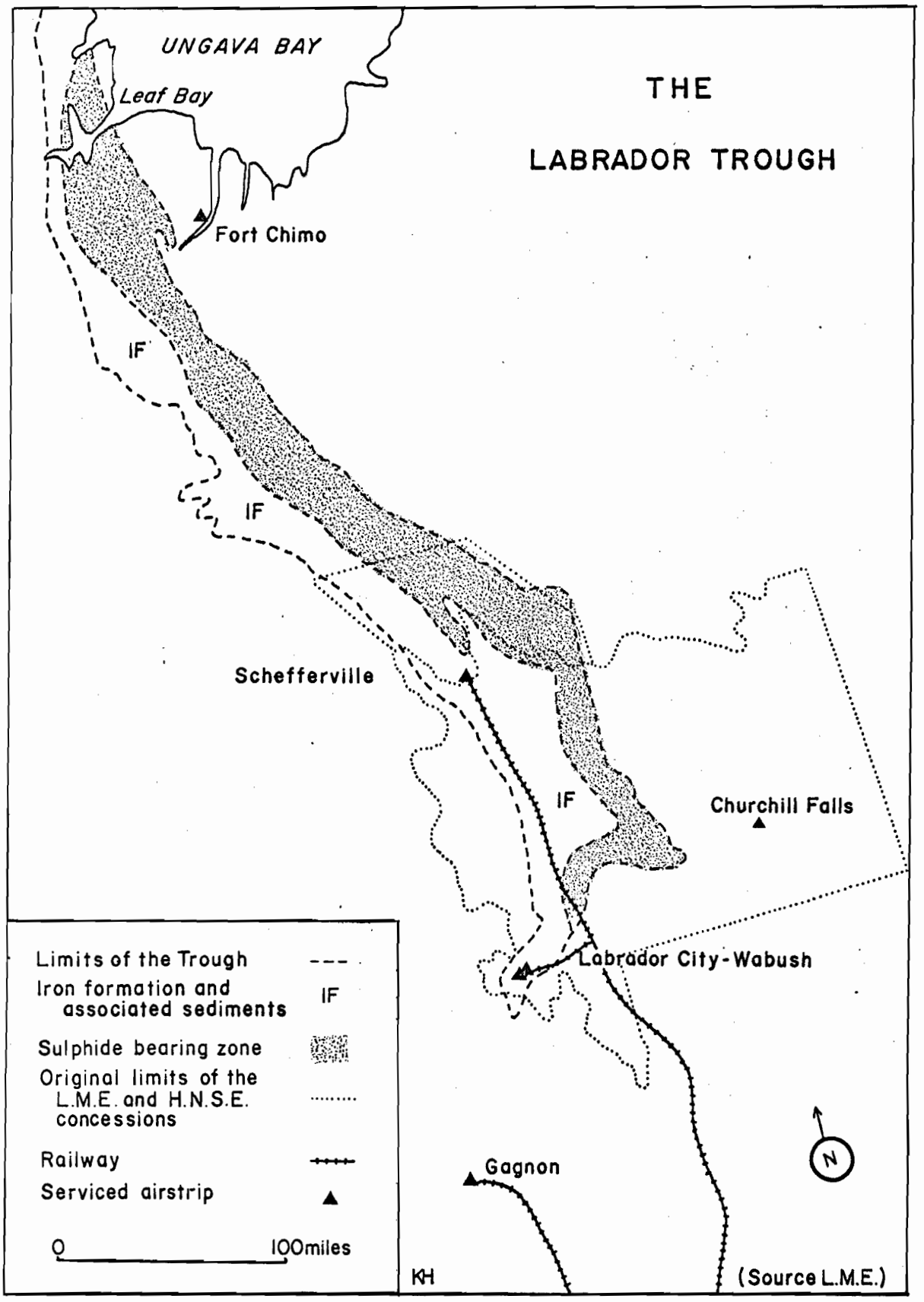
Labrador Mining and Exploration in 1936 obtained a 20,000 square mile concession from the Newfoundland Government and began work in the interior (4) (map 3) which was to bear fruit twenty years later. The large size of this initial concession was justified by a number of factors. Apart from the administrative convenience for the government, the isolation and difficulty of working in the area meant that a company able to handle such a concession would have some degree of financial strength and would be able to engage in some regional planning. The operation

of this method of large concession granting was facilitated by the fact that there was no human occupance and the land was held by the Crown. The development of mining in Labrador-Ungava has in fact been characterized by the absence of the small prospector so prevalent in other mining resource frontiers.

The original 20,000 square mile concession in Newfoundland-Labrador was granted on an agreement that the company would spend $50,000 annually for ten years and that the concession area would be reduced to 1,300 square miles within ten years. This was a spur to a thorough reconnaissance survey which was undertaken under the direction of Dr. J.A. Retty. The initial major base camp was at Sandgirt Lake south east of the present site of Schefferville. The barrier of distance for the interior was finally overcome with the aid of bush aircraft, but many problems remained ranging from the terrain and logistics to the lack of any other maps than those produced by Low on his epic canoe traverses.

The initial search was for base metals but in 1937 the Sawyer Lake iron ore body was shown to Retty by Mathieu André, a Sept-Iles Montagnais, and between 1937 and 1939 a further six ore bodies were discovered. In 1939 the McKay (Québec) Exploration Company was formed, a group with the same financial backing as Labrador Mining and Exploration, and obtained a 3,900 square mile concession in the adjacent area of Québec. By 1940 some 70 million tons of ore had been discovered but a study of

Map 3


UNGAVA BAY
Leaf Bay
THE
LABRADOR TROUGH
Fort Chimo
IF
IF
Schefferville
IF
Churchill Falls
Labrador City-Wabush
Gagnon
N
Limits of the Trough
Iron formation and associated sediments
IF
Sulphide bearing zone
Original limits of the L.M.E. and H.N.S.E. concessions
Railway
Serviced airstrip
0
100miles
KH
(Source L.M.E.)

mining and marketing costs gave a Lake Erie base price of $7.15 per ton, some $2.15 a ton more than the then current Lake Erie price for Mesabi non-Bessemer grading 51.5% iron (4). In 1940 active field work ceased due to a lack of funds.

In 1942 extensive financial reorganization took place in the mining companies and the Hollinger North Shore Exploration Company (H.N.S.E.) took over the McKay licence after having previously obtained an option to purchase control of Labrador Mining and Exploration (L.M.E.). The M.A. Hanna Coal and Ore Corporation, a United States' company, bought 40% of H.N.S.E.'s shares, the remainder being held by Hollinger Consolidated Gold Mines. Hanna also purchased 18% of L.M.E.'s shares, 51% of which were held by Hollinger.

In 1945 exploration consisted principally of semi-reconnaissance geological mapping and prospecting for base metals in the central part of the sulphide bearing belt on the eastern side of the Labrador Trough. Only limited drilling had taken place and the search for base metals was hampered by the lack of aerial photography. By the end of 1944 twelve ore bodies, totalling 160 million tons of iron ore had been outlined (33). No significant base metal finds had been made however and at this time only the discovery of these minerals would have been economically significant.

The Post 1945 Period

World War II had caused serious depletion of the United States' reserves of higher grade iron ore and at the same time it had also stimulated strides in science and technology. With the post war increase in economic activity an intensified search for minerals began with more advanced methods. In response to these new needs exploration for iron ore in Québec-Labrador began in earnest after 1945.

With the increased tempo of exploration work in the iron formation areas of the Labrador-Trough further ore bodies were discovered and by the end of 1946 thirty deposits had been outlined. As the exploration moved into a more advanced stage diamond drilling began and pre-production licences were taken out. In 1947 H.N.S.E. obtained a special permit for mineral exploration from the Québec Government for its 3,900 square mile concession (8). This cost $10,000 for issue, with an annual rent of $6,000 and the conditions that more than $25,000 worth of work had to be done the first year and $39,000 during each of the following years. Other conditions were the placing in production of the deposits prior to 1958, beyond which date an annual rent of $100,000 was to be paid, and a royalty of between four and seven percent of the annual profits. The original acquisition of the special licence to explore the 3,900 square miles laid down the time limit of June 1962 beyond which date the company could lease the areas it wished to retain.

By 1947 economists calculated that 300 million tons of ore were needed to make the exploration feasible and exploration continued with the aim of proving up this figure (4). The effects of the Second World War were not limited to the changing balance of resource reserves; it also affected technology. The use of air transport became important with the availability of surplus planes and pilots and the legacy of airfields at Mont-Joli on the south shore and Sept-Iles, Goose Bay and Fort Chimo. The impact of the aircraft can be gauged by the fact that in 1947 some 700 tons of airfreight and 67,000 gallons of G.O.L.[1] was flown into the Knob Lake area for the L.M.E. and H.N.S.E. exploration work based on the Burnt Creek camp. 1947 also saw the incorporation of the Québec North Shore and Labrador Railway and the Ungava Power Company, all the shares being owned by Hollinger Consolidated Gold Mines and the Hanna Coal and Ore Corporation. In the same year preliminary railway route survey was undertaken.

In the following year Hollinger Ungava Transport (H.U.T.) was incorporated to serve as the air transport facility for the H.N.S.E. and L.M.E. operations. In October, 1948 new calculations indicated that the economic threshold tonnage had risen to 400 million tons before which economic mining could not take place (4). At the end of 1948 some 300 million tons had been outlined and work continued aided by magnetometer and gravimetric surveys and by improving photogrammetry techniques. By 1949 much of the

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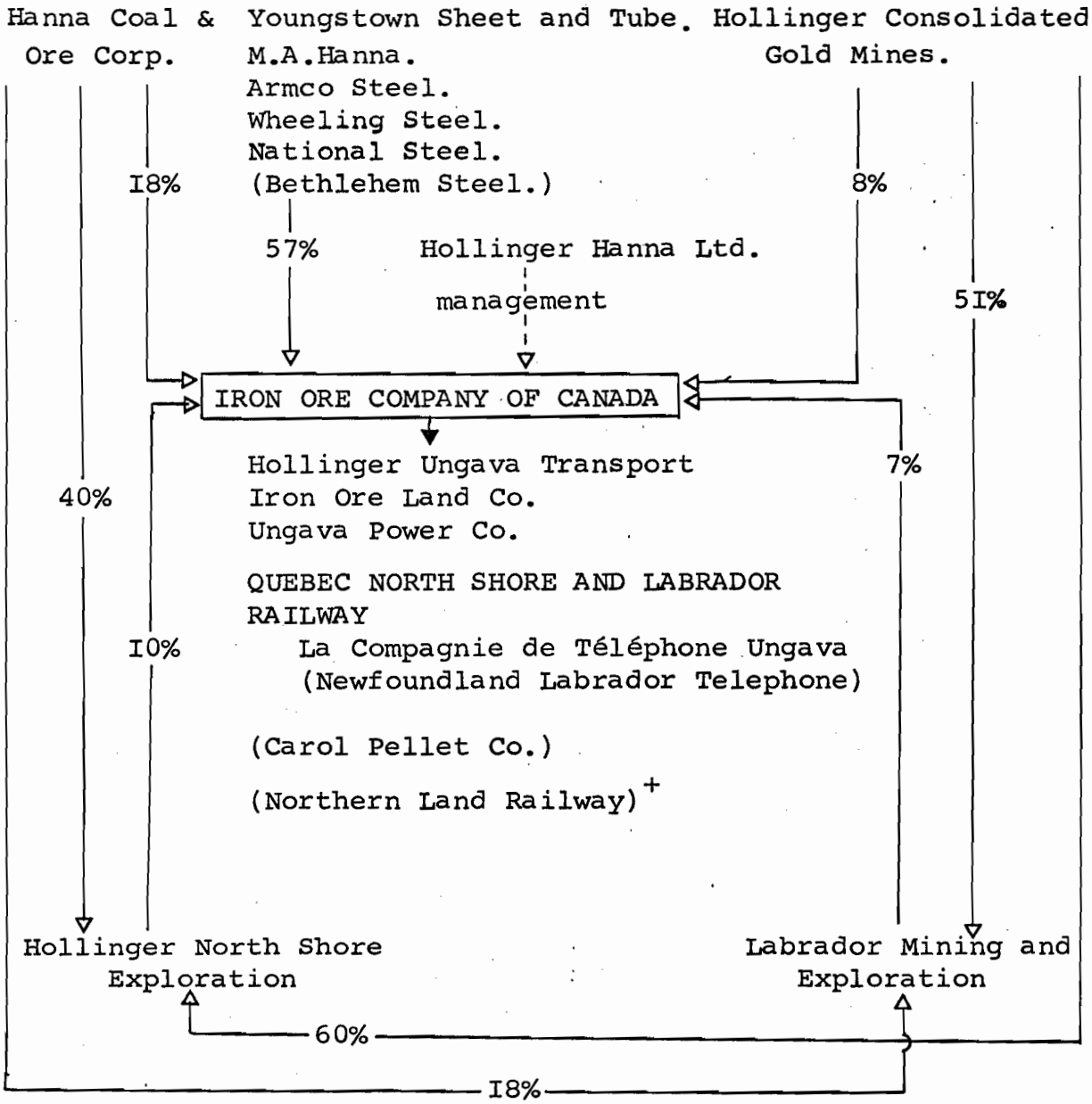
1. Gasolene, oil and lubricants.

DIAGRAM 1

THE STRUCTURE OF THE IRON ORE COMPANY OF CANADA.



Original Structure.
( ) denotes later additions.
+ denotes partly owned company.

Source: I.O.C.C., Sept-Iles.

topographic survey work was completed, the preliminary railway route surveyed and geological mapping at 1:12,000 continued.

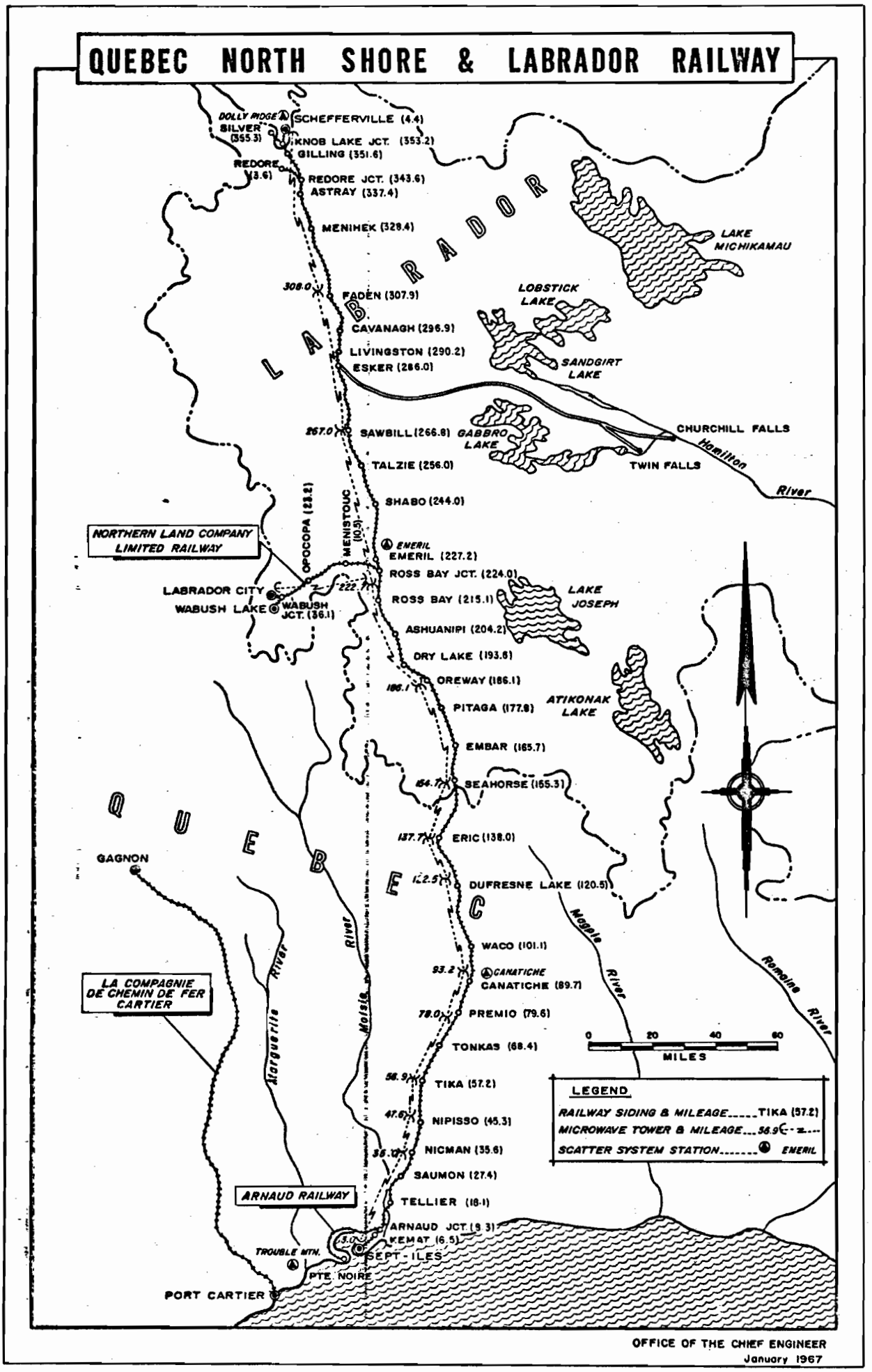
In 1949 the Iron Ore Company of Canada (I.O.C.C.) was formed and this alliance between the exploration companies and the potential ore consumers insured the financial success of the venture once sufficient ore tonnage had been proved. The original structure of the company, registered in Wilmington, Delaware, was complex as can be seen from diagram I. At this time the five American steel companies involved in the backing of I.O.C.C. contracted to accept ten million tons a year on a payment basis that was to at least equal the cost of production and delivery to tidewater at Sept-Iles plus $1 per ton, thus guaranteeing I.O.C.C. the costs of plant and equipment including the railway. Management of I.O.C.C. was contracted out to Hollinger Hanna Ltd., owned fifty-fifty by M.A. Hanna and Hollinger Consolidated Gold Mines, whose management fee was set at 10 ¢ per ton. Initially I.O.C.C. did not actually obtain the mineral rights (see below) which remained under the control of H.N.S.E. and L.M.E.

During 1950 the total of direct shipping ore proved reached 417 million tons and the operation moved from the exploration to the construction phase. The financing of the pre-production expenditure which was finally in excess of $250 million was assured by the backing of the five U.S. steel corporations. In addition to their financing $145 million was lent by 19 U.S. and Canadian insurance companies.

"Iron Ore by '54"

The critical plans produced by I.O.C. called for the transition from construction to production in less than four years. To achieve this involved the following tasks. Firstly, the construction of a railway from the port site selected, Sept-Iles, to the Knob Lake mining area - a distance of 360 miles across the Labrador Lake plateau after crossing the Laurentian scarp. Secondly, to construct all the mine and handling equipment from garages and workshops at Knob Lake through crushing and loading plant to a stock pile and loading dock at Sept-Iles. Thirdly, to construct the physical and social capital such as the townsites at mine and port areas, install communication links and services. All this had to be done in an area with a harsh, uninhabited environment, lacking in overland transport links to the remainder of Canada.

In September 1950 the contract for the railway construction was awarded to Cartier Construction, McNamara Construction, Morrison Knudson of Canada and F. Mannix (C.M.M.K.). The golden spike marking the completion of the line to Knob Lake was driven in February 1954. In order to facilitate and speed up construction a number of airstrips were built along the line of the track and the aircraft of H.U.T. flew 138,700 passengers and 170 million pounds of freight during construction, the largest civilian airlift in history (34). The total cost of the railway eventually exceeded $250 million and the whole project $300 million



OFFICE OF THE CHIEF ENGINEER
January 1967

and the construction labour force reached a total of 7,000 men. The railway was constructed as a single track, with passing loops, capable of carrying twenty million tons a year using multiple diesel units and centralized train control.

During the period of railway construction and townsite and plant design and construction, geological evaluation continued so that the best 500 square miles could be leased by I.O.C.C. from the exploration companies. L.M.E. sublet 250 square miles to I.O.C.C. and H.N.S.E. 204 square miles, the remaining 46 square miles being leased from H.N.S.E. in 1960. The terms of the sublease were as follows - that L.M.E. retains one eighth of the first 133,333,333 tons for sale on its own account and H.N.S.E. one eighth of the first 266,666,666 tons mined for sale on its own account. In addition the two concession companies retained one third of all the other iron ore from the subleased land, 27% of all the specialities such as manganese ore in the subleased land, received seven percent royalty on the competitive f.o.b. market price of the ore at Sept-Iles (with a minimum of 25 cents per ton) and retained full rights to all other minerals. The two concession companies continue to hold areas outside this lease on their respective sides of the height of land.

The Mining Operations

The first ore was shipped south in July 1954 and to the end of 1967 a total of 119,000,000 tons of ore had been mined in the Knob Lake area. The actual operations are influenced by

the nature of the ore, the occurrence of the ore and the climate.

The Labrador Trough, a geosyncline some 700 miles long with an average width of 30 miles, contains a complex series of proterozoic sedimentaries, volcanics and intrusive rocks. Folding during the Labrador and Cretaceous orogenies produced the present Trough which can lithologically be divided into three parts, a northern, a central around Knob Lake, and a southern. In the central section four groups of rocks occur and the Knob Lake group, the oldest of the four, is currently the most significant (35). Within this the Sokoman iron formation and Ruth slate formation are the most significant. The former, grading twenty to thirty percent iron, appears to be a chemically formed sediment, deposited in the late Pre-Cambrian.

Most of the ore bodies lie in the main ore zone extending northwest from Schefferville and running approximately six miles to the northeast of the Trough boundary. This zone straddles a complex ridge system as the resistance of the iron formations is greater than the surrounding metasediments. The altitude of this zone which ranges between 2,000 and 2,900 feet, has resulted in the existence of permafrost with depths in excess of 250 feet, a fact unforeseen in the 1940's (36). The majority of the ore bodies occur in tightly folded and strongly faulted rocks, usually elongated along the strike in synclines, faults or homoclinally folded strata. These bedded ores often grade into unaltered iron formation and appear to have formed in situ by circulating meteoric waters.

This has produced leaching and enrichment of the iron formation with the amount of iron per unit volume increasing as the carbonates and silica are removed (37). The rubble ores, breccia, talus and sand and gravel, often containing upper cretaceous fossils, unconformably overlie the bedded ores or occur within them.

The ore bodies range in size from one to 50 million tons (map 5) and ore is mined by conventional open pit methods permitting a high production, low manpower, low cost operation (photo 1). Actual operations within the open pits has been influenced by a number of environmental conditions, some of which were not foreseen when this subarctic mining venture began.

The high moisture content of the ore, up to 14% means that ore mined during the winter will freeze to the ore cars during the 360 mile, fifteen hour journey to the coast. Such a solid 80 ton lump of ore cannot be handled normally and the mining season is, therefore, reduced to 180 to 195 days. As originally all-year navigation was not thought feasible in the Gulf of St. Lawrence and as stripping of waste and lean ore can be done during the winter this was not an unforeseen factor. Because of this high water content and the increasing depth of these open pits, I.O.C.C. now carries on extensive dewatering operations to lower the water table in the pits and thus the water content in the ore. An ore drying plant has also been built at Sept-Iles to lower the moisture content to eight percent for some of the ores. Dewatering operations are costly but economic, for by the end of 1961 dewatering had saved $160 million in rail freight alone (38).

Map 5

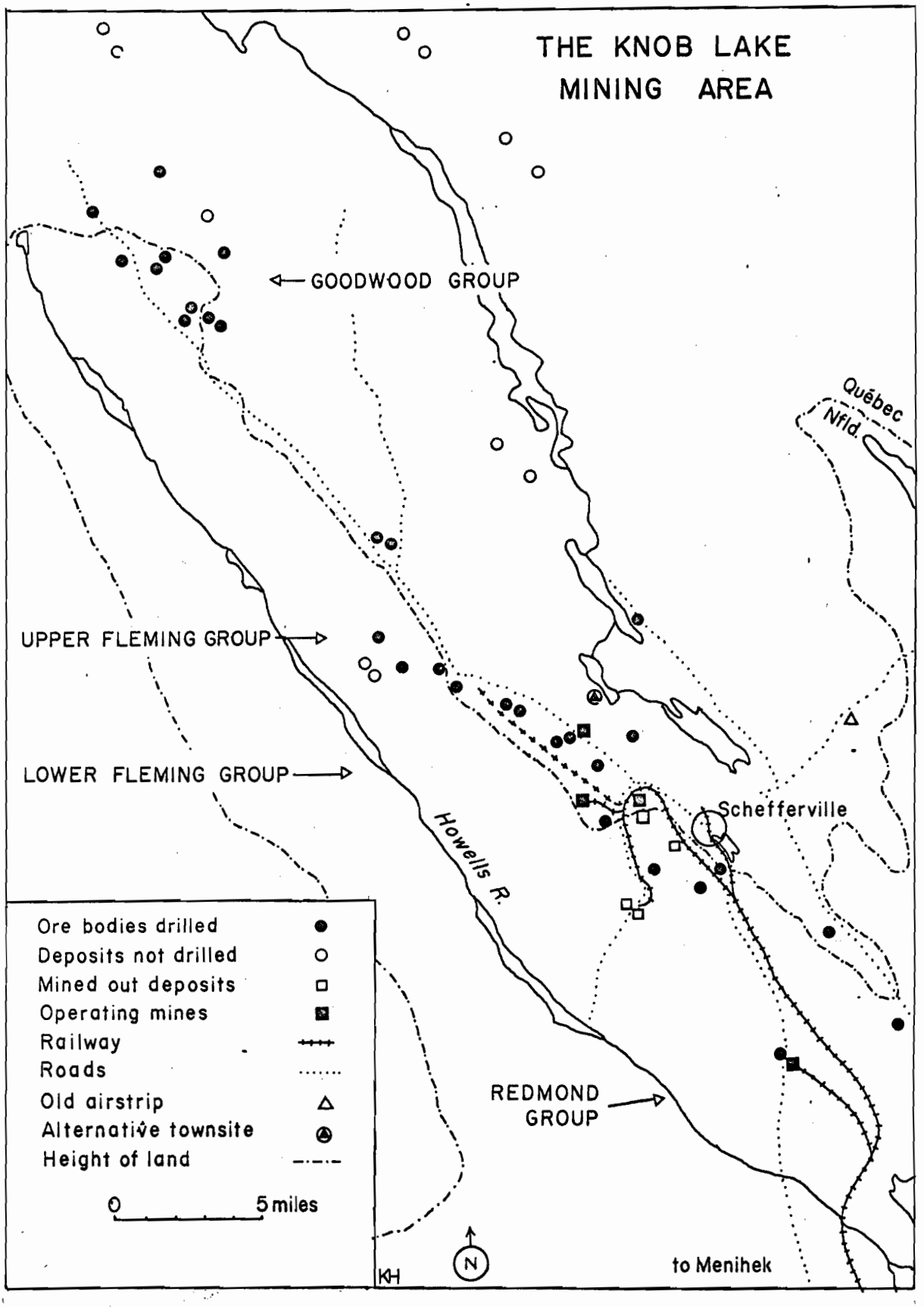
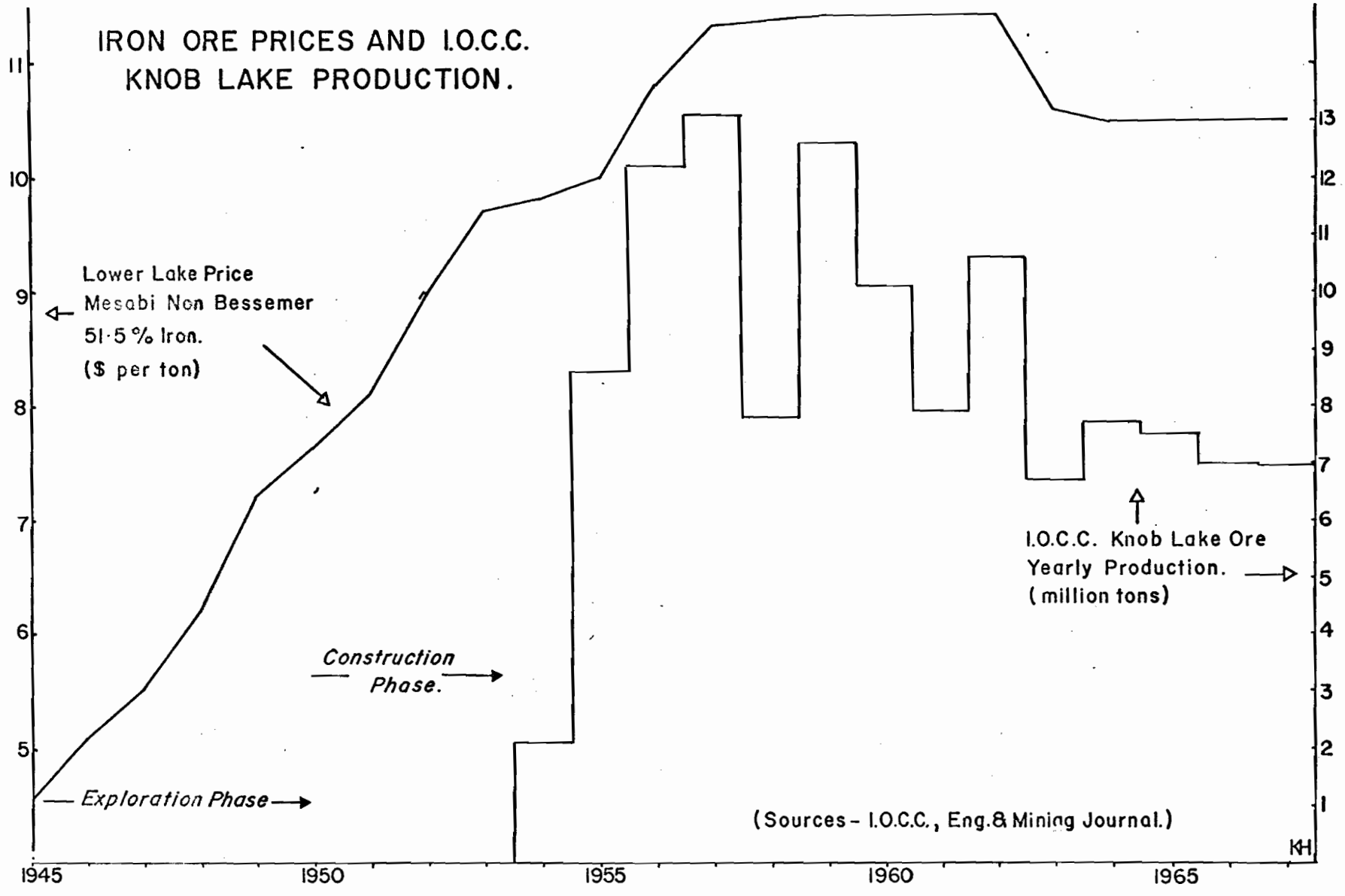

THE KNOB LAKE
MINING AREA
GOODWOOD GROUP
Québec
Nfld.
UPPER FLEMING GROUP
LOWER FLEMING GROUP
Howells R.
Schefferville
REDMOND
GROUP
Ore bodies drilled
Deposits not drilled
Mined out deposits
Operating mines
Railway
Roads
Old airstrip
Alternative townsite
Height of land
0
5 miles
N
KH
to Menihek

DIAGRAM II


IRON ORE PRICES AND I.O.C.C.
KNOB LAKE PRODUCTION.
Lower Lake Price
Mesabi Non Bessemer
51·5 % Iron.
($ per ton)
I.O.C.C. Knob Lake Ore
Yearly Production.
(million tons)
Construction
Phase.
Exploration Phase
(Sources - I.O.C.C., Eng.& Mining Journal.)
KH
11
10
9
8
7
6
5
13
12
11
10
9
8
7
6
5
4
3
2
1
1945
1950
1955
1960
1965

With the heavy snowfall in Québec-Labrador snow removal is a never ending task for much of the year. Graders, tractors, loaders and snow blowers are used and this equipment plus the addition of crushed aggregate and calcium chloride keeps the pit roads open and provides a hard non-slip surface (39). For clearing switches and the empty ore cars stored in the mine spurs all winter, a war surplus jet engine thawing device has been built.

The 22,000 horse power hydro station built at Menihek, which supplies all the power to the town and mines, has heated sluice gates to prevent freezing and all electricity distribution cables and transformers have been specially modified for the climate. The mining equipment itself has also had to be modified to cope with the low temperatures. In the case of the power shovels, modified ring gears have had to be fitted and the frequent boom breakage has been solved by installing ten 15,000 kw. heaters on the boom, since when there have been no cold weather metal failures. The waste rock used to freeze in the buckets and to remove the accumulation, fires would have to be lit inside the shovel. This was not only time consuming but also detrimental to the magnanese structure of the steel and has been replaced by electric heaters. The haulage trucks are not filled with anti-freeze because of the cost and they are run continuously unless they are in a heated building. The cabins are heated and the exhaust is run through the dump boxes to stop ore or waste freezing to the metal. Normal carbon plate steel cannot be used under cold weather operations because of the danger of overload, impact and torsion stresses so alloy steels have to be used for much fabrication.

Another reflection of the extreme climate is the presence of permafrost underlying the higher and more exposed ridges. Although frozen ore was encountered during exploratory trenching operations it was not until the Ferriman mine was opened up that the true nature and extent of the permafrost was realized. The permafrost exceeds 250 feet in thickness and its effects are two fold. Because of the presence of ice lenses in the ore a blasting technique had to be developed to sufficiently fracture the ore so that no large uncrushable lumps were left and the pit floor was level. This means that blasting expenses rise, e.g., the Ferriman pit costs an additional $500,000 a year. The presence of the frozen ore, however, can result in the saving of capital expenditure on dewatering equipment and with this in view I.O.C.C. are currently attempting to determine the thickness of permafrost in the Fleming area prior to mining there (40).

In the exploitation of the Knob Lake iron ore deposits the truth of the statement that resources only appear in response to needs can be seen. The iron ore industry as a whole in Canada has developed into being heavily dependent, to the extent of 85-90% of its sales, on export markets in the United States and Western Europe (41). As the iron ore industry is characteristically a captive one little free iron ore enters the market and to successfully exploit a new deposit on a large scale the mining company needs the U.S. steel companies and the U.S. ore merchants. The post war decline in the reserves on the Mesabi and other Upper Lakes medium

grade direct shipping ores stimulated the steel and ore companies into a world wide search and the Knob Lake development has to be seen in that context. The success of these companies' efforts in Québec-Labrador has been partly due to the favourable geographical location of the Canadian ore deposits in relation to the U.S. ore market, by using both the St. Lawrence Seaway and the east coast, to the stable political climate and to an incentive tax structure.

The three basic pre-requisites for the placing of an iron ore body in production are the assembly of capital, the assuring of markets for long term large scale operations and a stable, economic, fiscal and political climate which is conducive to investment and to long term economic operation. In the case of the Knob Lake development the first two requirements were met by the formation of the I.O.C.C. This complex corporate structure (diagram I) of the two Canadian companies, Hollinger Consolidated Gold Mines and L.M.E., allied with the U.S. mining and holding companies, M.A. Hanna and Hanna Mining, and six U.S. steel companies reflects this situation. There have only been minor changes in I.O.C.C.'s structure since its formation; Bethlehem Steel obtained a share in 1959 and in 1962 H.N.S.E.'s holding was liquidated.

The forces which gave rise to the exploration, evaluation and development of the iron ore in the Knob Lake area also gave rise to other developments in resources and technology which have placed the operation in a critical position.

The shortage of medium/high grade direct shipping ores in the Mesabi and their rising costs (diagram 2) had stimulated a successful world wide search for iron ore so that Knob Lake's original uniqueness was lost. For example exploration began in Liberia in 1947 and during the 1950's naturally rich ores grading 60-65% iron began appearing on the markets from South America and West Africa and larger ore carriers were providing lower rates. As a 50,000 ton ore carrier can offer half the rates per ton compared to a 10,000 ton carrier, long ocean hauls in larger ships could more than offset the additional distance costs. The West African iron ore production doubled during the period 1960-1965 to a total of 24 million tons per annum, but even there the large companies have had to face a 25% drop in ore prices since 1959 (42).

Also the post-war ore 'shortage' and a later change in Minnesota tax laws led to the development of the mining, concentrating and pelletizing of the Lake Superior taconites, which graded 25-35% iron in their natural state. The upper lake area was therefore resurrected as a source of ore for the U.S. market as the U.S. pellet capacity increased from nothing in 1950 to 65 million tons a year in 1967 (43). Pellets were also discovered to have many advantages for the blast furnace operator as they allowed a well prepared uniform blast furnace charge, a reduction in coke rates and increased furnace productivity. The total capital costs of blast furnaces and coke production facilities, etc., can be five or six times greater than the

investment for ore preparation plants. The additional capital costs of pelletizing plants is obviously therefore an attractive alternative to a direct run-of-the-mine product, especially as the higher iron content results in a saving of transport costs (41). The consequences of this development for the ore industry was unforeseen when I.O.C.C. was conceived. Large lower grade deposits amenable to concentration are now frequently more attractive to developers than medium grade direct shipping ores.

As a consequence of the post 1945 exploration and the development of concentrating technology by 1963 world iron ore reserves exceeded 300,000 million tons, i.e., some 300 years supply (44). With the problem of an overall shortage removed the emphasis has now turned to ores which will produce the cheapest steel and the "present trend towards an increase in concentration and agglomeration is likely to continue to expand until 'natural' ores are used in blast furnaces only in exceptional cases" (44). Thus the Knob Lake ores became less attractive to the steelmakers. This combined with production variations and undercapacity working of the U.S. steel industry caused the production fluctuations and decline to the current level of six to seven million tons a year. Had the company been operating in a free market the fluctuations would have been more pronounced.

Any evaluation of the future of the Knob Lake mining operation is an uncertain one. The reserve situation is good, for with the current shipping grade of 54% iron 300 million tons

remain, with many deposits undrilled. I.O.C.C.'s research laboratory at Schefferville has established the technical feasibility of upgrading the ores (45). Studies indicate that benefication of the ore at Sept-Iles will cost approximately 5% more than benefication in Schefferville (40). In spite of this I.O.C.C., if and when benefication becomes necessary to sell the ore, will probably beneficate at Sept-Iles as it would not be involved in providing additional housing and community facilities. In this eventuality the Schefferville mining operation and its seasonal pattern would remain unchanged.

The geographic spread of mining will increase as the Burnt Creek group of ore bodies become exhausted (map 5). Gill, Gagnon, Ruth and Wishart mines are exhausted.[1] French mine will finish in 1969, Ferriman North in 1970 and Star Creek Number 1 in 1971. The recently opened Redmond mine will operate until the 1980's. In 1968 the Fleming ore bodies will begin to be exploited with the opening of Retty mine. I.O.C.C. normally finds that development takes six to seven years to lead in from topographic control to tonnage drilling. The move to the Goodwood area could occur between 1980 and 1986 depending on the possible construction of a beneficating plant and the mining of iron ore now tipped as waste. With such increasing dispersion of mining communications become a problem. The construction of new rail spurs and power lines is essential but the provision of road links between the mines is a major consideration as pit maintenance crews and supervisory personnel have to move quickly from pit to pit. I.O.C.C. have recently completed a new road to the Redmond mine which may be paved eventually to provide a fast all weather surface.

[1] The location of the mines is shown on Map 7.

Another possibility currently under evaluation by the Schefferville Research Laboratory is the metallizing of the ore (45). Using lignite iron briquettes can be produced containing 98% iron and two percent silica. Such a product will obviously save shipping costs but equally significantly it is intended as a scrap substitute for steel production where its chemical purity and consistency would be an additional attraction.

I.O.C.C. is certainly an economic operation. In the early production period during 1956 it was costing $5.25 a ton to mine and move the ore to Sept-Iles, it was landed at Lake Erie ports for an additional $3.30 giving a total cost of $8.55 a ton when the Lake Erie base price was $10.85 a ton (46). Although the current price is $10.50 a ton increasing efficiency of mining operation has kept mining costs stable. With I.O.C.C.'s system of grade control and reserve estimation, using computer listings of sample assays and moisture content, a current value per ton is calculated and using this and the total mining costs an ore/stripping ratio is calculated which gives the maximum yardage of stripping for the minimum profit. This stripping and ore ratio is applied to geological sections and an economic pit bottom is delimited within which the actual mining is planned. This operational procedure combined with the ties to the company owners, the obvious plans for development and product research means that the Schefferville operation is on a firm base. One advantage that the direct shipping operation has over a concentrating grade ore production operation is the relative flexibility of output that can be achieved without tying up capital in spare concentrator and

pelletizing capacity. The Schefferville operation with four or five pits in simultaneous operation is also able to offer a degree of flexibility in the type of ore shipped, e.g., Bessemer, manganiferous, etc.

The future of the Knob Lake Mining Division of I.O.C.C. is difficult to predict as it depends on the demand for 54% iron ore by the United States and Western Europe. This itself is a function of the general economic situation and the changes in the technical requirements of the industry itself.

The Concentrating Grade Ores

At the time the Schefferville mines were in the construction phase exploration began on the more southerly extensions of the Labrador Trough, in both Québec and Newfoundland-Labrador. The continued rise in iron ore prices had produced developments of technology in ore benefication which made lower grade ores attractive.

The Québec Cartier Mining Company

This company is involved in operations in the watershed area of the headwaters of the Manicouagan system (map 6). The iron formation which has attracted so much attention to the area occurs as bands within the contorted and metamorphosed sediments. The ore is found as a specular hematite grading 33% iron and the ore bodies occur where such structures as anticlines give large

quantities of ore suitable for large scale open pit mining (47). Lying close to the watershed the area has a highly varied relief, rising up to 3,000 feet, with dissection near the scarp edge giving local relief of up to 1,500 feet.

The present mining development began in 1951 when the Cartier Mining Company began staking claims in the area. This company was an Ontario subsidiary of United States Steel. A 20,000 square mile aeromagnetic survey with diamond drilling of target anomalies followed. In 1954 drilling of the Lac Jeannine ore body began and the existence of large reserves was proved by 1956. During the winter of 1956-57 a pilot plant was airlifted into the area and tests during 1957-58 proved the amenability of the specular hematite to simple autogenous grinding and spiral concentrating. In 1957 Québec Cartier Mining (Q.C.M.) was incorporated to undertake the development of these United States Steel properties.

In 1958 the decision was made to mine and concentrate the Lac Jeannine ore body and construction began. The requirements were broadly similar to those of I.O.C.C. at Knob Lake as the complete range of facilities from a power site at Hart Jaune, through the construction of two townsites (Gagnon at the mine site and Port Cartier on the North Shore), mine plant and concentrator at Lac Jeannine and the railway had to be provided. The railway, La Compagnie de Chemin de Fer Cartier, unlike the Québec North Shore and Labrador, is a private carrier. The line was completed in December 1960 and the first concentrates were shipped from Port

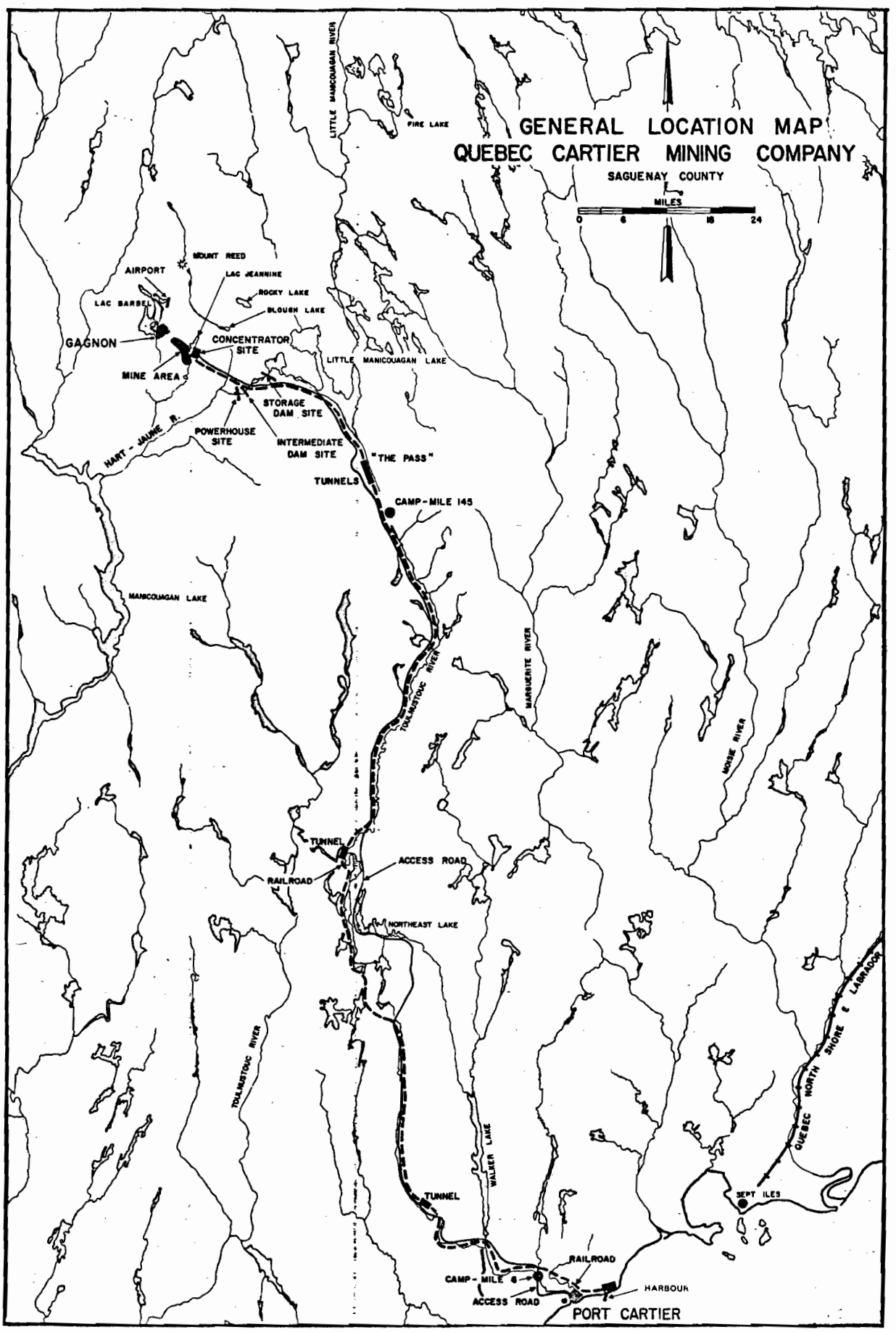
Cartier in July 1961. Production capacity is eight million tons of 66% concentrate involving the mining of 20 million tons of crude ore.

Q.C.M. had a choice of ore bodies at Mt. Reed, Mt. Wright and Lac Jeannine but chose the latter because intense metamorphism had altered the original iron oxides to a coarse grained specular hematite in a matrix of sugary quartz. This ore body was therefore easier and cheaper to drill, blast, crush and concentrate and the relatively coarse concentrate made an efficient blast furnace feed without pelletizing. A recent decision to lower the ultimate pit depth has extended the life of this mine well into the 1970's after which a move will have to be made to the other deposits. With a total investment of $350 million in the operation Q.C.M. mines, concentrates and ships on an all the year round basis.

The Carol Project

L.M.E. were first in the Wabush Lake area, 150 miles south of Knob Lake, during the 1930's but preliminary work did not take place until 1949-51. In 1953 detailed mapping and sampling began and during 1956 diamond drilling began in earnest when aeromagnetic survey had indicated large anomalies in the areas to the north, west and south west of Wabush Lake (48). With a base camp at Duley (Long) Lake H.U.T. airlifted supplies from the Q.N.S. and L., 40 miles to the east, using the frozen lakes as

MAP 6


GENERAL LOCATION MAP
QUEBEC CARTIER MINING COMPANY
SAGUENAY COUNTY
MILES
0
6
18
24
LITTLE MANICOUAGAN RIVER
FIRE LAKE
MOUNT REED
AIRPORT
LAC JEANNINE
ROCKY LAKE
LAC BARBEL
BLOUGH LAKE
GAGNON
CONCENTRATOR SITE
MINE AREA
LITTLE MANICOUAGAN LAKE
STORAGE DAM SITE
POWERHOUSE SITE
INTERMEDIATE DAM SITE
HART - JAUNE R.
"THE PASS"
TUNNELS
CAMP - MILE 145
MANICOUAGAN LAKE
TOULNUSTOUC RIVER
MARGUERITE RIVER
MOISIE RIVER
TUNNEL
ACCESS ROAD
RAILROAD
NORTHEAST LAKE
TOULNUSTOUC RIVER
QUEBEC NORTH SHORE & LABRADOR
WALKER LAKE
TUNNEL
SEPT ILES
RAILROAD
CAMP - MILE 6
HARBOUR
ACCESS ROAD
PORT CARTIER

landing strips prior to constructing an airstrip at Duley Lake. During the winter of 1956-57 the exploration camp was moved twenty miles north to D'Aigle Bay on Wabush Lake and more than 1,000 tons of supplies were brought in from mile 227 on the Q.N.S. and L. by winter tractor trains. During 1958-59 a camp was built near Wabush Narrows, close to the present site of Labrador City, and an airstrip cleared there. Some 3,000 tons of supplies were brought in over a winter trail from Emeril on the Q.N.S. and L., including the pilot plant, which operated during 1959-60 when it proved the feasibility of concentrating the low grade ores of the Wabush Iron Formation.

The Wabush Iron Formation lies as part of the Proterozoic rocks of the Labrador Trough, which in this area is approximately 40 miles wide. The rocks consist of former greywacke, sandstones and ferruginous sediments of Late Pre Cambrian age which have been regionally metamorphosed to mica schists, quartzites and high iron content schists and gneisses respectively. The sediments were later intruded with the Shabogamo intrusives, resulting in local contact metamorphism. The structure is complex because of the superimposition of two episodes of deformation and the actual size of the iron ore deposit today is a function of the type, wavelength and amplitude of folding (48). By 1960 eleven major zones of iron formation were outlined and preliminary grades and tonnages indicated enormous potential. The iron formation is a specular hematite and magnetite grading 37% iron which after autogenous grinding is easily concentrated by Humphrys spirals.

Late in 1958 the decision was made by I. O. C. C. to develop the Carol Project and as a result of the pilot plant operation the design of mining facilities, crushing plant and concentrator was finalized and construction took place between 1960 and 1962. The initial capacity of the concentrator was to be seven million tons of 66% concentrate and the cost of the project was planned at $150 million.

With the almost simultaneous evaluation of the ore deposits to the south of Wabush Lake by the Canadian Javelin group (see below) I. O. C. C. decided to construct jointly rail and power facilities. The Northern Land Railway, linking the new mining areas to the Q.N.S. and L. main line at Ross Bay was built in partnership with Wabush Mines. The Twin Falls Power Corporation was conceived in association with the Wabush Mines interests and the British Newfoundland Corporation (Brinco). Brinco, which owns the power rights for the whole Churchill drainage basin, built the Twin Falls station. The construction of this hydro plant, like the whole of the Carol Project, was facilitated by the existence of the Q.N.S. and L. railway, as Brinco had constructed a road from Esker (mile 286) to the Churchill Falls area in 1957. Initially of 120,000 horse power the second increase of the station's capacity has raised this to 500,000 horse power. May 1959 saw the beginning of the construction of the 36 mile Northern Land Railway from Ross Bay to Wabush Narrows. The railway was completed in May 1960, when the construction of concentrator and mine facilities as well as the new settlement of Labrador City began.

In October 1961 I. O. C. C. decided to augment the concentrator with a pellet plant of five and a half million tons capacity. The Carol Pellet Company was established to finance this $70 million operation and it represented a different arrangement of I. O. C. C.'s U. S. steel companies. The plant is operated by I. O. C. C.

The concentrator began operating in 1962 and the Carol Pellet Company came 'on stream' in May 1963. The initial production proved inadequate and in 1965 I. O. C. C. took the decision to expand the concentrator and pellet plant to ten million tons annual capacity. This will be effective in 1968 and will involve mining 22 million tons of crude ore.

The factors lying behind the development of the Carol Project included the requirements for concentrates and pellets by the partners in I. O. C. C. together with the existence of large deposits (reserves are in excess of 3,000 million tons) of low grade ore amenable to concentration and pelletization. The large ore bodies permit economic pit design with low waste stripping ratios, e.g., Humphrey Mine .087 cubic yards per long ton of ore (48), and the use of large 100 ton haulage trucks. There are no permafrost problems and the pellets are produced and shipped on a year round basis unlike the seasonal Knob Lake operation. The ore although amenable to concentration and having a constant iron content, unlike the Knob Lake ores, has a variable magnetite content. Prediction of the magnetite concentration zones is proving difficult and as these are difficult to grind because it is harder and fine grained they are a minor problem. A magnetic separator has recently been installed and this will extract half a million tons of magnetite per year from the tailings

deposited in Wabush Lake. The operation of winter mine equipment was aided by the experience gained at Knob Lake and personnel were transferred from Knob Lake during the early stages of construction and production. The existence of the Q.N.S. and L. railway made both exploration and construction stages of the Carol Project more economical.

Wabush Mines

The area which has been developed by Wabush Mines lies to the south and east of Wabush Lake, Labrador, only a few miles south east from I.O.C.C.'s Carol Project. It is geologically similar to the I.O.C.C. property. The ownership of the ore and the companies involved in the development are linked in a complex way.

The area was originally part of the concession granted to the Newfoundland and Labrador Corporation by the Newfoundland Government (49). In 1954 the Canadian Javelin Company acquired 4,775 square miles of these concessions with an agreement that provided for a five year exploration period, to be followed by a two year development period and a 99 year lease. Javelin carried out exploration work and at the same time began acquiring Newfoundland and Labrador Corporation stock. In 1955 a wholly owned subsidiary, the Wabush Lake Railway, was formed to construct a rail link from the property to the Q.N.S. and L. This was not proceeded with.

During 1957 Javelin entered into agreements with the Steel Company of Canada (Stelco) and Picklands Mather & Co. of Cleveland, Ohio,

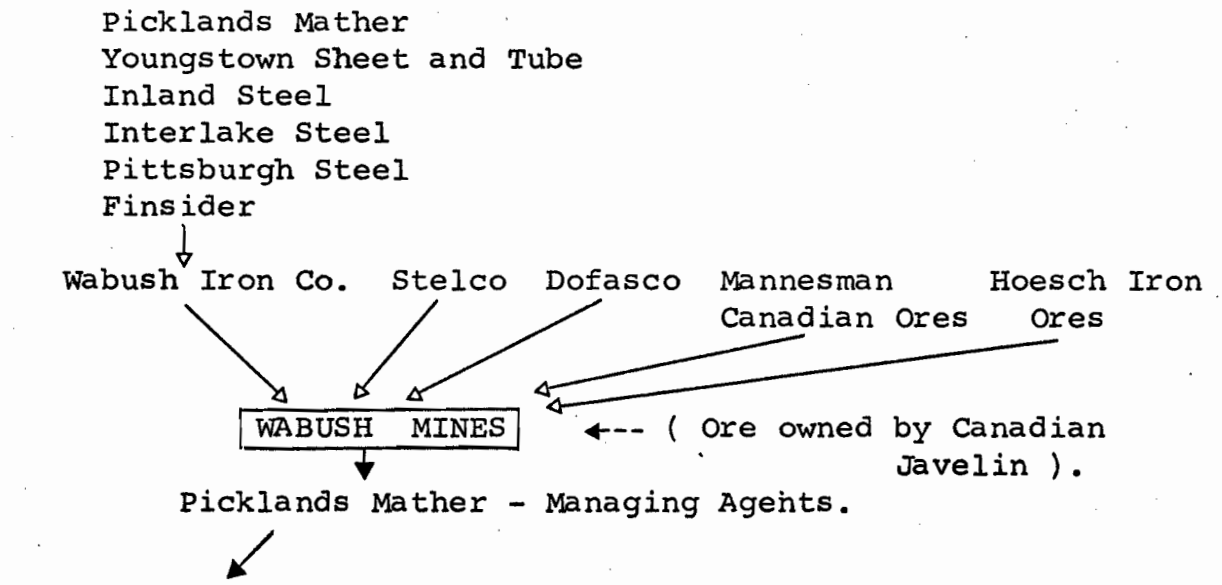
to lease the western 40% of the mining lease for a royalty of one dollar per ton on an output of six million tons a year. This agreement also appeared to give the right to explore the remainder of the concession area to the companies, who could then select two additional mine sites in an area not to exceed five square miles within a period of five years. At the same time another contract was agreed between Javelin and the Wabush Iron Company, a combine of Picklands Mather & Co. and Stelco with Javelin holding a ten percent share, giving it an obligation to mine ten million tons a year from the eastern part of the holdings at a payment of 75 cents per ton. This was not proceeded with. Javelin at the same time reserved for itself several other deposits which Picklands Mather & Co. had the right to mine for two and a half percent royalty. All the agreements specified that Picklands Mather & Co. were to be the sales representatives for North America and Javelin for Europe.

Javelin spent four million dollars in the period to 1957 on the exploration work but in spite of many production targets and dates, financial manoeuvring and obtaining ore contracts continued for some years (50). During the 1959-61 period a pilot plant was operated and as a result of its operation in 1962 the actual construction of the Wabush Mines operation began. The eventual company structure is shown in diagram 3. Like I. O. C. C. and unlike Q. C. M. the combine links together steel companies, ore merchants and the property owners.

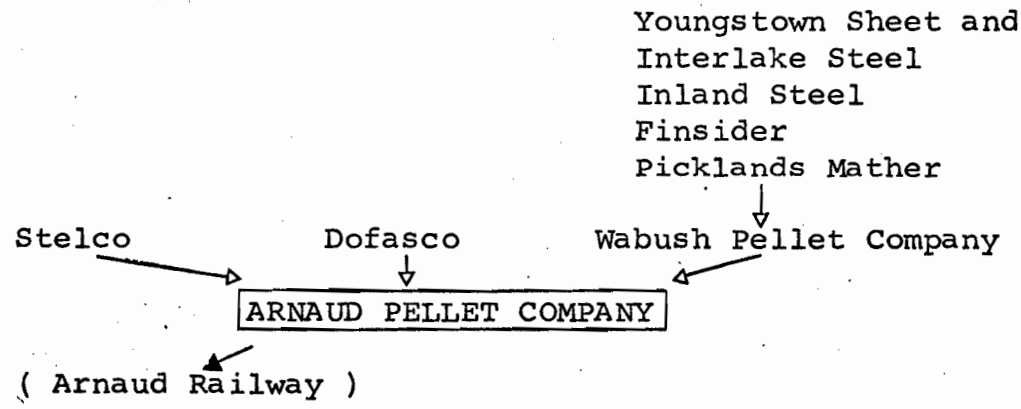
DIAGRAM 3

WABUSH MINES COMPANY STRUCTURE.

I. MINE AND CONCENTRATOR- WABUSH, LABRADOR.



2. PELLET PLANT - POINTE NOIRE, QUEBEC.



Original Structure. Hoesch and Mannesman have withdrawn.

Source Wabush Mines, Picklands Mather & Co.
Managing Agents, Pointe Noire.

The original partnership of ten steel companies has been reduced to eight with the withdrawal of the two German partners, Mannesman and Hoesch. The Italian State Steel Company, Finsider, remains a partner. The two Canadian companies Stelco and Dofasco control 40% of Wabush Mines, but the U.S. partners have a majority holding.

Construction began in 1962 and proceeded for three years on the planned lines of a concentrator to produce five and a half million tons of 66% concentrate a year from the specular hematite. Later the companies decided that they required a pellet supply and a pellet plant was built at Point Noire on the south west side of Sept-Iles Bay, where 42 foot water depth was available. This location decision was made for a number of reasons (51). The concentrator being built at the mine site had an established flowsheet design and 530 special covered rail cars had been constructed to carry the concentrate south. Both these would have to be redesigned to permit pelletizing at the mine site and the townsite of Wabush would itself have to be expanded to accommodate the larger work force. Politically it was also judicious to have the concentrator in Newfoundland-Labrador and the pellet plant in Québec as taxes and local payrolls would be equally spread between the provinces. In addition the company would save on freight costs as oil and bentonite, the pellet binding agent, would not have to be shipped north to the sole profit of Q.N.S. and L. The plants opened in 1965 after an investment of close to $300 million at an initial capacity of five and half million tons of concentrates and five million tons of pellets a year.

Conclusion

The three concentrating grade ore producers appeared at one time to be joined by a number of others. The iron formation in the northern part of Labrador Trough was evaluated by a number of companies, e.g., Oceanic Iron Ores, Fennimore Iron Mines, Atlantic Iron Ores, International Iron Ores, etc., whose reserves appeared to indicate several billion tons of ore (49). In spite of studies of the feasibility of stockpiling ore at an ice free transhipment portsite in Greenland to overcome the short shipping season in Ungava Bay these developments lapsed as a result of a lack of markets and capital (52). The close vertical integration of the North American steel industry and its captive ore contracts is a strong barrier to the emergence of any independent producers. In addition the high cost increments of operating in northern Labrador-Ungava combined with the current state of the iron ore market acted as strong deterrents. Geological exploration continues in the Labrador Trough but the search has returned to the sulphide zone.

CHAPTER FOUR: SCHEFFERVILLE

Introduction

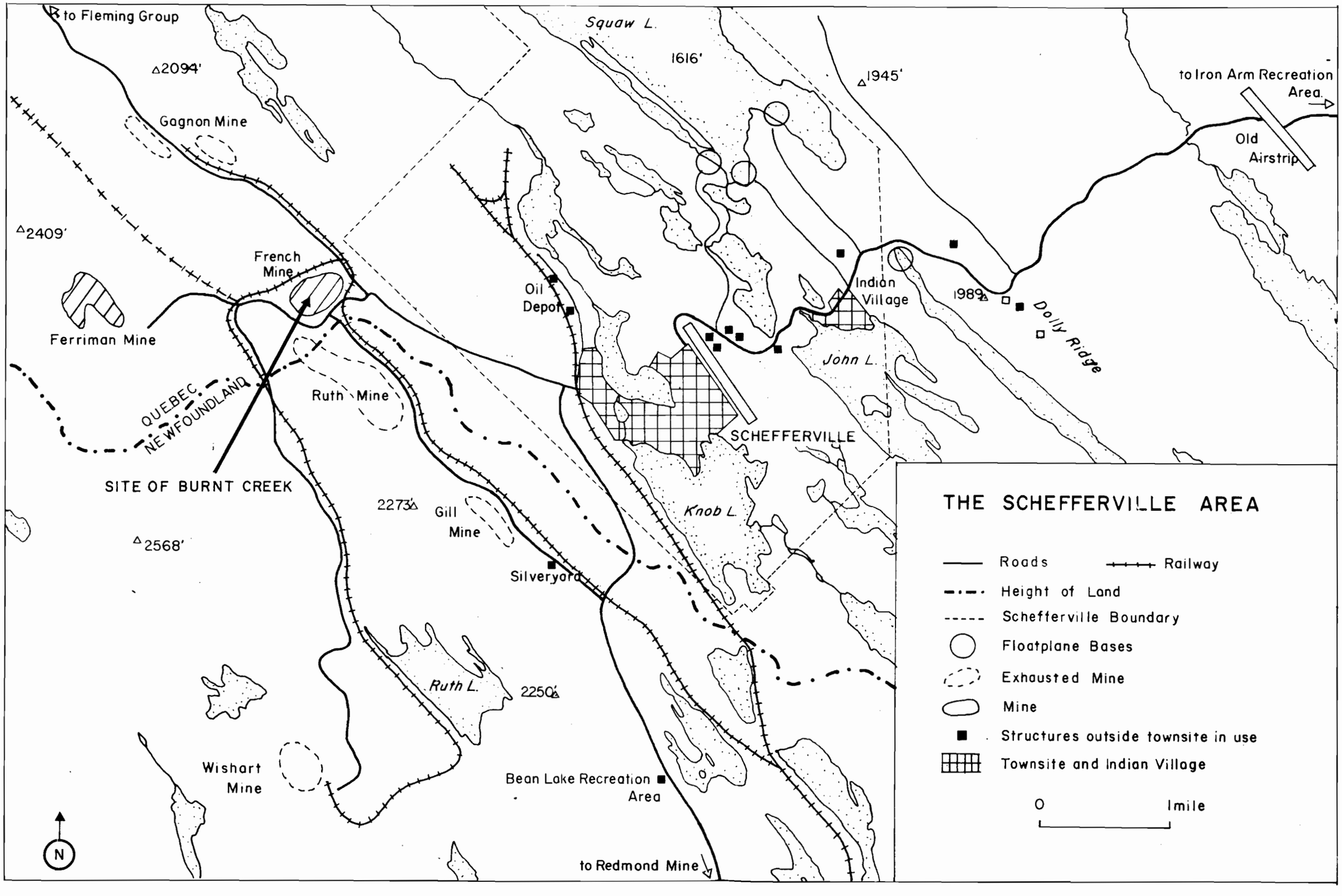
The first modern settlement of the Knob Lake area occurred in 1945 when an exploration camp was set up on the shores of Knob Lake. From this camp trails were constructed to the major ore zones and a road was also blazed six miles to the east, where an airstrip was constructed in 1947. As the scale of operations grew the major centre of exploration work was moved three miles to the northwest to Burnt Creek, where in 1947 the major exploration camp was established (photo 2). From this camp a network of exploration roads was constructed, some of which are shown on map 5.

When I. O. C. C. decided to bring the deposits of direct shipping ore into production the problem of site selection and physical planning of the Knob Lake townsite arose. Because of the isolation of the ore bodies in the interior of the Labrador-Ungava peninsula it was obvious to the company that it would have to have a fully serviced townsite constructed in order to attract and retain the skilled labour force required for the large scale mechanized mining. The townsite would ideally be centrally located with respect to the more than 40 ore bodies, close to the new airstrip and proposed railway and at the same time offer good construction conditions. As a result of agreements made with the Québec

Government the townsite location was restricted to Québec territory. The site choices were limited to two when all these limiting factors were considered - an area between Ridge Lake and Lac la Cosa and the site between Knob and Pearce Lakes. The latter was chosen as it lay in close proximity to the new airstrip which was constructed in 1953. The possibility of using the Burnt Creek site as a nucleus for a settlement was precluded by the discovery during trials of a diamond drill rig that it lay on top of the 21 million ton French ore body.

The town of Schefferville lies in an elongated broad depression approximately four miles wide with an average altitude of 1,600 feet. This depression contains a number of low steep ridges and valleys with scattered lakes and bogs. The area's vegetation is predominantly lichen woodland with black and white spruce, tamarack, bogs and muskeg. The gaunt bleached spikes of the extensive burns close to the townsite emphasize the slow tree regeneration in a harsh climate.

To the west of the townsite lies a complex series of ridges containing the major ore zone. This belt runs northwest - southeast and reaches a maximum altitude of 2,800 feet, i.e., approximately 1,200 feet above the vale. The woodland degenerates with altitude and the upper parts of the ridges are covered with lichen heath and tundra. To the east the vale is bounded by a lower ridge which rises 300 feet and to the south a series of low hill marks the watershed between the Ungava Bay drainage and the Hamilton


to Fleming Group
Squaw L.
1616'
△2094'
△1945'
to Iron Arm Recreation Area
Old Airstrip
Gagnon Mine
△2409'
French Mine
Oil Depot
Indian Village
1989
Dolly Ridge
Ferriman Mine
John L.
Ruth Mine
QUEBEC
NEWFOUNDLAND
SCHEFFERVILLE
SITE OF BURNT CREEK
2273'
Gill Mine
Knob L.
△2568'
Silveryard
Ruth L.
2250'
Wishart Mine
Bean Lake Recreation Area
to Redmond Mine
N
THE SCHEFFERVILLE AREA
Roads
Railway
Height of Land
Schefferville Boundary
Floatplane Bases
Exhausted Mine
Mine
Structures outside townsite in use
Townsite and Indian Village
0
1mile

(Churchill) River drainage and thus the unmonumented 1927 boundary between Québec and Newfoundland-Labrador (map 7).

The climate (see Appendix I and Chapter II) is severe and the lack of any appreciable shelter for the townsite makes the early winter winds even more noticeable. As far as the heating degree days and windchill are concerned the settlement is certainly one of the most rugged in Canada which attempts to provide the full range of southern urban services.

The "insular" site between Knob Lake, which serves as the town's water supply, and Pearce Lake covered approximately 100 acres. The bedrock was originally covered by a variable depth (6 - 40 feet) of fluvioglacial kame deposits. The vegetation cover was entirely removed from this and the whole site graded to give a sufficient thickness of sand and gravel to protect the buried services from frost. This work was done in 1953 at a cost of $800,000 (3).

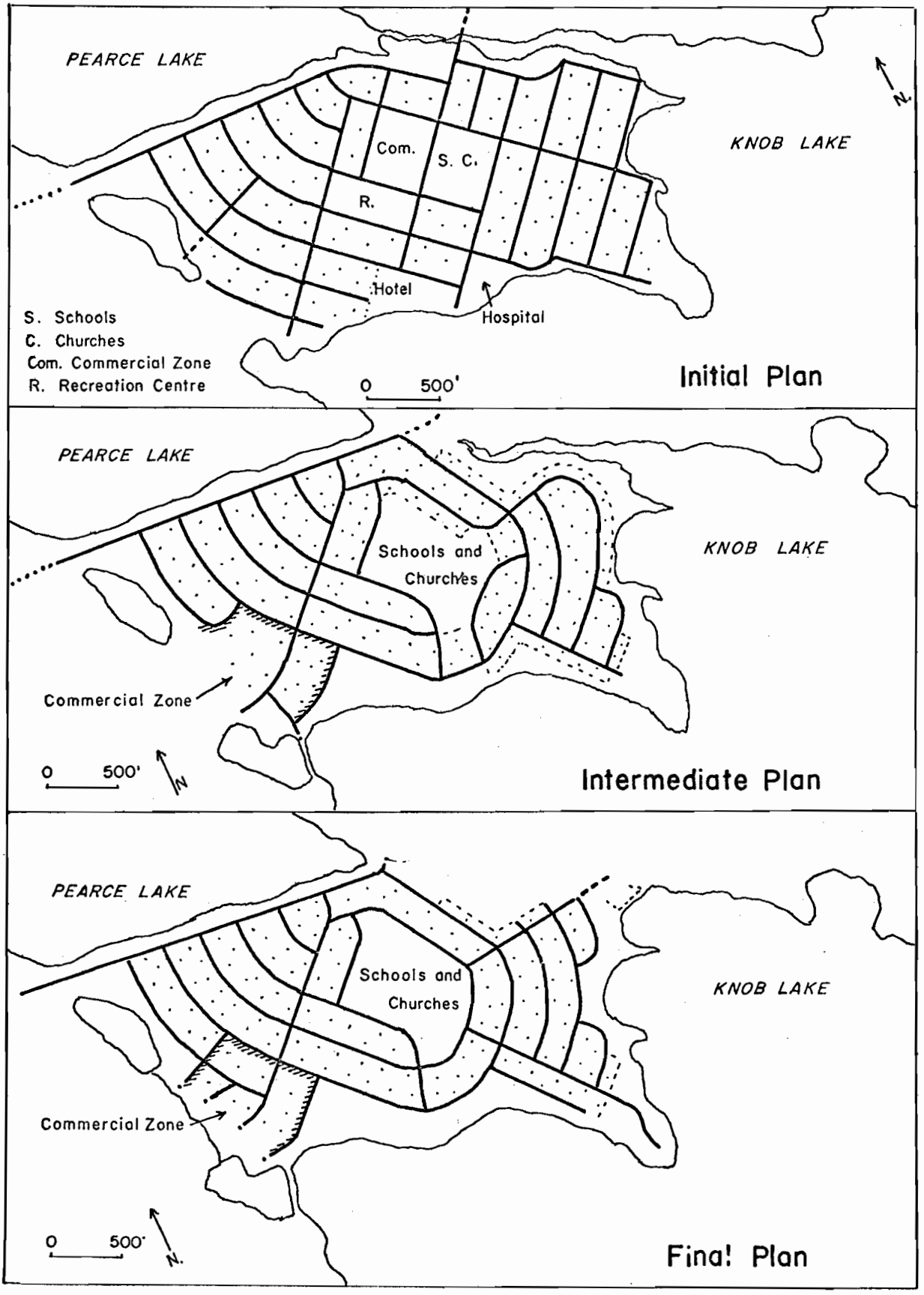
Evolution of the Plan and the Townsite

During 1953 the company hurriedly constructed five bi-family houses in a crescent close to Pearce Lake, moved 15 temporary houses from Burnt Creek, constructed a temporary school and food store and at the same time began construction of its own industrial area and bunkhouses (photo 3). The new airstrip was also finished in 1953.

As can be seen from map 8 the first plan was a projection of the roads already traced with little adjustment to the site and

MAP 8

SCHEFFERVILLE. EVOLUTION OF THE TOWN PLAN



was rather unimaginative. This plan was apparently rejected by the provincial government on these grounds. The second plan again preserved the Pearce Lake development and continued to reserve the central area for schools and churches while the commercial zone was moved to the west. The third plan was adopted and in the most part built. These plans were prepared by the planner Plante, working directly under contract to the I.O.C.C. Engineering Department.

In spite of some difficulties caused by the delay in housing construction by the contractors, the construction of the townsite continued during 1954 when 50 houses and the first school was built. 1955 saw more houses completed and the Catholic church built. The construction of the commercial zone began during the following winter with the Hôtel de Ville, theatre, bank and a general store being the first to be built. The construction period lasted until 1960 when the hospital was completed but the streets were not completely paved until 1962.

In 1955 the Bell Telephone Company and its contractors arrived in Schefferville to begin construction of the Mid-Canada Early Warning Line (M.C.E.W.L.). The existence of an evolving serviced townsite with excellent communications in the strategic central portion of Labrador-Ungava had attracted another function to Schefferville's single enterprise mining community role for I.O.C.C. These M.C.E.W.L. contractors established camps to the east of the townsite. At this stage the basis of the residential, industrial, commercial and defence zones became established (map 9).

MAP 9

SCHEFFERVILLE

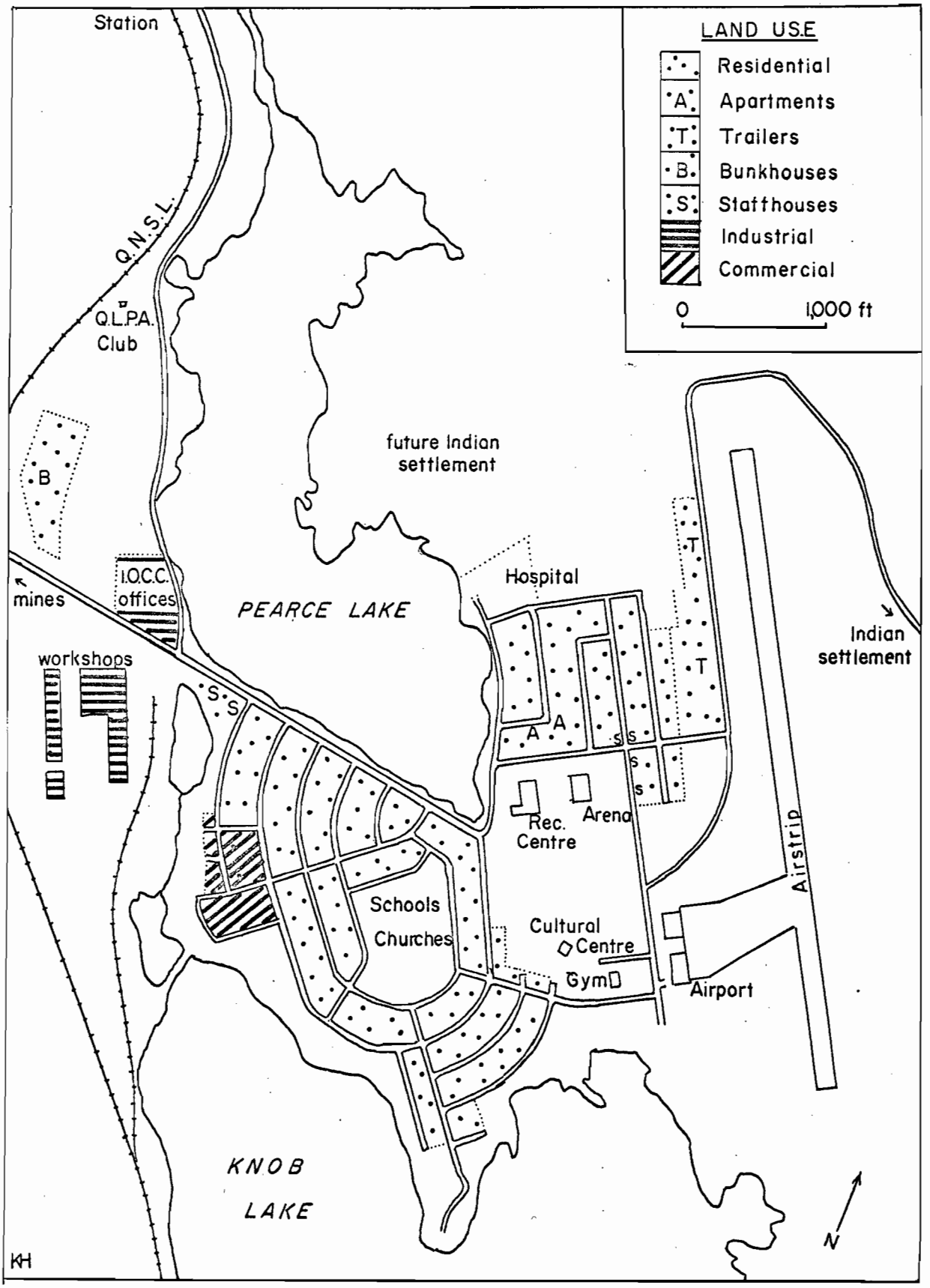


Photo. No. 1 Ruth Mine, 1966, this mine is now exhausted and is filling with water (I. O. C. C. photo).

Photo. No. 2 Burnt Creek, 1953, with bunkhouses on right and workshops in the centre of the camp (I. O. C. C. photo).

The original site between the two lakes had an ultimate maximum capacity of 475 to 500 homes. With the rising permanent labour force, an increasing provision of community services and Schefferville's unseen defence role, this area proved inadequate and a weakness of the plan became evident. Expansion to the west was barred by the industrial zone and to the north and south by lakes. The only possible area for expansion lay to the east but the defence zone and airstrip forced the housing extension to the north. The housing in this area is predominantly of the row type and this combined with the straight roads make it less visually attractive than the older zone (photos 3 - 10). With this expansion the commercial zone became even more off centre for the townsite as a whole.

The 650 housing units are a mixture of 18 styles of single and multi family dwellings of the usual Canadian construction with full basements, wooden frames and painted asbestos shingle cladding. In spite of their conventional designs their costs were high ranging from $18,000 to $34,000, plus transportation, per family unit (3). Typically of a company town at this time rents were low, ranging initially from $55 to $75 per month and were met by payroll deduction. As an additional subsidy the company originally paid all heating costs and as owner paid all local taxes. Early I.O.C.C. house sale schemes and mortgage assistance were basically applicable to the Sept-Iles situation, where the company had to aid housing provision to attract and hold labour and where it has materially aided private home building and ownership. The most recent I.O.C.C. house sale scheme

is meeting with some success in Schefferville as it has been combined with a revised rental policy which makes it more attractive for new employees to buy rather than rent their homes. Current rents range between $50 and $100 per month (53).

Municipal Administration and Political Development

From its inception until 1955 the townsite was administered by I.O.C.C. and the superintendent of the company at Knob Lake was responsible for the development and administration of the town. The house construction and services were left to the Engineers Department which supervised contractors' work.

Schefferville was built and established under the Québec Mining Towns Act, as no holder of a mining licence can develop a mining town without the control of the provincial government (2). In the terms of this law provincial authority rested with the Department of Municipal Affairs but the government's powers to survey and service the townsite were not executed. In Schefferville I.O.C.C. surveyed and planned the townsite and assumed responsibility for installing services and buildings. The lease, by the Iron Ore Land Company, of the townsite area from the provincial government was drawn up in the spring of 1954 but its details were not apparently released until November 1956 (3). In this lease the Crown ceded to the Iron Ore Land Company all residential lots in Schefferville. The company as tenant lessee had to prepare and survey the lots, had to pay all taxes imposed by the municipality and would have to erect buildings on the

lots. The water and sewage system which was built at a cost of $2 million would be ceded to the municipality when the latter could pay the entire cost of the system. The government retained all public lands in the municipality and all the mineral rights so that the Iron Ore Land Company's ownership was restricted to the residential lots and the services. The town was therefore built basically as a company town under some government supervision. Its early experiences were consequently radically different from that of Chibougamau during the same period, where no single company existed and where a more 'open' approach was followed.

The Municipal Limits were made extensive (map 7) and cover 9,000 acres, only about 30% of which has actually been developed. The major company area of offices, workshops and warehouses are included within the limits, as are the Indian Settlement and the Squaw Lake floatplane base. These extensive municipal limits were intended to permit control over speculation and substandard building.

The Québec Mining Towns Act provided for a nominated council of five members, a mayor and four aldermen, to be appointed by the Lieutenant Governor in Council for a period of up to five years, after which an elected council would replace it. This council was to be composed of two aldermen to represent the French Canadians, one to represent the English speaking Catholics and one to represent the Protestants with a French Canadian mayor (54). The town was incorporated in July 1955 and the nominated council, all I.O.C.C. employees, began its term of office.

At the end of the five year term there were only four property owners in the town and thus, in the terms of the law, only four people eligible to be elected as aldermen. Faced with this situation, a product of I.O.C.C.'s dominance of the housing provision, an extension of the term of office of the nominated council was obtained. The council submitted names for their replacements as losses occurred and the provincial government approved them.

In 1965, when the choice of aldermen on property qualifications remained equally limited, the town prepared a special Bill for the Québec Legislature. This Bill intended to make it possible for anyone who had lived in Schefferville for one year to be elected to the council and anyone over the age of 18 years resident in Schefferville for more than 12 months could vote. With the change of provincial government the Bill was delayed, amended and finally passed in February, 1967. The Bill (Private Bill 207 Loi conçernant la Ville de Schefferville) as there were still only 25 landowners, allowed everyone resident in Schefferville for more than 15 months to present themselves for election as aldermen. The voting age was set at 21 years, with similar residence qualifications. The first election was held on November 5th, 1967; there were two candidates for mayor and seven for the four aldermen's posts. The nominated council was elected in its entirety, 860 individuals voting of the 1,400 on the electoral roll (55).

It is hoped that this change to an elected form of local government will help to develop and maintain an interest in community

affairs as well as being more democratic. Although the town after 1955 was not technically a 'company town' the I.O.C.C. dominance in all local affairs allied to the nominated local council form did little to remove this impression. With the change to an elected form of Town Council, the house sale schemes, the holding of council meetings in French, etc., the paternalistic direct reliance on the company characteristic of the people in a single enterprise community might be lessened.

The municipal administration was placed in the hands of a town manager, a form of administration typical of small mining communities. The town provides a full range of services for its residents. The water and sewage systems are rented from I.O.C.C. for a nominal annual payment of $1. There is a five man municipal police force, established in October 1955 when the I.O.C.C. police were replaced. A volunteer fire department is also based at the Hôtel de Ville. The town has a policy of contracting out maintenance services for administrative and economic convenience and this policy has had the advantage of providing opportunities for local businesses to emerge. Snow removal, road maintenance and garbage collection are all handled in this way.

The town's annual budget indicates the type of activities a single enterprise mining community has to deal with. As can be seen from the details of this budget in Table II recreation accounts for $163,000 of the total $582,000. The Recreation Centre buildings are rented from I.O.C.C. which built them between 1958 and 1963 at a cost of $1,500,000 for $1 a year. The town's income derives

TABLE II

1967 BUDGET FOR THE TOWN OF SCHEFFERVILLE

Expenses

Administration	$68,000
Police	50,415
Fire	18,360
Street Lighting	7,090
Public Works	135,300
Garbage Collection	31,000
Parks and Fly Control	15,000
Recreation Centre	100,000
Arena	36,500
Gymnasium	25,000
Cultural Centre	2,800
Water Works	44,000
Sewage System	24,220
TOTAL	$582,985

Income

General Property Tax	$174,000
Special Tax (i.e. I.O.C.C.)	167,000
Residents Water Tax	19,000
Garbage Tax	11,500
Commercial Water Tax	80,000
Commercial Garbage Tax	25,000
Sales Tax	12,000
Amusement Tax	6,000
Federal Grant	11,000
Provincial Grant	40,000
Recreation Centre	10,000
Arena	10,000
Various	20,185
TOTAL	$585,185

(Source: Town of Schefferville)

principally from I. O. C. C. through the special tax and the general property tax. As the sewage and water system as well as the Recreation Centre are rented the town has no municipal debt to finance.

Schefferville's Experience as a Planned Settlement

That Schefferville has been a moderately successful transplant of early post war southern Canadian planning concepts to the subarctic is evident from the first visual impressions. Technically too the problems to be faced in the subarctic have been mastered; water, sewage, power and heat now present few problems. The town was admittedly built in a short time but three years elapsed between the decision to open up the Knob Lake ores and the beginning of construction of the townsite so the unimaginative treatment is unfortunate.

The wholesale levelling and removal of vegetation undoubtedly made construction easier, but the yearly ritual of remaking lawns and planting of shrubs in the townsite indicates the lack of vegetation and shelter is apparent in the town. The density of the insular portion of the townsite is low, approximately 20 persons per acre; this is well below European densities for neighbourhood units which commonly range up to 50 persons per acre (56). Langlois' (3) suggestions of the integration of larger apartment blocks housing the single and childless people in the townsite area, with the structures oriented to provide shelter, would have been preferable. Any avante-garde approach to physical planning might however have made it difficult

to persuade the migrants that life in Schefferville was no different from that in the south! The overall visual appearance of the town can be gained from examining photos 4 to 11.

The priorities which appear to have been adopted in the physical planning of Schefferville were firstly, the selection, design and construction of an industrial area for I. O. C. C. This had to contain the offices, warehouses and workshops necessary to run an isolated mining operation. In the case of Schefferville the company also built its bunkhouse accommodation for single men in the area, unlike the other three communities where such accommodation is an integral part of the townsite residential area. The provision of transport and communications facilities was also an early consideration; the position of the airstrip and railway were basic factors in townsite location and the phone exchange was in fact one of the first buildings in Schefferville. Secondly, the provision of family housing and thirdly, the provision of commercial services for the emerging community had to be considered. Finally, facilities for recreation and improvements to the visual and social amenities of the townsite were dealt with.

In connection with the housing provision there appear to have been a number of reasons for avoiding the exotic or experimental. A basic consideration was the question of speed and of presumed economy and preference of the future population for single family houses. Such housing is easier to sell in due course. The use of segregated pedestrian access, courtyards, etc., is

Photo. No. 3 Schefferville, view from southeast, 1954, the beginning of house construction on the newly levelled townsite (I. O. C. C. photo).

Photo. No. 4 Schefferville, view from southeast, 1965, the R. C. A. F. station can be seen on the right, the schools and churches in the centre of the townsite and the I. O. C. C. area in the distance (I. O. C. C. photo).

Photo. No. 5 Schefferville, view from south, 1966 (I. O. C. C. photo).

Photo. No. 6 Schefferville, commercial zone, hotel left, union hall centre, cinema right.

Photo. No. 7 Schefferville, the cultural centre and gymnasium (right) on the former R. C. A. F. station.

Photo. No. 8 Schefferville, Catholic church and Bishop's residence.

Photo. No. 9 Schefferville, I. O. C. C. bunkhouses.

Photo. No. 10 Schefferville, private apartments.

fraught with problems of economy and efficiency of operation in northern environments. The local municipality has a limited snow removal budget, and cost and practicality effectively prevent snow clearance except on the streets, which consequently have to serve as access for eight months of the year. The low densities inherent in the single family housing patternhave resulted in the frequent use of cars in the townsite but garage provision was limited. Taxis and the local bus line do offer an alternative. The provision of services in the commercial zone is dealt with below.

The importance of amenities in initially attracting the migrant is difficult to assess as the main motive underlying the move is financial. To retain the migrant however the provision of amenities is important (57). I.O.C.C. in building the town undertook only physical planning, they had no forecasts of the future community's character to enable them to engage in social planning. The Québec Labrador Pioneers Association (Q.L.P.A.) was initially established as a social organization and it built its Town and Country Club and tavern in 1954. It initially acted as a focus for recreation but later the company Recreation Centre was established. This gradually acquired more facilities and has now been taken over by the town of Schefferville. Although many of its services are charged on an as used-basis the town still spends $40 per person per year on recreation. The recent acquisition of a gymnasium

and cultural centre (housing a library, etc.) and the current development of a recreation area at Bean Lake, where a ski lodge and eventually a golf course are sited, emphasizes the continued development in this sphere.

The first major test of the Schefferville plan and its administration arose as a consequence of the unforeseen defence role which appeared with the construction and operation of the M.C.E.W.L. The Bell Telephone Company and its sub-contractors established their construction camps in the eastern part of the townsite adjacent to the airstrip during 1955. The area was subsequently covered with an assemblage of temporary bunkhouses, workshops, etc., which even after the operation of the M.C.E.W.L. continued in existence, not being finally cleared until 1967. The actual operating base itself, R.C.A.F. Station Knob Lake, with its prefabricated buildings and overhead heating lines was not the most beautiful of sights in the town. With the final closure of the then obsolete M.C.E.W.L. in 1965 the disposal and use of its facilities presented a new problem.

The Department of National Defence in disposing of the buildings and equipment of R.C.A.F. Station Knob Lake presented a number of problems to the town. The actual disposal of the buildings was as follows. The hangar, equipment store, warehouse and fire hall were acquired by the Department of Transport. The Canadian Marconi Company, who had replaced Bell Telephone as the operators of the M.C.E.W.L., have continued to maintain the airstrip on a contract basis and they use these buildings. The

gymnasium, mess hall and garages were acquired by the Department of Indian Affairs and the combined quarters were obtained by a local businessman under condition that they were removed.

The Indian Affairs Department initially proposed to move the Indian Settlement which had grown up in Schefferville (see below) to this site but the town protested as the space available was too restricted, especially in view of the rapid rate of increase of the Indian population. When the R.C.A.F. station was in operation townspeople obtained some benefit from the gymnasium and mess facilities and their loss was noticed. As the town had an extensive financial commitment to recreation adding to this burden was not easily undertaken. Fortunately, however, the town has been able to rent the gymnasium and the mess, the latter has been converted into a cultural centre, and can offer a very wide range of recreation facilities. The combined quarters buildings have not yet been entirely removed.

The intention behind the extensive municipal boundaries was to avoid the problem of squatters and substandard development. However, in the case of Schefferville the lack of political and financial power of the town over the unsurveyed land has allowed three instances of this to develop.

The first occurred as a by-product of the construction of the M.C.E.W.L. when Eastern Canadian Stevedores built a collection of temporary structures close to the north eastern end of the airstrip. When the construction phase ended these structures were

converted to residential and commercial purposes. The temporary unserviced structures have been in use ever since (photo 11). I.O.C.C. finished its house building in 1960 and as non-company housing is expensive and the town has not the power to evict, nor a great desire to do so as alternative accommodation is not available, these buildings have remained in use.

A second example of the lack of municipal powers is the case of the Dolly Ridge road garage. This area was originally designated as a commercial service zone and a lot was leased in 1957, for ten years by the provincial Department of Lands and Forests. Obviously unsuitable from the viewpoint of the expense of providing services this zone was never expanded. It is to be hoped that the provincial government will show more interest in removing the building than it has in the standard of building erected.

Another example of temporary expedients becoming semi-permanent and the limited power of the town is the trailer park. 50 trailers were originally brought in during 1957 by I.O.C.C. to alleviate the housing shortage. Their numbers grew with time and now amount to approximately 100. They are not now owned by the company. They were initially sited on unsurveyed land close to the airstrip where connection to services was possible. As the area was unsurveyed the trailer owners pay only garbage and water tax and the school boards are unable to obtain any income from them. Surrounded by unpaved roads and a gravel airstrip they provide a dusty summer environment.

There is thus in Schefferville a story of temporary expedients becoming virtually permanent features of the townsite, of divided responsibility of provincial, federal and municipal levels of government and the inability of the town to implement much action for aesthetic improvements in the unsurveyed portions of the townsite.

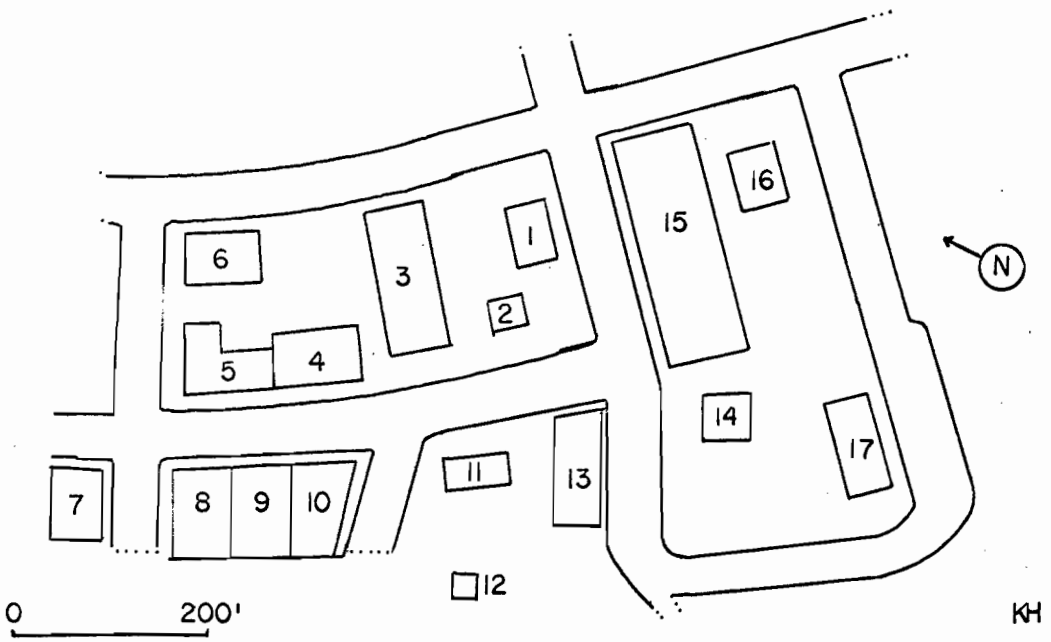
The Commercial Zone

The town plan which was finally adopted and formed the basis of construction placed the commercial zone on the western edge of the townsite. As I.O.C.C. owned all residential lots in the townsite there was no possible role for speculators and private interests were not allowed in the town until it had become established and they were then restricted to the commercial zone.

The commercial zone was divided into lots, which were originally designated a precise function. These lots were placed on sale at Sept-Iles by the government in July 1955 (3). 11 were bought at that time at prices ranging from $1.26 to 60 cents per square foot, on the understanding that construction had to begin within two years. The current situation in the commercial zone is shown in map 10. Of the current services the hotel, bank, cinema, Imperial Oil Gas Station and the Hudson's Bay Company store are all operations dating from ths initial period. The second supermarket, presently run by Lamontagne, was in 1955 the first general store in Schefferville replacing the I.O.C.C. grocery. It was later operated by Bowering's as a general store and supermarket before being taken over by Lamontagne after which it was restricted to food. Of the original

Map 10

SCHEFFERVILLE COMMERCIAL ZONE



KEY

I Hôtel de Ville.
2 Telephone Exchange.
3 Cinema.
4 Lamontagne Supermarket.
5 Hôtel Montagnais.
6 Canadian Imperial Bank of Commerce.
7 Restaurant, Beauty Salon, R.A.Q.Liquor Store.
8 Laundry,speciality shops.
9 Menswear, Grocery, Pool Room etc.
I0 Union Hall, Caisse Populaire.
II La Compagnie de Téléphone Ungava.
I2 Taxi.
I3 Hôtel Royal and Restaurant.
I4 B.A. Service Station.
I5 Hudson's Bay Company.
I6 Imperial Oil Service Station.
I7 Post Office.

11 lots two were never built on and the third was used by the Hudson's Bay Company for their store expansion. The majority of buildings were e[illegible]d before 1960. The only recent construction has been the telephone company's office and garage.

As the zone was not planned as a whole and as the lots were originally sold for a given function the subsequent non-erection of some buildings gives the zone a more haphazard unfinished air than the remainder of the townsite. Although the range of services available is adequate, the lack of planning to cope with the severe winter by offering some form of pedestrian mall or plaza for shoppers is a sorely felt point. The planners in addition did not appear to foresee the high car population, (there are in excess of 1,300 private vehicles in the town), so the empty lots do have some utility for parking.

The Role of the Entrepreneur in the Single Enterprise Community

In connection with the small northern community it is useful to distinguish two classes of entrepreneur. Firstly there are those characterized by a mercantile attitude and a strong preference for liquidity, i.e., those concerned with short term profit, with little investment and with small stocks. Secondly there are the entrepreneurs with industrialist's attitudes of concern with long term heavy investment, continuity of production, by a need for advanced technology and complex organization, i.e., the actual creators of the single enterprise community.

The relative importance of these two types within the community will depend on the size of the community, the nature of the population structure, the local market and the type of resource base. In the case of those towns, like those of Labrador-Ungava, which are not based on a renewable resource base there are obvious problems for non-prime company investors, the uncertain economic future fostering a mercantile attitude. In addition the provision by the mining company of many of the housing, recreation and service functions necessary for the small community means that the field for entrepreneurial activity is small, especially in the early stages of development.

In the case of Schefferville, I.O.C.C. provided all services at Burnt Creek and even when the first families arrived in Schefferville itself the company grocery store and warehouse was the only retail outlet in town. As the company owned all the residential land in the town and the province the remainder the company policy to exclude private interests was possible, although it attracted much criticism at the time (58). After the sale of the commercial zone lots the first private businesses appeared.

Schefferville at the moment seems to support three types of business. Firstly there is the branch of a southern company; of these the Hudson's Bay Company, Canadian Imperial Bank of Commerce, the cinema and the oil companies have continued in operation. Secondly, there are the individual entrepreneurs who came to Schefferville and established businesses, e.g., the second hotel-garage-fishing club

business, a menswear store, jewellers, aircraft charter, etc. The third group of businesses are those established by people who originally came to Schefferville to work for I.O.C.C. and who have moved into their own businesses, e.g., the service station operators, small tradesmen, etc. Some of the businesses are run as side lines to regular company employment, e.g., newstand and poolroom or are run by wives, e.g., beauty parlors but in all these cases the original motivation in moving to Schefferville was the company job. These businesses do employ full time workers.

Any extension beyond basic retailing is a function of the prime company's attitude and in Schefferville during the last ten years, I.O.C.C. has followed a policy of reducing involvement. The laundry and bakery have been disposed of and the company contracts out catering and personnel transport from townsite to mines. The town policy of contracting garbage, snow removal and road maintenance gives business to local contractors and businesses. The major hotel still remains under indirect company control however.

Business in single resource towns is always precarious, Elliot Lake businessmen saw turnover drop 80% with a reduction of local labour force of 33% during the uranium crisis of 1959 (2). Analysis of other single resource towns indicates that the personal service component within them is higher than similarly sized towns elsewhere (14, 15). The communities are also deficient in wholesale trade, manufacturing and construction because of the

small 'hinterland'. In the case of Labrador-Ungava the fact that companies involve themselves in so many of these service functions makes equivalent analysis impossible. Entrepreneurs providing personal services can certainly play an important part in the social and economic life of these communities. They can also play an indirect role in promoting stability by diversifying the economic base, providing transport and communication and by widening the range of comforts and amenities.

Diversification

Schefferville was originally conceived as essentially a sophisticated camp or housing facility for I.O.C.C. This single role however was soon augmented. As a consequence of its position in the centre of the peninsula and its excellent all year communications with the south Schefferville was chosen as the Section Control Station for the eastern portion of the M.C.E.W.L. This was constructed between 1955 and 1957, the Doppler Detection Sites along the 55° parallel offering detection capability without the expense of surveillance radar. The operating agency was the R.C.A.F. which contracted out this function to the Canadian Marconi Company. During the period of operation from 1957 to 1965 the station was occupied by approximately 200 men at a time. The annual expenditures of these men in the town, the annual wage bill totalled $1,500,000, was a great help to business in the town although only 25 men actually lived in the town with their families (59). The Canadian Marconi Company also maintained the airstrip and the road to the

Dolly Ridge Section Control Station.

With the closure of the station the town lost its second major employer, although the men had been recruited in the south. Canadian Marconi still has the contract to service the airstrip and the Department of Transport transmitter site on Dolly Ridge. As this latter D.O.T. site will be soon connected with the town power supply Marconi will no longer have to keep the road to Dolly Ridge open in the winter. This task will then fall to the town of Schefferville or the Department of Indian Affairs. Marconi currently employ six men in Schefferville.

The second unforeseen development was the growth of an Indian Settlement close to the town. At the beginning of construction the area was only sporadically hunted and trapped by Indians from the south and from Fort McKenzie 160 miles to the north. The closure of this latter Hudson's Bay post in 1950 was followed by the move of the Nascopie Indians who traded there to Fort Chimo. Some Montagnais from Sept-Iles were employed during exploration and construction, but it was not until 1957 and the arrival of the 175 strong Fort Chimo band of Nascopiethat the Indian Settlement became a permanent feature of Schefferville.

Initially the Indians camped on the shores of Knob Lake but during 1957 they were moved to John Lake where the Federal Indian Affairs Department began building houses for the Nascopie. Here they were joined by the numerically stronger Montagnais from Sept-Iles, who as they had a reservation there were unable to obtain

similar housing from the government. The Indian population had grown to 282 Nascopie and 422 Montagnais by August 1967 (60).

As the Indian Settlement is isolated from the townsite it would prove to be very expensive to provide piped water and sewerage for the village. In view of this, the poor standard of housing, fire protection, etc., (photo 12) and the now almost complete integration of the Indian children in the Schefferville schools the Indian Affairs Department has decided to construct a new settlement close to the hospital. The plans for this settlement have now been agreed to and approved by the town. It is intended to build a series of row houses with six or eight houses in each block and a grant of $7,000 is available for each individual home. Any Indian who wishes a better home, i.e., those in regular employment with I.O.C.C., can obtain a mortgage for the amount in excess of $7,000 from the Central Mortgage and Housing Corporation.

The presence of the Indian Settlement is of mixed benefit to the town of Schefferville. Fire and police services are provided but there is no return income. Approximately 100 Indians obtain regular and temporary work with I.O.C.C., the town, contractors and fishing camps. Their incomes, in addition to the average sum of $3,500 per month paid in relief, is all spent locally to the advantage of Schefferville businesses. The Indian Affairs Branch also employs six people and has an annual budget of $236,000 (10). The majority of this, $190,000 is paid to the local school boards. In the case of the Protestant School Board this income is useful due to the small number of Protestant families in Schefferville. Its importance

Photo. No. 11 Schefferville, temporary structures converted to residential use.

Photo. No. 12 Schefferville, Indian Settlement.

is likely to increase as the Indian population continues to grow. The Indians as the most permanent elements in the town could play a growing part in the life of the community. However, the lack of education, the difficulties caused by the French Catholic orientation of the Montagnais and the English Protestant of the Nascopie and the problems of transition and integration have not yet been overcome.

Schefferville, originally built as a single enterprise mining community, has therefore had to absorb these two additional functions. With the changes in defence technology the M.C.E.W.L. function has gone, but the Indian Settlement is a feature that Schefferville does not share with the other three iron mining communities. Schefferville has also attracted a small number of research facilities because of its position in the centre of Labrador-Ungava peninsula, a scientifically little studied area. McGill University has run its modest McGill Sub-Arctic Research Laboratory continuously since 1954 and this has acted as the base for a wide range of scientific studies locally and within the whole of Labrador-Ungava. There was also for some time an ionospheric research station of Dartmouth College, N.H. There is also a Dominion Observatory Seismic Station and recently a seismic installation operated by the Geotech Corporation of Dallas, on contract to the U.S.A.F., for underground nuclear test detection.

With up to one third of the area lake-covered, central Québec-Labrador is a fisherman's paradise and Schefferville acts as a centre for a variable number, usually half a dozen, of 'fly-in' hunting and fishing camps. With rates of up to $460 per week plus the cost

line of the railway, using predominantly D. C. 3 equipment.

At the termination of construction H. U. T. disposed of all but three of its D. C. 3's and has operated these aircraft and a Beaver on a schedule basis to link Sept-Iles with Schefferville and later with Labrador City. The service is limited to I. O. C. C. personnel and equipment and some 8,392 passengers and 900,000 lbs. of freight were carried in 1966 (62).

Commercial airline services into Schefferville began in 1955 when Canadian Pacific Airlines obtained a charter for passenger service. In December of the same year Québecair replaced C. P. A. and commenced with a six flight per week service to Sept-Iles. This company has continued to serve Schefferville and as its network extended the town was directly linked with a number of communities along the St. Lawrence as far south as Montreal. In 1958 Québecair became the first Canadian regional carrier with turbine equipment and its Fairchild F27 aircraft now provide a daily passenger, mail and freight service. The total number of passengers carried to Schefferville reached 6,494 in 1960 since when there has been an irregular decline to 4,407 in 1964. The 1966 figures were 5,022 passengers to and 4,488 carried from Schefferville. Freight and express traffic has totalled 130,000 to 146,000 pounds annually in recent years (63).

Examination of the monthly totals by destination shown in diagram 4 indicates the importance of Montreal as a preliminary destination and the seasonal variations in traffic reflecting summer

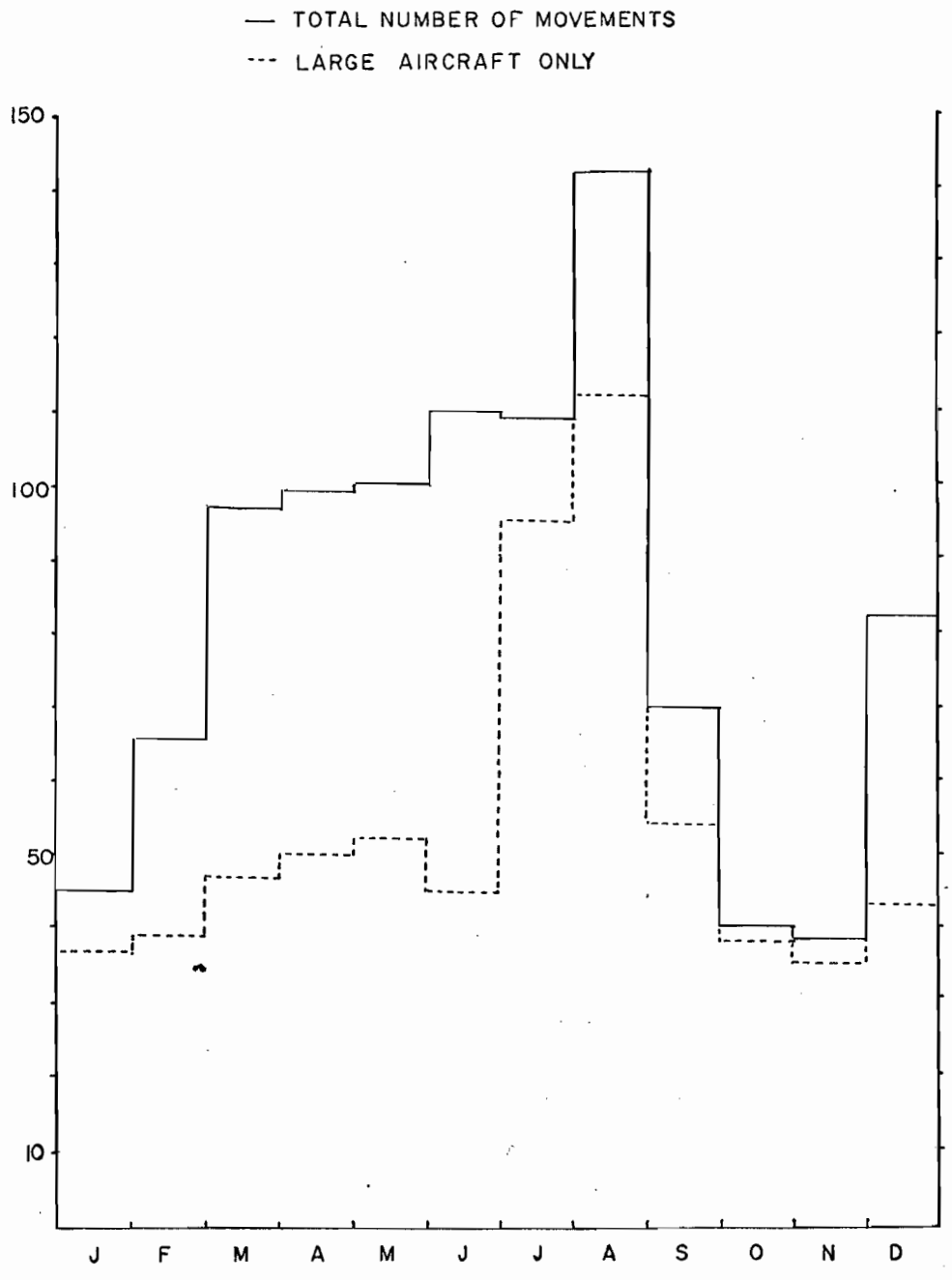
vacations and the winter work restrictions. Sept-Iles has been increasing in importance from 927 in 1964 to 1,256 in 1966, now representing 27% of the total. If the H. U. T. figures are added, it becomes the most important destination.

During the early construction period before the railway was completed the Knob Lake airstrip was the sole physical link with the south. Almost as soon as this activity had quietened the construction of the M. C. E. W. L. began. Equipment for the radar sites was brought north on the railway and flown out to the sites using Canso amphibians during the summer and ski-equipped D. C. 3's during the winter. Flights per month exceeded 1,500 in August 1956 but during breakup and freezeup this was much reduced (26). Knob Lake was also used as a staging post for aircraft flying north during the construction of the Distant Early Warning (D. E. W.) Line. With the completion of the M. C. E. W. L. in 1957 its effect on local air traffic movements was restricted to the year round maintenance of the sites and their annual resupply. The former involved the stationing of up to six large Vertol helicopters at Knob Lake to move technicians to and from the automated unmanned Doppler Detection Sites. The latter involved the use of two or three Cansos and a C46 to airlift 220,000 gallons P. O. L. during late June through August (59). With the closure of the eastern sites in 1964 and the remainder of the section in 1965 this summer flying activity has disappeared.

The current seasonal pattern of aircraft movements is shown in diagram 5. The majority of large aircraft movements are

DIAGRAM 5

SCHEFFERVILLE AIRSTRIP
1966 AIRCRAFT MOVEMENTS



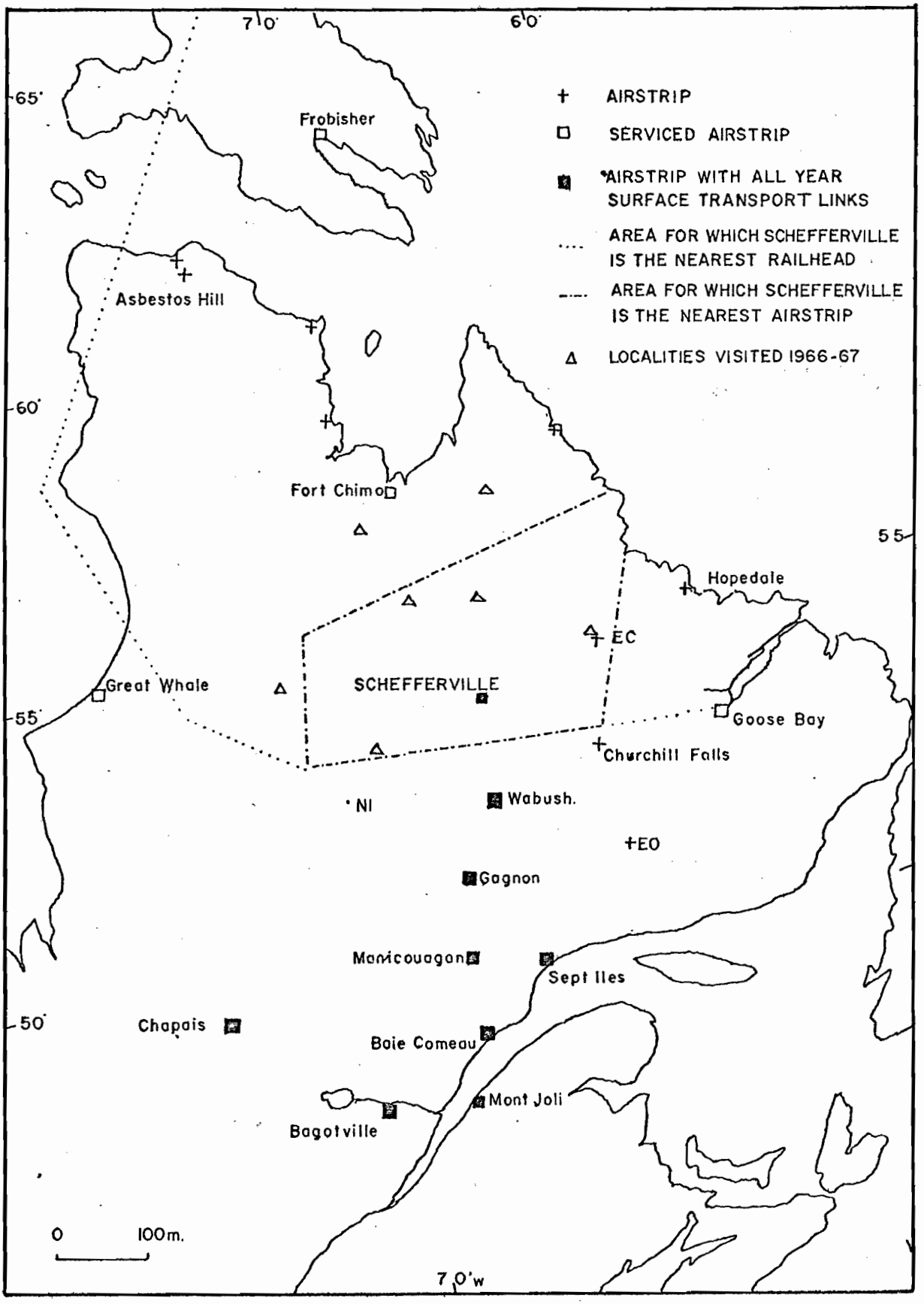
N.B. SQUAW LAKE LANDING NOT INCLUDED.

provided by Québecair and H.U.T. flights. The rise in their number in the summer is due to the increase in transit activity and the re-supply of the Border weather station. No detailed information was available for the smaller bush aircraft activity during the summer when they operate from the floatplane bases on Squaw Lake. Their large number in late winter prior to break-up reflects logistical support for mineral exploration camps in the sulphide zone of the Labrador Trough.

At the time of the M.C.E.W.L. construction there were in excess of 30 floatplanes using Squaw Lake (64). Since that time there has been a considerable reduction and in 1967 the only regular users were L.M.E., H.U.T. and Laurentian Air Services. The latter company, whose headquarters are in Ottawa, operate out of Schefferville on a year round basis and it is their protected point. They operate a Beaver during the winter and in summer this is joined by a Twin Beech and a Cessna 180 all available for charter at the current rates. In addition there is a locally resident bush pilot operating a Norseman aircraft. These two charter aircraft operations have a typical range of activities from support of government geological and topographical survey parties, mining company exploration, fishing camps to short local flights taking Indians out to better hunting areas.

As can be seen from map 11, Schefferville is in a key position as the northernmost serviced airstrip with all year surface transport links in the Labrador-Ungava peninsula. The area actually served from Schefferville extends over a greater area than

MAP 11


7 0'
6 0'
65'
60'
55'
55
50'
70'w
AIRSTRIP
SERVICED AIRSTRIP
AIRSTRIP WITH ALL YEAR SURFACE TRANSPORT LINKS
AREA FOR WHICH SCHEFFERVILLE IS THE NEAREST RAILHEAD
AREA FOR WHICH SCHEFFERVILLE IS THE NEAREST AIRSTRIP
LOCALITIES VISITED 1966-67
Frobisher
Asbestos Hill
Fort Chimo
Hopedale
EC
SCHEFFERVILLE
Great Whale
Goose Bay
Churchill Falls
NI
Wabush
EO
Gagnon
Manicouagan
Sept Iles
Chapais
Baie Comeau
Mont Joli
Bagotville
0
100m.

the area for which it is the nearest airstrip, especially to the north and west. As the local bush pilot now services Nitchequon weather station, formerly serviced from Wabush, its 'hinterland' even extends to the south west. Although the area served is vast the almost complete lack of occupance and economic activity, or even remote potential with the exception of the Labrador Trough, makes any expansion of Schefferville's role in air transport unlikely.

Early observers writing at the time of construction of the I.O.C.C. operation and later the M.C.E.W.L., painted a rosy picture of Schefferville's future role. Langlois in 1955 wrote (trans.) "... in the near future this airport will be one of the most important in Canada"(65). Later mention of an R.C.A.F. interceptor base and airstrip reconstruction and lengthening was made, but 1968 sees the modest 4,600 foot gravel strip which still awaits lengthening and paving. Nordair, which flies from Montreal to Fort Chimo and northwards, had Schefferville as a flagstop for traffic to and from the north but this is not now used and the limited potential of shipping freight north from the railhead has never been exploited.

With the completion of the Q.N.S. and L. railway in February 1954 the Knob Lake area's reliance on air transport was broken. Although the line was constructed for ore transport three passenger trains a week are now operated on a year round basis. The journey to Sept-Iles normally takes 10 hours and the fare of $14 compares with the $36 air fare. The major use of the line is for supplies, fuel oil, etc., but 300 to 400 passengers are carried each week between Schefferville and Sept-Iles. I.O.C.C. employees are allowed

to take their cars out free of charge for their vacations as there is no road into Schefferville. This lack of an independent means of leaving the town is felt; a small survey carried out in May 1967 indicated that 52% of those interviewed chose a road link from a range of four possible changes in Schefferville. This feeling is often psychological but nonetheless is important.

In addition to providing a transport link the Q.N.S. and L. also provide communication facilities for Schefferville through La Compagnie de Téléphone Ungava. Radio communication was replaced by telephone and teletype with the arrival of the railway in 1954. The Schefferville exchange originally had 300 lines and there were 12 voice and six teletype channels available. As the population grew these facilities were expanded, (exchange capacity reached 700 in 1958), and improved. During 1960-61 Q.N.S. and L. installed a microwave system along the line of the track providing 240 channels and Schefferville now has excellent telecommunication links with the south.

I.O.C.C. in July 1958 established CFKL, a small local radio station. Using taped programmes it provided a valuable entertainment service and carried local and national news. In the fall of 1964 this was replaced by a C.B.C. link which now provides English and French services. The local news service however is not comparable to the earlier service. At one time a local newsheet was published and distributed daily by I.O.C.C.; this lapsed, and has recently been replaced by a weekly bilingual newspaper, the 'Koksoak',

printed in Sept-Iles and distributed free within the town. In August 1965 I.O.C.C. also provided a television service; this originates from taped programmes in Labrador City and is relayed via the microwave link to Schefferville for retransmission. The French/English programme proportion is allotted to match the linguistic composition of the population.

Schefferville has therefore varied and adequate communication and transportation facilities. The daily air service ensures a regular mail service and Montreal newspapers are available in the town the afternoon of their publication. The radio service provides immediate news and entertainment and this is complemented by the television service. The lack of a road link is the only real drawback.

The Future

Schefferville, like so many other developments in Canada's north, was greeted with a wave of speculation about a glowing future. With the change in iron ore economics it has been lucky to survive.

Although the mine labour force may decline with more efficient mechanization, e.g., by using larger and quicker haulage trucks, the town's population may well remain the same. Kiruna in northern Sweden has had an interesting experience in this connection. The population has risen from 24,879 in 1958 to 28,343 in 1965. During the same period the Luossavaara-Kiirunavaara A.B. mining company (LKAB) labour force declined from 3,968 to 3,633 while production

rose from 10 to 15 million tons of iron ore a year (66). This appears to have been due to a number of factors. Firstly, until the 1950's Kiruna was short of shops, schools and services. Secondly, the reconstruction of the older parts of the town had given rise to a demand for a construction labour force and even on completion such buildings will need a service labour force. LKAB and the local commune have long practised careful co-planning with regard to investment activity, so that such work is maintained at an even level wherever possible. Finally, the transfer of service functions from LKAB has created opportunities for local entrepreneurs. Underlying this has been the overall nationwide rise in living standards and the growth of the tertiary sector of the economy.

While an identical situation does not exist in Schefferville, (the community is younger, smaller and without an inhabited hinterland), as an indicator of a trend it does suggest that a labour force reduction may not lead to a population contraction. In Schefferville I. O. C. C. has transferred some of its functions but the demographic nature of the Indian component of the local population is a unique factor. The town's future function will undoubtedly remain as a single enterprise mining community with a small role as a communications and service centre for Nouveau-Québec, especially the Labrador Trough.

CHAPTER FIVE: POPULATION AND LABOUR FORCE IN SCHEFFERVILLE

Labour Force

The I.O.C.C. labour force in Schefferville reflects the interaction of a number of factors. Among these are the nature of mining itself where a highly mechanized operation leaves little opportunity for unskilled manual labour. The structure of the force is also affected by the small number of jobs suitable for females. Other significant factors in the case of Schefferville have been the company's past production fluctuations and recruitment policy. I.O.C.C. has in recent years tried to maintain the majority of its labour force from the province in which the division is operating, Québec in the case of Knob Lake and Newfoundland in the case of the Carol Project. While this has been possible in the case of hourly paid workers, the supervisory and skilled grades have tended to be recruited from a much wider area. The company has employment offices in Sept-Iles, Montreal and St. John's. The Canada Manpower Commission and private employment consultants are also used. The large construction labour force had familiarized many men with the area and the opportunities it offered and a similar diffusion of knowledge occurred with the annual lay-off at the end of the shipping season. The company policy of reducing involvement in non-mining activities has also reduced the size and affected the composition of its work force, e.g., by contracting for catering services.

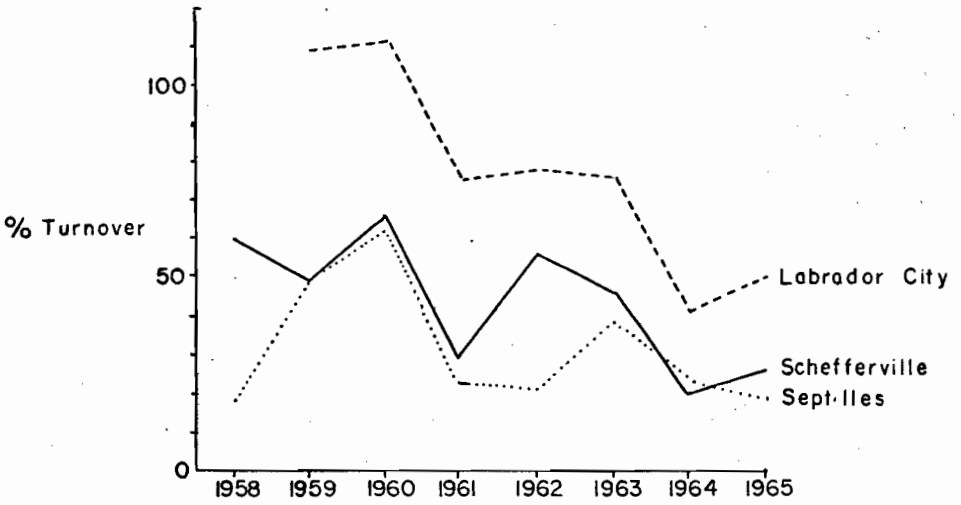
Information on the labour force during the construction period is not available. I.O.C.C. has been keeping detailed personnel records only for the last seven years. Material from studies of the force made in 1963 and 1965 was made available by the Personnel Department in Schefferville. The company also allowed a compilation of the characteristics of the January, 1967 labour force to be made. This material forms the basis of the discussion of origins and permanence and is the source of all figures quoted in this chapter.

The high degree of masculinity and youth which characterized the construction labour force was not finally removed in Schefferville until the townsite and M.C.E.W.L. construction was completed. In 1955 I.O.C.C.'s January labour force of 500 expanded to 1,500 in August, with an additional 500 construction workers in the town. The following year saw a July labour force of 1,330 and by July, 1957, the year of peak production (13,000,000 tons), the summer labour force reached 1,896, with a lay-off of 600 men at the end of the season. The July, 1960 labour force totalled 1,900 since when there has been a decline to the 1967 level of 960 in winter and 1,150 in August as can be seen from diagram 6b. The extent of the lay-off has decreased from 32% of the summer force in 1957 to 17% in 1967. This reflects the growth of winter stripping and pit preparation and has been important in retaining a nucleus of skilled employees, in reducing turnovers and in increasing the relative stability and permanence in the community.

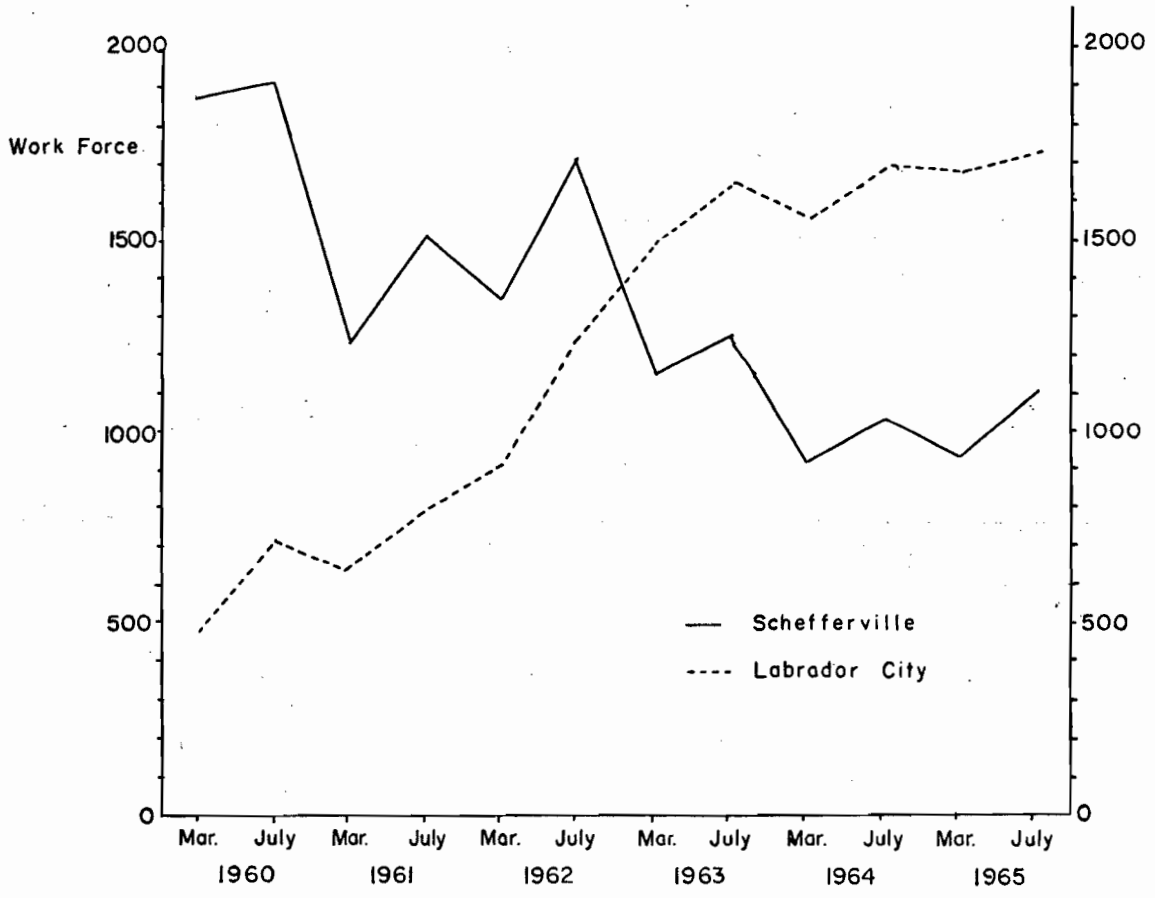
The labour force in the early period was characterized by a large proportion of young males, typical of any construction project.

DIAGRAM 6

I.O.C.C. WORK FORCE ANALYSIS.



A.) WORK FORCE TURNOVER BY LOCATION



B) SCHEFFERVILLE AND LABRADOR CITY WORK FORCE TOTALS

(Source: I.O.C.C. Personnel Records)

The average age of the force had risen to 33.0 in December, 1965, with the married men older (average age 36.0 years) than the single men (average age 27.9 years). The hourly paid workers were older than the salaried workers, average age 33.5 years compared with 32.0 years. The proportion of married men in the labour force was 65% in December, 1965.

The effects of the maturing of the Schefferville labour force can be seen by examining the annual turnover rates between 1958 and 1965 in diagram 4. The Sept-Iles and Carol turnovers are also included. The term "turnover" is defined as the total number of terminations as a percentage of the average labour force for a given period.

Humphrys (4) quoted a turnover in excess of 120% for 1955, but I.O.C.C.'s Schefferville records do not now extend beyond 1958, so actual details of these early years cannot be determined. As indicated in diagram 6a, the turnover in Schefferville has dropped since 1958. The large drop in 1964 is a consequence of the change in recording policy, as temporary workers and transfers were excluded from the calculations after this date. The Schefferville turnover continues to drop with time and the 1967 figure was 15.2%. The continued improvement in the turnover situation has naturally affected the average length of stay: 6.1 years in December, 1963 rising to 6.4 years in December, 1965. Married men characteristically are less mobile; their average length of service in December, 1965 was 7.5 years compared with the 4.4 years for the single workers.

Information on comparable labour force turnovers in other northern mining communities is scanty but sufficient exists for the relative stability of the Schefferville operation to be established. Bourne (10) in his study of Yellowknife quoted turnovers for Giant and Con gold mines in excess of 100% for 1957. These declined to 30-40% by 1962 after the completion of the highway to the south in 1960 and the subsequent reduction in the cost of living and isolation. In the Soviet Union similar problems are encountered in holding labour in remote areas. For example, during 1959-1964 in the whole of Siberia and the Soviet Far East for every 1,000 immigrants 969 had left the region by the end of the period (67). In the Yakutskaya A.S.S.R. in 1962, 39.4% of industrial workers left their jobs and in the remote mining areas this was even higher, e.g., 51% at Indigirka and 93% at the Deputatskiy tin mines (68). The Russian situation is due to a shortage of fresh food, anomalous wage rates caused by the workings of the northern increment systems, the low standard of living accommodation and the climate.

At Kiruna in Arctic Sweden, L.K.A.B. has been mining ore for 50 years. Their turnovers in recent years have ranged from 18.6% in 1961 to 9.9% in 1963 at Kiruna itself and 20.7% in 1965 at the new Svappavaara Mine (66). L.K.A.B. find that age and duration of employment are amongst those factors which mean most with regard to adjustment and identification with the company. That age is important is indicated by the turnover rise from 9.9% in 1963 to 16% in 1965 with a rise in the 16-25 year age group from 13% to 22% of the labour force.

Origins of the Labour Force

I.O.C.C. retain the original application for employment made by the employee. The company made available the age, sex, length of service, education level, marital status, number of dependents and the payroll category of the employee. From the files additional locational information on each individual was obtained; the birthplace, the place of education, the 'home' or permanent address at the time of application for employment and the last employment address. This information was unfortunately not available for all employees, especially those recruited in the early days of the operation, e.g., transfers from C.M.M.K.

This data was recorded on punched cards as latitude and longitude, census division/area code and population size for each of the four locations. The latter was obtained from the 1961 census as this date lies closest to the middle of Schefferville's period of operation. No information was available for the employees who had terminated prior to January, 1967. As the collection was made in winter the 200 men recruited for the shipping season are not included and the analysis is therefore most applicable to the more permanent elements.

The origins of the labour force during the construction period and the early operation stages are unknown, but opinions are that the force has always been predominantly Québec in origin (9). The overall provincial origin breakdown for 1963, 1965 and 1967 shown in Table III indicates the percentage born and last resident in the

TABLE III

PERSONNEL ORIGINS OF THE I.O.C.C. MINING DIVISIONS

Province	Birth %		Last Residence %	
	Knob Lake	Carol	Knob Lake	Carol
December, 1963				
Western	1	2	1	1
Ontario	6	6	5	9
Québec	52	15	72	22
Maritimes	11	4	8	3
Newfoundland	11	60	12	62
Foreign	19	13	2	3
December, 1965				
Western	1	2	1	1
Ontario	4	5	4	10
Québec	57	13	76	19
Maritimes	11	5	7	4
Newfoundland	10	59	9	63
Foreign	17	16	3	3
January, 1967				
Western	2	-	1	-
Ontario	4	-	5	-
Québec	50	-	63	-
Maritimes	10	-	9	-
Newfoundland	14	-	8	-
Foreign	18	-	3	-

(Source: data supplied by I.O.C.C. Personnel Department, Schefferville)

various groupings. The Knob Lake division's workforce birthplace distribution shows little change over the years. The distribution of last residence indicates a slight decrease in the Newfoundland component as the Carol Project has diverted more of the recently recruited Newfoundland labour. The drop in the 1967 Québec proportion is probably due to the large number of unknown home addresses in this compilation.

The birthplace of the whole force is shown on map 12. The importance of the South Shore-Gaspésie, the remainder of Québec and selected areas of the Maritimes is apparent. Analysis of the overall force birthplace data shows that the South Shore-Gaspésie area accounts for 26%, i.e., more than half the Québec proportion. The neighbouring area of New Brunswick,(Madawaska, Restigouche and Gloucester counties) contains 6%. In this region, with broadly similar socio-economic conditions, approximately a third of the force was born. If the Indians are excluded only 1.5% originated on the North Shore, 3% in the Lac St. Jean area, 2.5% in the Eastern Townships and 3% in Montreal.

I.O.C.C. have five payroll groups according to job status. Group I are the hourly paid workers, e.g., semi-skilled operators, etc., Group 2 are the unionized clerical workers and Group 3 the non-unionized clerical workers. Group 4 are the supervisory personnel and include foremen, senior administration, tradesmen, engineers, etc. Group 5 are the senior management. Tables IV to VII give the details of the analysis of the various groups produced by a computer-assisted classification of the original data.

TABLE IV

I.O.C.C. SCHEFFERVILLE. PAYROLL GROUP 1
ORIGINS

	% Birthplace	% Home	% Last Employment
I. Region			
Western Canada	1	1	1
Ontario	2	2	4
South Shore-Gaspésie	33	28	10
Lac St. Jean	3	2	1
Québec	7	6	4
Trois Rivières	3	3	2
Eastern Townships	2	2	1
Montréal	2	12	16
North Shore	7	13	26
Québec (remainder)	4	6	8
New Brunswick	5	3	2
Nova Scotia	1	1	1
Prince Edward Island	1	-	-
Newfoundland	10	9	8
Foreign	18	1	1
II. Size of Place			
Less than 1,000	17	10	6
1,000- 2,000	33	24	6
2,000- 4,000	17	19	22
4,000-10,000	10	10	9
10,000-30,000	11	12	18
30,000-100,000	5	5	8
Greater than 100,000	7	19	31

(Source: data supplied by I.O.C.C. Personnel Department, Schefferville)

TABLE V

I.O.C.C. SCHEFFERVILLE. PAYROLL GROUP 4
ORIGINS

	% Birthplace	% Home	% Last Employment
I. Region			
Western Canada	4	4	5
Ontario	9	11	11
South Shore-Gaspésie	13	11	2
Lac St. Jean	3	1	2
Québec	4	3	4
Trois Rivières	2	2	-
Eastern Townships	3	3	2
Montréal	4	9	11
North Shore	1	4	15
Québec (remainder)	9	11	13
New Brunswick	10	11	10
Nova Scotia	6	5	7
Prince Edward Island	-	-	-
Newfoundland	6	6	8
Foreign	26	13	11
II. Size of Place			
Less than 1,000	16	7	4
1,000- 2,000	26	20	8
2,000- 4,000	8	17	17
4,000-10,000	13	11	7
10,000-30,000	13	14	20
30,000-100,000	10	7	14
Greater than 100,000	14	24	30

(Source: data supplied by I.O.C.C. Personnel Department, Schefferville)

Examination of the birthplace distribution of the hourly paid workers of Group 1 (Table IV) shows that 61% originate in Québec, predominantly from the South Shore-Gaspésie[1]. When the home and last employment addresses are examined an indication of migration of these workers is gained. The South Shore-Gaspésie proportion drops as does the foreign component and the North Shore and Montreal rise. This migration is discussed below. Table IV Section 2 emphasizes this urbanward migration of these workers who originated in predominantly small communities. Map 13 indicates the birthplaces of the men in this group who have been in Schefferville for more than 130 months, i.e., the more stable elements. In this case the South Shore-Gaspésie proportion rises to 48% and the North Shore to 7%.

A similar analysis of the other large group, the supervisory Group 4, is shown in Table V. The South Shore-Gaspésie and foreign components decline and Montreal and the North Shore rise as the birthplace, home and last employment distributions are considered. A pattern of decreasing proportion from the smaller communities is shown in Table V Section 2. Map 14 indicates the birthplace and Map 15 the home address of this group. As this group includes a wide range of jobs the characteristics of the group are far less homogeneous than the hourly paid workers. Some of the longer

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1. The regional divisions used in this chapter are the standard Québec Economic Regions, shown on Map 13.

TABLE VI

I.O.C.C. SCHEFFERVILLE. PAYROLL GROUP 1 CROSS CLASSIFICATION BIRTHPLACE SIZE AND LENGTH OF SERVICE

Service (months)	Size of Place 1	2	3	4	5	6	7
Less than 12	9	9	9	8	8	6	4
12-23	13	22	8	5	9	1	3
24-35	3	8	4	6	4	2	5
36-47	-	-	1	3	1	2	1
48-59	2	7	-	2	-	-	-
60-71	4	2	2	-	1	2	2
72-83	3	8	4	-	5	-	2
84-95	10	6	8	4	3	3	2
96-108	2	8	4	3	1	3	2
109-120	10	22	9	2	8	1	2
121-144	11	33	9	7	3	-	-
More than 144	8	18	17	2	7	-	3

TABLE VII

I.O.C.C. SCHEFFERVILLE. PAYROLL GROUP 1 CROSS CLASSIFICATION HOME AND LENGTH OF SERVICE

Service (months)	Size of Place 1	2	3	4	5	6	7
Less than 12	9	4	10	7	8	5	16
12-23	5	17	13	4	10	-	11
24-35	-	7	5	7	4	1	8
36-47	-	-	1	-	1	2	3
48-59	3	3	-	1	2	-	3
60-71	2	4	1	-	3	1	2
72-83	3	5	6	-	3	-	5
84-95	5	6	9	4	3	3	17
96-108	1	6	5	1	1	5	7
109-120	6	15	18	7	9	2	10
121-144	9	29	7	7	4	1	3
More than 144	4	15	13	6	10	-	3

Size of Place	Class	
	1	Less than 1,000
	2	1-2,000
	3	2-4,000
	4	4-10,000
	5	10-30,000
	6	30-100,000
	7	Greater than 100,000

serving employees have been promoted on the basis of experience and performance. Many of the foreign born and non-Québec employees in this group are young engineers and geologists.

Tables VI and VII were produced in an attempt to discover if there was any relationship between the size of the community the worker was last resident in and his length of service. These indicate that the longer service employees in Group 1, the more permanent migrants, have tended to come from the smaller communities. Firstly, this probably reflects the geographical origins of this group, i.e. from areas where large urban communities are few. Secondly, if the annual intake has included workers from larger communities they may have had a greater propensity to move after only a short stay. The rural or small urban centre origins of the other workers favourably affects their perception of I. O. C. C. and Schefferville and affects their capacity to move through the disparities in their educational levels and work experience.

Population

Information on the growth of population in Schefferville is scanty and unreliable. The figures presented here are drawn from I. O. C. C. and town of Schefferville sources. The population of the Burnt Creek camp varied seasonally and with the stage of the exploration programme, usually numbering several hundred during the summer. With the construction of the Schefferville townsite families began to move in; there were 16 in November, 1953 and 25

in December. During the following summer the population in Schefferville rose to 1,200 but there was a reduction during the following winter (diagram 7). By late summer, 1955 the population reached 3,000.

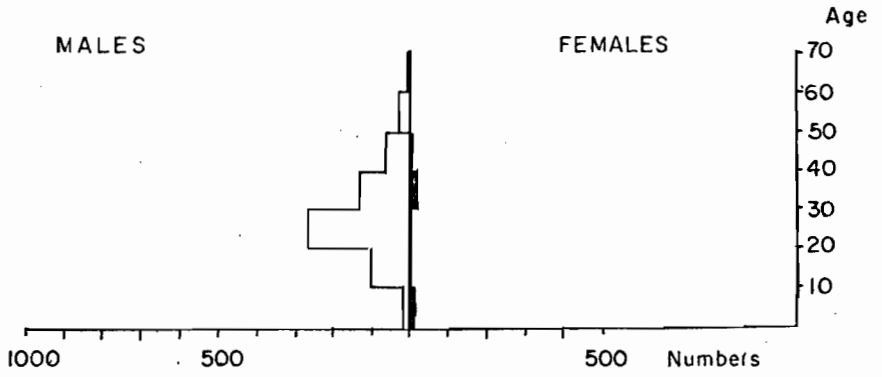
The growing provision of homes and the presence of families in 1956,(there were 250 by September), saw further growth in the proportion of young children and females. The 1956 census gave a population of 1,632 but unofficial estimates place the peak at about 2,800. By 1958 the population included 456 families, with a summer peak of 4,500, including 500 Indians. The town of Schefferville estimates that 1960 saw the peak population of 5,000 since when there has been an irregular decline. The 1961 census recorded 3,178, the 1966 3,086 and the 1967 electoral census 3,194 with an additional 704 Indians. All these figures are certainly on the low side as they rarely include Q.N.S. and L. employees at the Silveryard, the Squaw Lake landing or transients and unofficial lodgers who do not wish to be enumerated. The town believes the winter population to be in the region of 3,000 plus Indians.

An age v. sex structure pyramid was constructed using the data of the 1967 electoral census (diagram 8). This shows a marked contrast with the earlier ones produced by Langlois (diagram 7). The growth in the proportion of children and females is the most marked sign of the maturing of the community. However the characteristic masculinity of a mining community is still apparent as the 1966 census gave 129 males for 100 females. In 1956 the rate was 318 per 100

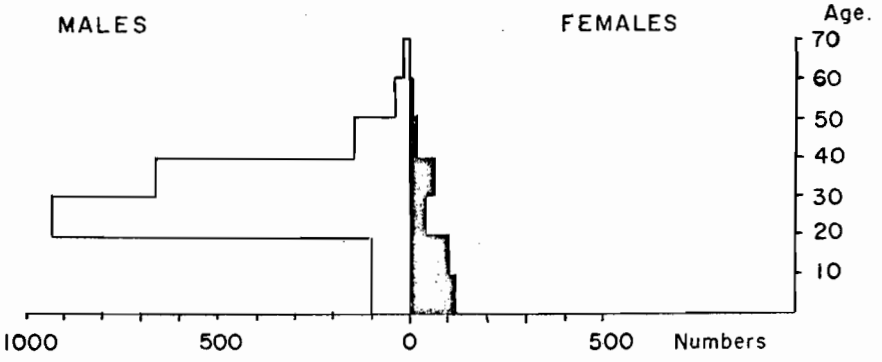
DIAGRAM 7

SCHEFFERVILLE. EVOLUTION OF THE POPULATION STRUCTURE.

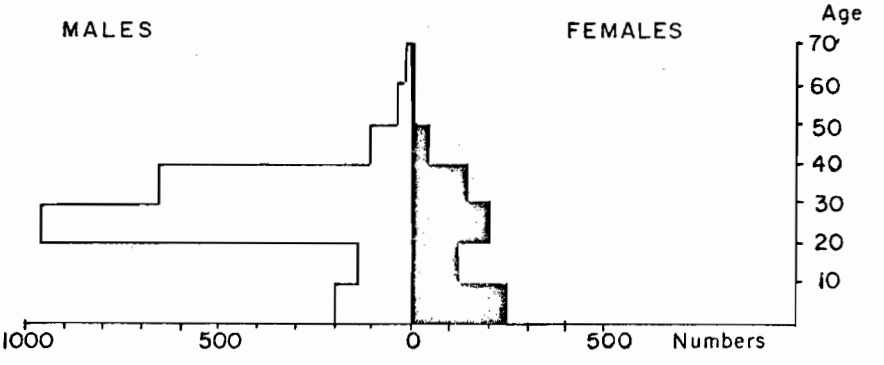
1. December 1954



2. August 1955



3. July 1956

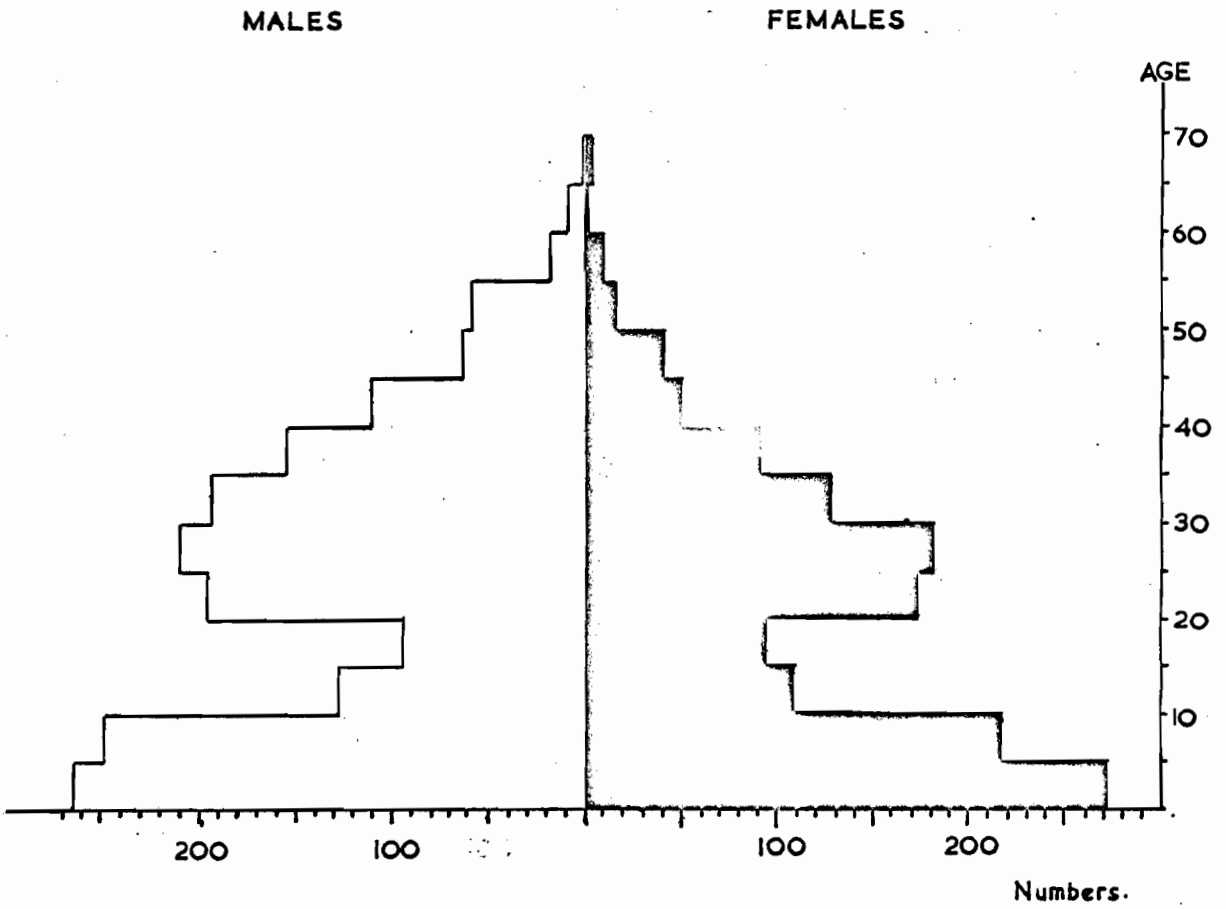


(after Langlois)

DIAGRAM 8

SCHEFFERVILLE.

1967 POPULATION STRUCTURE



(source Schefferville electoral census)

females and during the period the bunkhouse population has dropped from 900 to 300.

The origins of the population is unknown. If the labour force data can be extended the Québec proportion is possibly in the region of 60% by birth and 75% by last residence. A small survey of 90 families made in May, 1967 indicates that 12% were last resident in a rural area and 67% from a town larger than Schefferville. In a discussion of the 1961 census the 1966 CanadaYear Book states that the urbanward migration from farms accounted for 9% of the migrants. The fact that the sample received more than its proportional share of rural migrants reinforces the impression created by the labour force origin maps and tables.

In an attempt to establish any changes in the ethnic mix of the population the parish records were examined. However due to the different recording techniques each year no firm conclusions can be drawn. Table VIII however does indicate a decline in the number of families since 1962 with the proportion of French Canadian families being 71% in 1966, 64% in 1965 and 67% in 1964, figures in approximate agreement with the labour force origins.

As would be expected from such a young population living in an economically secure environment the fertility of this population is high. If the number of females between the ages of 16 and 45 are taken from the 1967 electoral census and the number of children born to them (69) a rate 211 per 1,000 women is recorded. This compares with the 1960 Canadian average of 182 but is well below the Schefferville Nascopi Indian rate of 500 (70).

TABLE VIII

PAROISSE COUER IMMACULE DU MARIE: SCHEFFERVILLE

Year	Number of Catholic Families	French Canadian Families	Protestant Families
1959	434	336	-
1960	545	378	-
1961	564	407	-
1962	600	500	-
1963	583	469	-
1964	588	477	123
1965	505	399	119
1966	485	421	109

(Source: Parish Records)

Migration and Permanence

As can be seen from the maps and tables the role of the South Shore in the provision of labour for Schefferville is important, especially in the case of the more permanent hourly paid workers. This movement is part of an overall spatial and historic pattern of migration in the area.

The Gaspésie and South Shore was an early settled area. The east was settled initially by fisherman and by 1763 most of the coast had already been granted as seigneuries. To the west the peopling of the South Shore was favoured by proximity to Québec and by natural conditions. Agriculture gave way down river to subsistence

agriculture, forestry and fishing. During the nineteenth century the higher lands were occupied.

Today the area is characterized by an archaic economy and in 1951, when I.O.C.C. began the latest stage in the industrialization of the North Shore, the Gaspésie-South Shore had 47% of its labour force in the primary sector and only 8.8% in manufacturing. The region had long been one of persistant out migration, between 1851 and 1956, 232,600 left the region downstream from Montmagny, i.e., 260% of the 1851 population of 89,400 (71). Since the mid-nineteenth century the Gaspésie-South Shore has acted as reservoir of labour for the industrialization of New England and the towns of Québec and Ontario. The area has been characterized by its high birth rates e.g., Gaspé in 1950 reached 56.9 per 1,000 (9), and the regions average of 27.4 for the period 1951-1955, compared with 19.4 for the whole of Québec (71).

The studies made by the Bureau d'Aménagement de L'Est du Québec (B.A.E.Q.) of the Rivière du Loup, Témiscouata, Rimouski, Matapèdia, Matane, Gaspé and Iles de la Madeleine area indicates the characteristics of the area's economy relevant to the migration. In 1963 for example the population of 326,000, some 5.9% of Québec's total, produced only 1.18% of the province's value of production. The value of production per head was $307 compared with $1,539 for the province as a whole (72).

The Gaspésie-South Shore area studied by the B.A.E.Q. is characterized by a large area, small population, remoteness from urban centres, high birthrate, large e migration and dependence of its

limited industry on primary raw materials. It is an area of low incomes, of a high rate of government financial assistance and high unemployment. Average male incomes in Amqui are $2,700, in Lac au Saumon $2,100 and in Gaspé $2,700. Within the urban areas incomes are still low, e.g., Rimouski in 1963 was 32% below the national average (73).

There are similar financial pressures in the northern parts of New Brunswick with high birth rates, large families and low incomes, e.g., 1963 average male income in Grand Falls was $2,500 and Shippegan $2,300. Analagous socio-economic conditions prevailed in Newfoundland with typical average male incomes in 1963 of $2,300 for Harbour Grace and $3,300 for St. John's (73).

There are thus strong financial push factors in the areas which have provided the hourly paid workers, the average male income in Schefferville in 1965 was $6,200, almost three times the income levels in some of the communities named above. In the case of the supervisory and technical staff their higher educational levels and skills enable them to have greater geographic mobility. Commonly they will regard Schefferville as a stepping stone for career experience.

The migrant's perception of the Schefferville area and his conception of the functional or social distance involved (74) in the migration is in the case of the hourly paid workers influenced by the historical pattern of migration in the area. Although the physical distance from the Matapédia valley to Schefferville is almost 500 miles compared to 200 miles to Québec City its functional or social distance may be much less. There has long been a close relationship

between the North and South Shores and the development of mining after 1950 was the latest stage in this relationship. During the 1850's forestry on the North Shore from Tadoussac to Bergeronnes used seasonal labour from the South Shore and Charlevoix. Although seasonal, some permanent migration began, the 1851 population of 2,400 grew to 6,100 by 1861 when 70% of the population was male. After 1900 the growth of the pulp and paper industry provided an economic stimulus for further migration and by 1941 the North Shore population had risen to 25,000 (9).

As a result of the mining and power construction, together with the activities of the pulp and paper companies it was estimated that by 1963-64 there was a floating labour force of 10,000 on the North Shore. As well as the temporary work migrations there were also permanent moves. Bussières in 1958 examined the population origins for Hauterive and Baie Comeau and discovered 57% originated on the South Shore and only 11% from the North Shore itself (9). Bussières also examined the labour forces of Anglo Canadian pulp and paper at Rivière Laval and Sault au Couchon and Québec North Shore Paper at Outardes, Manicouagan, Franquelin and Rivière aux Rochers and discovered only 14% from the North Shore and 64% from the South Shore.

With the close ties between the industrialising North Shore and the Gaspésie-South Shore the reason for the predominance of migrants from this area to Schefferville is clear. Although the physical distance is greater than a move to large urban centres in the province, the functional and social distance is less. Experience of the North Shore extending in some cases over several generations,

a similar small town existence, etc., made the move relatively easy. The material advantages of higher incomes, better housing, relative permanancy of employment, opportunities for training, etc., were then allowed their full play.

It is therefore easy to see why the Gaspésie-South Shore as the nearest area of surplus manpower provided such a high proportion of the Schefferville labour force. That such migrants have tended to stay longest is a consequence of the relatively similar geographical and social conditions prevailing in Schefferville and their formative communities. Schefferville's physical, social and economic amenities are also important but the feeling of being 'chez nous' is especially important for the wives, on whose attitudes the workers decision to stay or leave often depends.

For the supervisory and technical personnel the motivations are somewhat different. Many of these men have gained positions on the basis of experience and performance without paper qualifications and moving may present problems. On the other hand for a young engineer, often educated in an urban environment, the stay in Schefferville is regarded as a career stage only. If he does stay rapid turnover can give him a high level job at an early age. To ascertain the relative importance of the local environment and the personal satisfaction of the individual and his perception of Schefferville would demand a survey beyond the scope of this research.

In comparison with many other mining communities Schefferville has a relatively stable labour force. This is in spite of its isolation, its climate and the seasonal nature of the mining operation. The

stability is a product of two sets of factors. Firstly, those connected with the migrant worker, in Schefferville's case the predominance of the French Canadian worker from the South Shore-Gaspésie. Secondly, those connected with the local community. The perception of this environment will vary with the migrant, but Schefferville offers housing, recreation and economic benefits not often available in similar size towns elsewhere.

CHAPTER SIX: GAGNON

INTRODUCTION: THE MINING OPERATION

It was with the airlifting of a pilot plant into the Lac Jeannine area in the winter of 1956, that the Québec Cartier Mining Company (Q.C.M.) operation entered a more permanent stage. As with I.O.C.C. and its Schefferville development Q.C.M. was faced with a multi-sided programme of mine, concentrator, railway, port facilities, power development and townsite construction involving the expenditure of $250 million.

The Lac Jeannine ore-body lies at an altitude of 1,800 feet in an area of dissected, wooded terrain, some 150 miles north of the St. Lawrence. The railway route from the coast had to climb from sea level across two watersheds of 1,800 and 3,000 feet before reaching the mine area. Initial extensive aerial survey indicated thirteen possible rail routes and the final route was mapped in 1956 (75). Construction began in December 1957 and was completed in December 1960. An access road was built paralleling the railway to move townsite, concentrator, power dam and railway materials into the interior.

Port Cartier, unlike Sept-Iles, was not a natural harbour as it lies on a rocky exposed coast. Surveys had indicated that ice conditions at this point would permit all-year shipping thus avoiding the necessity of stockpiling winter concentrate production. The artificial port is capable of handling 100,000 ton ore carriers and

the first concentrate was shipped in July, 1961. The current construction of a 10,000,000 bushel grain elevator by the Dreyfus Corporation, scheduled for completion in April, 1968, will give the St. Lawrence Seaway carriers a return cargo.

The decision to mine the Lac Jeannine ore-body, rather than the other deposits held by Q.C.M., was a result of the relative ease with which the specular hematite could be mined, crushed and concentrated with a simple flowsheet of wet autogenous grinding followed by rougher and cleaner spiral separation (75). The operation is highly mechanized and capacity is currently 20,000,000 tons of run-of-mine ore and 8,000,000 tons of the 66% concentrate.

The severe winter climate has imposed some operational modifications, as occurred in Schefferville. Steel equipment subject to stress has to be constructed with special alloy steels, welding at low temperatures requires pre-heating with propane torches, special lubricants have to be used, etc. The make-up water for the grinding mills is pre-heated in winter to prevent freezing when it comes into contact with the cold ore. The concentrate contains three percent moisture so it can freeze in the rail cars during transit to Port Cartier. Q.C.M. tried oil in the cars, calcium addition, etc., but the only effective way to overcome this has been to dry the concentrate to one half percent moisture when required. These operational problems have now been overcome so that it is possible to allow summer production to fall to two thirds of capacity and allow employees to take summer vacations.

THE TOWN OF GAGNON

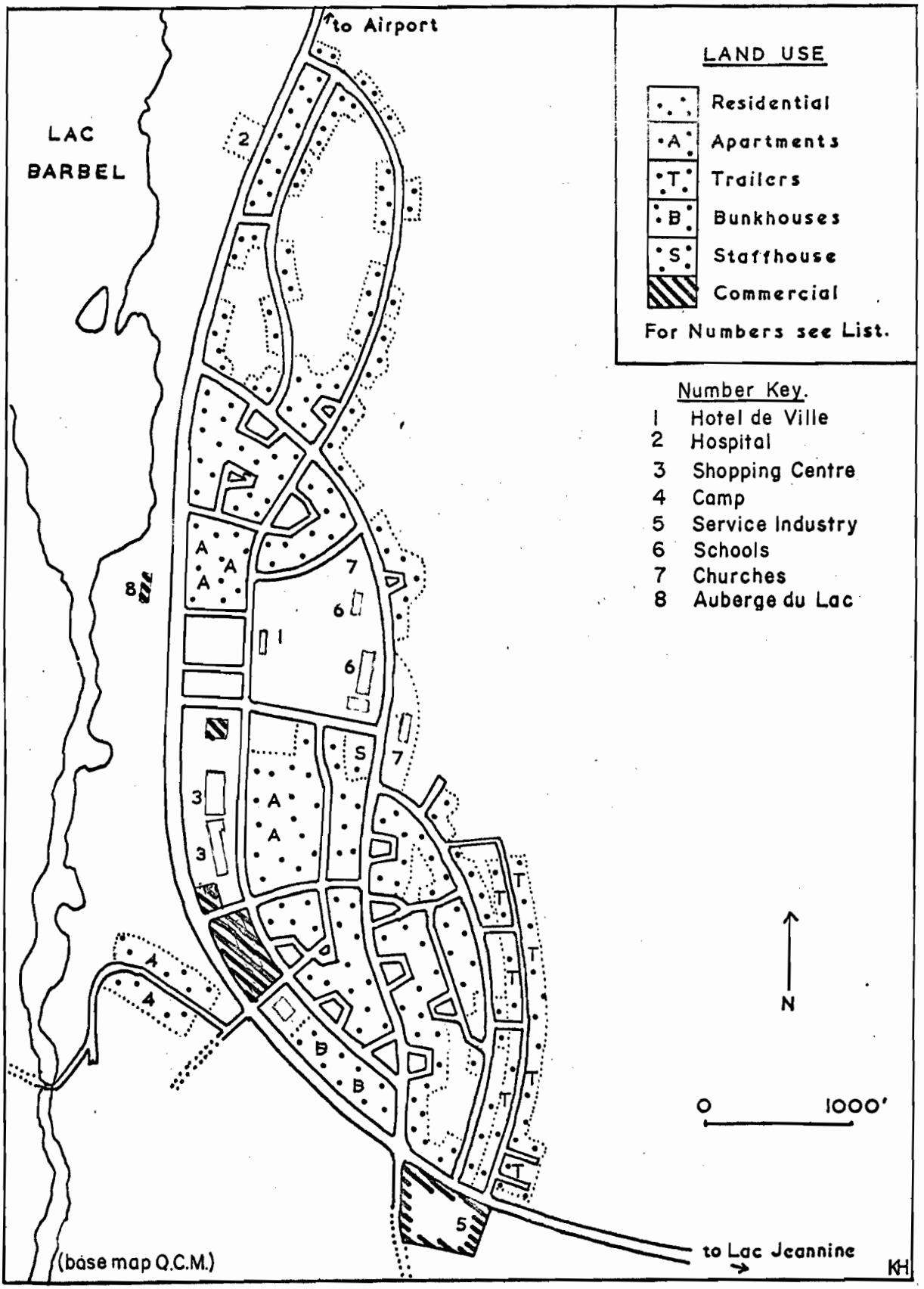
The Plan

The Gagnon townsite covers an area of approximately 250 acres on a gentle south west facing slope overlooking Lac Barbel. The townsite location was chosen by Q.C.M. for a variety of reasons (76). It is situated half way between the Janis Lake airstrip and Lac Jeannine, in an area of scenic potential where the effects of the mining operation could not be seen or heard. The locality is one of rugged terrain so the slopes of the townsite, between 11% and 8%, allowed an effective layout of streets and buildings and in addition the topography was suited to lot and street drainage. The site is oriented to the south west to receive maximum insolation and has an adequate water supply. Although the soil conditions, with up to thirty feet of bouldery glacial till and occasional bedrock outcrops, were not good, they were typical of the region.

The designers of the town, architect E. Fiset and engineers Beauchemin, Beaton and Lapointe, were guided by a number of concepts. In the first stage of planning their major consideration was to "search for a sense of liberty and openness"(76) by attempting to obtain the best and widest views possible for all parts of the site. The sense of openness they were seeking was accentuated by the long sweep of the streets on the longitudinal axis of the plan (map 16) which in addition had the practical advantage of facilitating traffic circulation and such everyday functions as the collection of workers for transport to the mine site.

MAP 16

GAGNON



The planners also tried to preserve as many trees as possible within the townsite in order to relieve any impressions of bleakness before landscaping was effective. The only practical way to do this was to retain groups of trees, but the changes in groundwater conditions and the toll taken by construction machinery has rendered this only partly successful. The planning and development of this townsite had to be treated differently from such a development in the south, because provision had to be made for the winter with its low temperatures and heavy snowfall (snowloading of 90 lbs. per square foot, etc.). In addition the isolation of the site had to be taken into account in organizing the provision of men and materials and the factor of simultaneous occupation and construction between 1959 and 1961 had to be considered.

Planning, as in the case of the other Québec-Labrador communities, achieves a considerable degree of freedom from usual restrictions. Lots can be arranged and oriented for particular design needs and the buildings on them oriented to obtain the best views and perspectives. The planners, without resorting to picturesque treatment, tried to achieve a satisfactory aesthetic expression of the translation into architectural forms of the "spirit and significance of a dynamic enterprise rising in a forlorn and rugged land" (76). Thirteen house designs were used in Gagnon and to counteract the potential monotony they were alternated and disposed differently (photo 13). The general visual harmony of the town derives from the vertical redwood siding, the white cement walls and asbestos panelling accented by bright colours on the doors and mouldings and the natural stone walls (photos 14, 15 and 16)

Photo. No. 13 Gagnon view from south west during construction, 1962, Lac Barbel in distance (Q. C. M. photo).

Photo. No. 14 Gagnon, family housing.

Photo. No. 15 Gagnon, Catholic Church.

Photo. No. 16 Gagnon, family housing.

On the basis of Q.C.M.'s estimates of total townsite population at various labour force levels, the original plans were drawn up to permit expansion in stages to a possible total population of 8,000 and services of this capacity were installed. Actual construction has terminated with a total of 560 housing units and a population of 4,000.

Construction began in the south of the townsite and proceeded northwards from the bunkhouses and cafeteria nucleus. As detailed plans were drawn up for the extension, many town plans show the streetlines and house positions, the subsequent non-erection of the later stages has given extra emphasis to the designers' aim of openness. The planners assumed that housing would eventually become privately owned and this accounts for the low density and the high proportion of individual homes. The housing plans gave 24% of the total in row or semi-detached homes, 14% in apartments and 60% in detached houses, while 60% of the housing is of three bedroom type units.

The attractively designed bunkhouses and cafeteria, unlike Schefferville, are situated in the townsite itself and the commercial area is centrally located. A service industry zone was established at the southern edge of the town but no planning provision was originally made for trailers. The roads were paved in 1962 and landscaping and the provision of lawns followed in 1963, the major part of this work being completed by 1965. An area between the major road and the lake has been reserved as a park and Lac Barbel itself is easily accessible for boating.

The town was named after the Honourable Onesime Gagnon, a former Lieutenant Governor of Québec and the Province's first Minister of Mines.

Local Government and Administration

On incorporation by a private Bill in February 1960 a Town Council was appointed by the Lieutenant Governor in Council for a five year period. Before the five years had passed it was obvious that there was going to be an insufficient number of property owners to make practical the usual transfer to local self government. The town's charter was therefore changed so that firstly everyone resident in Gagnon for one year who is eligible for local taxpaying can vote and anyone resident for one year who has paid his local tax can stand in an election. This effectively limits the franchise to the male householders; women, unless they rent in their own name, and bunkhouse residents are excluded (77).

The Mayor is elected for a three year term and two councillors are elected each year for a three year term. Of the original nominated mayor and six councillors, the mayor and two councillors were elected in the first election in February, 1965. As there have been elections every February the Council is now entirely elected. Gagnon therefore moved to formal municipal self government quicker than Schefferville, but interest in municipal affairs is limited and the major work is the drafting of bye-laws. As in the case of Schefferville local administration is operated by a town manager.

The Town's 1967 budget totalled $421,000 (78), but unlike the I.O.C.C. communities the Council has had little formal part to play in the provision of recreation, which is performed by the Centre Recreatif. Unlike Schefferville the Town had to pay $71,000 for debt servicing as a result of a loan to purchase capital equipment. The other major expenditures on roads, public works, police, etc., are much the same as the other communities. Almost 50% of the Town's revenue comes from land taxes and as Q.C.M. owns virtually all property that means the company contributes $284,000 to the Town's budget. The usual smaller contributors are garbage, snow removal and water taxes and $23,000 from trailer park rentals.

As in the case of Schefferville the Town's boundaries were made extensive, some eight square miles, to allow control over peripheral developments. With the exception of the Hudson's Bay Company, Bell Telephone, etc., all housing in Gagnon is owned by Q.C.M. The homes rent for $85 - $95 per month and the apartments for $75 - $85 and unlike Schefferville, Q.C.M. has no current house sale plans. As in the case of most of these towns there seems to be a certain reluctance to provide a surplus of houses. There is in fact a shortage and to alleviate this two steps have been taken. Firstly, living in basements was not originally permitted, but an amended bye law now permits this and the summer of 1967 saw approximately 100 basements occupied. Secondly, trailers were not originally allowed in the townsite, but a serviced park for 100

units was constructed. Because of the site ground conditions its preparation was expensive, $150,000, but it does yield a small income to the Town.

As the mine area is some distance from the townsite the problem of the legacy of temporary construction period buildings is less acute in Gagnon. There are however a small number of temporary buildings in use in the town (photo 17) both for housing and for commercial use and these form the major visual 'black spots' in the town together with the trailer park. The Town is gradually moving these buildings and selling the lumber for garage construction, as the original plans did not make adequate provision for the large car population.

The Commercial Zone and Entrepreneurs

Q.C.M. originally tried to establish a commercial shopping centre with large supermarkets, etc. It was not successful and the Hudson's Bay Company, which built its store in 1961, was the sole major store until the construction of the shopping centre in 1964. The latter was constructed by an entrepreneur along the usual pattern (photo 19) typically offering no winter protection. It has never been fully completed and occupied, and appears to be too large for the local market. It contains the usual range of department stores, supermarket, post office and a number of smaller stores.

There has been little scope for entrepreneurs in Gagnon. There are no privately-owned apartment blocks, so the role of providing

Photo. No. 17 Gagnon, service industry area.

Photo. No. 18 Gagnon, rear of trailer park area.

Photo. No. 19 Gagnon, shopping centre.

Photo. No. 20 Gagnon, recreation centre arena and swimming pool.

housing for transients and new arrivals is not open. The Town originally contracted for maintenance services, etc., but has recently bought $300,000 worth of equipment and it now undertakes snow clearance, general contracting, etc. No small entrepreneurs have emerged from within the community as in Schefferville and the opportunities for part-time employment are also more limited.

Labour Force

August, 1960 saw the construction labour force reach its peak of 8,000 men. As the majority of construction was completed by the following year this rapidly declined. Initial town plans were based on provision for a labour force of 1,100 men and this has been attained. Without a production expansion this figure is unlikely to expand and may in fact decline slightly as increasing familiarization with the automation and mechanization of the mine and concentrator operation increases operational efficiency.

Q.C.M. itself has never completed a study of the origins of the labour force so any changes in the composition of this force through time remain unknown. However, Biays (8) stated that the South Shore (especially the counties of Rimouski, Matane and Matapédia, together with the towns of Rimouski and Matane and such localities as Lac au Saumon, Sayabec and Amqui), was important in providing labour for the Q.C.M. operation. The large centres such as Montréal and Québec were important in providing management and technicians and such towns as Elliot Lake and Shelter Bay provided some of the workers because of their local industrial conditions.

In an attempt to determine with some greater degree of accuracy the origins of Q.C.M.'s work force a sample was taken from the company's Gagnon records. The sample was arranged as follows. Of those men recuited in 1958 each alternate individual was selected from the year's files, which were arranged in a chronological order from the January through to December recruits. For the 1959, 1960, 1961, 1966 years every fourth individual was selected. No other sampling technique was possible with the office administrative arrangements and the desire to concentrate on the more stable part of the labour force. As in the case of Schefferville there is no way of ascertaining if the few men remaining from the early work forces are typical or atypical of the overall force at that time in terms of age, origins, etc.

Of the 185 individuals studied 88% were married and the average age was 39 years. Obviously the men recruited in 1958 were older, average age 43 years, than the 1961 recruitment, 37 years, and the 1966 recruitment, 28 years. The age on recruitment expectedly showed that the more stable long term workers were older, 38 years for the 1958 group, than the 1966 workers, 27 years.

From the information filed with the employees record it was possible to obtain the birthplace, place of education, the 'home' address as given by the applicant at the time of joining Q.C.M. and the last employment address. This information has been recorded in the same way as the Schefferville data as geographical position, census division and size of place, based on the 1961 census. This information is combined with the age, education, marital status, etc., of the individual.

Examination of the overall sample's birthplace (map 17) shows a pattern with some similarity to the Schefferville situation. The major difference is the greater homogeneity of the force in respect of its Québec origins; some 84% of the sample were born in Québec. Of the 1958 and 1959 recruitment, this percentage rises to 90%. Analysis of the actual origins of the employee produces the following pattern. The counties of the South Shore[1] provide 38% of the birthplace, Saguenay County, i.e., the North Shore 9%, Lac St. Jean area[2] and Montreal 4%.

If the home address is considered the pattern changes. The South Shore's share drops to 30% while Saguenay County rises to 30%, both Lac St. Jean and Montreal remaining the same. When the last employment address is considered the South Shore drops to 9% and Saguenay climbs to 52%, the Montreal and Lac St. Jean components remaining unchanged.

When the year's recruitments are considered separately the basic pattern of the majority of birthplaces being on the South Shore and the migration to the North Shore before moving to Gagnon is repeated. 40% of the 1958 sample were born on the South Shore but only 5% had their last employment there in spite of the fact that 45% still indicated it as their home. This reflects the socio-economic conditions prevalent in the area which were outlined in the discussion of the Schefferville labour force and the existence

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1. Bonaventure, Gaspé S, Gaspé N, Kamouraska, Matane, Matapédia, Rimouski, Témiscouata and Rivière du Loup.

2. Chicoutimi, Lac St. Jean Ouest, Lac St. Jean Est.

TABLE IX

PERCENTAGE OF THE GAGNON LABOUR FORCE SAMPLE BY REGION

		1958	1959	1960	1961	1966
1.	Birthplace					
	South Shore	40	43	36	32	30
	North Shore	15	24	-	3	11
	Lac St. Jean	10	-	11	5	15
	Montreal	5	-	3	3	7
2.	Home					
	South Shore	45	24	36	23	22
	North Shore	15	33	8	45	48
	Lac St. Jean	5	10	11	3	11
	Montreal	10	-	3	3	7
3.	Last Employment					
	South Shore	5	5	13	10	7
	North Shore	65	53	28	61	63
	Lac St. Jean	5	10	11	-	11
	Montreal	5	-	6	3	7

(Source: data provided by Q.C.M., Personnel Department, Gagnon)

of the temporary and short term work migration from the South to the North Shores of the St. Lawrence. Some 15% of the 1958 sample were born on the North Shore and considered it home but 65% had their last employment there. Examination of Table IX shows a similar pattern for the other years with the exception of the low employment figure for 1960 in Saguenay.

The percentage of South Shore men in the later years' sample shows a decline. This is possibly due to two main factors. Firstly, the South Shore percentage of the total of the 1958 and 1959 recruitments may have been much lower originally but the migrants from other areas have left. Secondly, the increasing second generation effect within Saguenay county itself. That this latter is significant is the fact that in 1966, 48% considered it their home address. Many of these are younger men whose parents may have moved to the North Shore in the last few years as the industrialization of the area has proceeded.

As we have no means of determining the origins of the original labour force, we are unable to state if the large number of South Shore men from 1958 and 1959 reflect their greater propensity to settle in these small mining towns, or whether the whole force at the time showed the same spatial patterns in its origins. It is, however, interesting to see that the long term residents in Gagnon originate in similar areas to the Schefferville work force veterans in the various payroll categories. Some analysis was made of the birthplace size but the existence of such a range of scale between Montréal and the smallest villages makes the average population

size of little use. If the Montréal-born are excluded from the figures the 1958 group's mean birthplace size is 5,800, the 1959, 6,300 the 1960, 18,400, the 1961, 10,600 and the 1966, 24,100. As in the case of Schefferville the more permanent elements have tended to come from smaller communities, thus indicating that the nature of the formative community may influence the length of stay of the migrant in the northern town.

The Community

Gagnon's experience of population growth and stabilization is similar to Schefferville's but the shorter construction period and the lack of a seasonal lay-off has resulted in fewer fluctuations. The permanent population in 1959 was very small but the 1961 census gave the town's population as 1,900 and the 1966 as 3,999. Currently with 560 housing units in the town the population appears to be stabilizing at about 3,800 or 750 families (79).

There is a large proportion of young people in the population e.g., in 1966 42% of the population was less than 20 years of age With approximately 185 births a year the birth rate is approximately 47, reflecting a young population living in an economically secure environment. The mean family size is 4.2, or 5.2 if the single people are excluded, the figure envisaged by the planners being 4.4. No detailed information was available on the detailed age-sex structure of the population but the parish records indicate a high proportion of single people, some 26% in 1963, but this had declined to 18% in 1966. The bunkhouse population has also shown a decline in recent years; it was 315 in August, 1967.

TABLE X

Population of Gagnon

Year	Total	Total Families	English Speaking Families
1962	3,453	570	104
1963	3,546	635	69
1964	4,000	740	68
1965	4,896	757	70
1966	3,999	n.a.	n.a.

(Source: Legendre, 1966)

As can be seen from table X the population of Gagnon shows an increased French Canadian element, up from 75% in 1962 to 91% in 1966. No detailed information is available on the origins of this population but Legendre's sociological survey of a small number of families in 1966 gave the following distribution.

Lower St. Lawrence and Matapédia	30%
Gaspésie and Matane	8%
Côte-Nord	11%
Lac St. Jean	11%
New Brunswick	8%
Remainder of Québec	20%

This survey also indicated that 42% of the sample were of rural origins and that 59% were from the primary sector of the economy, farming, fishing and forestry.

The motives of the migrant were investigated by Legendre and he states that the majority were attracted by the high salaries, the permanent work and the security of employment. Commonly prior work,

especially for the unskilled worker, was in such seasonal activities as construction and forestry, sectors where turnovers are characteristically high. Originating in socio-economically depressed areas with a tradition of migration to work opportunities, such as the seasonal migration of workers from the South to the North Shores for the forestry industry, the migrant's move to Gagnon is typically regarded as yet another short term move. Legendre claimed that almost all the people envisage only a stay of three to four years in Gagnon. No information was available on labour force turnovers apart from the statement that it was "comparable to other mining operations" (80). As it is locally assumed that approximately a quarter of the households leave Gagnon each year the turnover is possibly in the region of 30%.

Such relative impermanence has several effects on the community which allied to the company town structure and the diversity of population background makes normal community development difficult. Interest in local government is rather restricted; in a recent bye-election, admittedly during a vacation period, only 25% of the electorate voted compared to 75% in a general election.

The social life in the community is also affected by the dominance of Q.C.M. Not only does shift working produce its own recreation patterns but company roles do in some cases pass over into social relationships. Although the housing allotment in Gagnon is based on department and not on job status, Legendre does claim that social divisions exist on the monthly-hourly paid basis. He also mentions that there is a certain amount of differentiation based on urban and rural origins. In most cases however Gagnon's population

is in the process of social change, e.g., in the patterns of education and consumption in the high wage, high cost environment of the northern mining town.

Those migrants who stay longer than the average realize that they would be unable to get the same conditions elsewhere and they have come to some degree of acceptance of the advantages that Gagnon has to offer. The climate, especially the poor summers and the isolation, are still noticed and the high living costs are criticized. Under these conditions the recreation facilities play an important role.

The fact that Gagnon is an isolated urban settlement has meant that amenities and communications are of some importance in stabilizing the community. The provision of amenities in Gagnon is very similar to that in the other mining communities. The Centre Recreatif has been provided by Q.C.M. with a large building with facilities for hockey, bowling, curling, swimming, etc. Typical of these communities is the emphasis placed on provision of sporting facilities with little specific provision for cultural activities. There is no cinema in Gagnon but cable television has been provided by the Centre Recreatif, the French service originating in Matane and the English in Moncton. There is also an English and French radio service. The range of stores is adequate for the size of the community but there is only one restaurant and one hotel with a single bar and tavern; there is no equivalent of the Q.L.P.A. in Gagnon and no branch of the Royal Canadian Legion.

Gagnon has been served by Québecair from the beginning of scheduled air transport to the town. It is currently served by four flights a day; one stops on its way from Montréal to and from Wabush and Schefferville and the other links Gagnon with the North Shore. During the last three years the traffic has grown steadily; 8,981 passengers were carried in 1964 and 13,949 in 1966 (63). The major origin and destination points are Montréal, 33% of the 1964 traffic which declined relatively to 22% of the total passenger traffic in 1966, Québec 12% and 8%, Rimouski 18% and 12% and Baie Comeau 12% and 7% in the two years. The relative decline in all these points has been due to the rise in the volume of traffic to and from Sept-Iles from two passengers in 1964 to 4,068 in 1966, or 29% of the latter years traffic. This is the consequence of the introduction of a new service by Québecair, but does show the influence and importance of Sept-Iles as the regional service centre for the interior. Q.C.M. have a DC 3 aircraft based at Sept-Iles but it does not operate a scheduled service.

The local road network is limited. There are roads to Hart Jaune and the powerhouse, to Mt. Reed to the north and a road has been pushed west to the Lac Audet recreation area and is being extended to the Racine de Bouleau river to give access to the Manicouagan. There is no road link to the North Shore, the original access road built for construction purposes has been abandoned and the first 80 miles reverted to the Québec North Shore Paper Company of Shelter Bay. Unlike the other communities the physical difficulties of connecting Gagnon to the south by road are small. Hydro Québec

as part of its Manicouagan-Outardes project has built private access roads northwards from Baie Comeau, and these all weather roads reach to within 80 miles of Gagnon. The possibility of connecting Gagnon with this road is however complicated by a number of factors. Hydro Québec's roads are private access roads; a good quality gravel highway would possibly cost $5 to $6 million (81) and would be of limited use as there are only 1,300 cars in Gagnon. Thirdly Gagnon's ties are with Port Cartier and Sept-Iles, whose businessmen would be affected if a road axis to Baie Comeau was to be built; and finally the political division into Saguenay and Duplessis Counties has weakened any united pressure for Provincial Government action. Although often mentioned and anticipated in Gagnon no construction has started.

La Compagnie de Chemin de Fer Cartier is a private carrier, unlike the Q.N.S.L., and all freight is handled by Federal Terminals, frequently using 'piggy-back' equipment to ease handling and transit from the rail terminal at Lac Jeannine to the town. There are two passenger trains a week and three in the summer vacation period. As in the case of Schefferville the mining company provides free transportation of the employee's car from mine area to the coast.

CHAPTER SEVEN: THE NEWFOUNDLAND LABRADOR SETTLEMENTS

Introduction

Both Labrador City and Wabush are products of the more recent trends in iron ore technology involving the mining, concentrating and pelletizing of low grade ore. Their competitive position is aided by the large scale of all phases of the operations, made possible by the existence of huge ore bodies which are easily mined, crushed and concentrated. The existence of the Québec-Newfoundland boundary and the demands of the provincial governments has affected both the origin of the population and labour force as well as some details of the administrative evolution.

LABRADOR CITY

The Town

The I.O.C.C. Carol Project entered the construction phase in 1958 after extensive exploration work and pilot plant operation had proved the existence of in excess of 2,000 million tons of ore. Initially there was the possibility of two locations for the townsite necessary to house the mine and plant workers. The northern location at D'Aigle Bay was not well situated in relation to the position of the Northern Land Railway or the newly built Wabush airstrip. The southern site lying on the north shore of Little Wabush Lake was therefore chosen.

THE LABRADOR CITY - WABUSH AREA

Railway
Road
Townsites
Camp
Concentrator
Pellet Plant
Local Improvement District Boundary
Ore Deposits

to Ross Bay Junction
Airstrip
WABUSH LAKE
Little Wabush L.
Dumbell L.
LABRADOR CITY
Lorraine L.
Luce L.
SMALLWOOD MINE
HUMPHREY MINE
Carol L.

Scale 0 1m. N

KH

The present townsite covers an area of approximately 1,000 acres and lies in the lee of hills which rise 1,100 feet above Little Wabush Lake (map 18). The townsite lies in an area of glacial knob and kettle deposits sloping gently to the lake. The site is more sheltered from the prevailing wind than Schefferville and the area is also more heavily wooded with only small sections of burn. The settlement lies eight miles to the southeast of the present mining area and the concentrator and pellet plant lie some one and a half miles to the north northeast (photo 21). In contrast to Schefferville these company installations are not visible from the town.

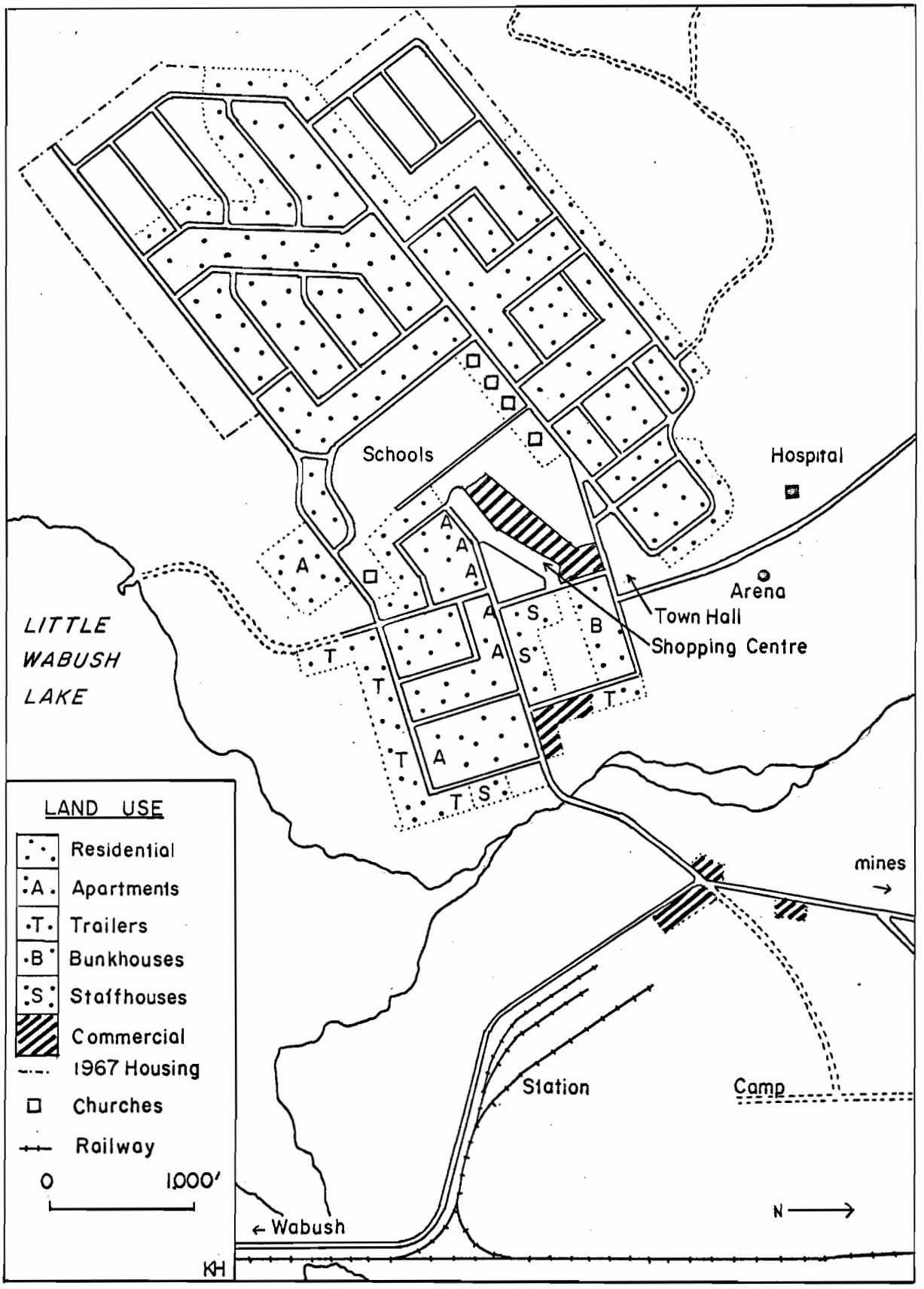
The town plan, a broadly rectangular one, was designed by H. Dineen and Associates and has been followed with little alteration. Construction has proceeded generally from the original bunkhouse nucleus in a westward direction. The plan, as in Schefferville, designated churches and schools for the central area as well as a commercial zone (map 19).

The settlement began with the I.O.C.C. exploration camp and pilot plant which now lie one mile east of the centre of the present townsite. The first permanent buildings were the bunkhouses and associated cafeteria which were built in 1959. In contrast to Schefferville these were placed within the townsite proper. The first homes were built in October, 1959 and as in the case of the bunkhouses the designs used at Schefferville were employed.

Although many of the early homes were built to the same plans as Schefferville, the last few years construction has been

MAP 19

LABRADOR CITY



predominently of single family bungalows or apartment units (photos 22 and 24). The company has now changed its housing policy in Labrador City and the last two years' construction has been strictly for sale. The employees buy their houses through a C.M.H.C. scheme. The houses contract price is $18,500, I.O.C.C. providing the serviced lot, and the employee can obtain a thirty year mortgage for $110 per month including tax and insurance. The company has also introduced the scheme applied in Schefferville for the purchasing of older houses. In both cases the company, as is necessary in a single enterprise community, has a buy-back agreement to protect the purchaser and has the first option on house sale for seven years as a precaution against the alienation of the local housing supply. There are approximately 200 private apartment units in the town, with rents ranging two or three times as high as the rents for company housing. These are commonly used by employees of local stores and businesses. In addition approximately 170 trailers are currently in use by contractors, local companies, I.O.C.C. and private individuals (82).

The town's physical appearance is similar to Schefferville's as a result of the similarity of house designs and the attempts at variety given by the coloured shingles and roofs. In contrast to Schefferville there are far more trees within the townsite. It was found that leaving small groups of trees was not successful so that the latest housing area has larger blocks of trees left between the houses. To cope with the drainage of the sloping site a number of large ditches cut like swathes through the town.

Photo. No. 21 Labrador City, I.O.C.C. Carol Concentrator and pellet plant.

Photo. No. 22 Labrador City, 1966 family housing.

Photo. No. 23. Labrador City, theatre and Town Hall.

Photo. No. 24 Labrador City, privately built apartments.

These have been bridged in places to provide pedestrian access and although they may well be covered in the future their dry summer state when they are filled with dead wood, litter and silt is unattractive.

Although the I.O.C.C. mine and mill are not visible from the townsite the Wabush mines installations are visible across Little Wabush Lake. It would seem that I.O.C.C. did learn something from their Schefferville experience, especially in connection with the commercial zone which is visually and functionally an improvement on the Schefferville situation and the provision of off street garages.

Population

It was not until 1958 and the establishment of the pilot plant that any semblance of permanence came to the Carol Project. By March 1960 the population had grown to 507, twenty seven families and 450 men. With the completion of the railway in May 1960 and the construction of a further 100 housing units the population reached 1,200 in September of that year. Prior to the decision to expand the pellet plant the 1964 population was planned to be 750 families. The expansion of the plant has now raised the ultimate town population to more than 7,000.

The 1967 construction of homes and the plant expansion, scheduled for completion by January 1968, had resulted in a contractor's labour force of approximately 1,200. This allied to the high turnover of labour makes anything more than an estimate of population in July, 1967 very hazardous. The Local Improvement District expects the population to level off at about 7,300 at the

termination of construction, with 70% of this figure of Newfoundland origin (82). No data was available on the age sex structure and because of the religious diversity, (there are Catholic, United, Anglican, Pentecostal and Salvation Army Churches), no church records could be used.

Labour Force

The Carol Project labour force shows a gradual rise through the period of construction to the production level of 1,600 to 1,700 in 1963. The very high turnovers of the early period, in excess of 100% (diagram 6) are due to the lack of accommodation at that time. With the end of the construction of the housing this turnover will drop, as all personnel supervisors believed that housing was the key factor in retaining the married employees in these northern towns. The Schefferville work force is remarkably stable for a subarctic mining venture with a seasonal lay off, approaching as it does L.K.A.B.'s performance in Kiruna, a much older and larger community. The factors behind this are partly environmental, or connected with the nature of the community itself and its amenities, and partly personal connected with the origins and the expectations of the workers. In the case of Labrador City, although the community is larger than Schefferville and offers equal or better amenities, the housing provision has not been as good until recently.

The higher turnover is also a reflection of the type of workers and the nature of the work itself. In contrast to Schefferville

the Carol operation requires a high percentage of mill and pellet plant workers. These tend to be young males direct from school who have to work under dirty and noisy conditions. Without ties to the community these workers once they have accumulated some capital have a tendency to return home to Newfoundland. A superficial correlation between the high turnovers and the high percentage of Newfoundland labour is discounted by company officials (83). The lack of an all year industrial work tradition and experience could apply equally well to areas of the Gaspé, South Shore and New Brunswick where many of the Schefferville work force originated, as to outport Newfoundland. Housing provision and the relatively unstable nature of a younger work force are more important factors.

The difficulty I. O. C. C. has faced in recruiting certain classes of Newfoundland labour is shown by the fact that during 1965 of the 467 people recruited by the St. John's office, 318 were unskilled, 59 were tradesmen and only three were professional and supervisory. In contrast of the 281 people recruited through the Montréal office only twenty five were unskilled, 165 were tradesmen and nineteen were professional and supervisory. This indicates that although the total labour force in Labrador City is predominantly Newfoundland in origin there are significant differences between job grades.

The Community

Labrador City has a wide range of formal and informal social organizations and amenities. As construction proceeded

social amenities gradually became more developed. In 1960 a social club was organized and a Ladies Community Club was established to help incoming families and these were followed by an increasing range of activities. An active ski club was soon established and by 1962 it had 300 members. The Ashuanipi Social Club, fulfilling the same role as the Q.L.P.A. in Schefferville, opened its club house in the centre of the town in 1962 and the following year saw the completion of the Royal Canadian Legion. There is now the usual range of social organizations, church groups, sports clubs, Lions Club, etc.

With a young population the provision of sports facilities was considered necessary and the permanent arena was started in 1964. The recreation centre now includes facilities for a full range of sports with the exception of swimming, there is even a small golf course under development at the moment. The town also has a cinema and in October, 1964, C.B.C. radio arrived, initially with French programming during the day and English during the evening. This has now been replaced by two separate language services as in Schefferville. Taped television was installed in Labrador City with I.O.C.C. aid and as in the case of Schefferville the French/English programme content is in accordance with the population composition.

The provision of adequate schooling for the large numbers of children in the town has presented a problem which in the case of Labrador City has involved the expenditure of $2,500,000 on educational facilities. In 1960 I.O.C.C. set up a temporary school

whose enrollment grew to 116 by the end of the school year. In 1961 the first permanent school was opened and the school population has continued to grow, the forecast for 1971-2 is 2,000 (82). The current administrative 'set up' is composed of a Catholic School Board, which provides up to Grade VIII and which contains a French language section, and the Labrador City schools run as private schools by I.O.C.C. The company has appointed a private school board to run the schools. In practical terms the use of a private school system avoids the necessity of separate denominational schooling and it is not in receipt of government grants. It certainly is an administrative convenience to avoid the duplication of services inherent in the Newfoundland educational system. The Labrador City Collegiate therefore contains both Protestant and Catholic students up to Grade XI following the Newfoundland curriculum and French language students following the Québec curriculum.

Local Government

Newfoundland has not had a strong tradition of local government and the evolution of the political structure of the Labrador settlements reflects this in addition to the fact that they are single enterprise communities. Unlike the Québec Government, which in the case of Schefferville granted only individual lots to I.O.C.C., the Newfoundland Government in Labrador City granted the whole block to the company for townsite construction. Originally this was run as a closed private camp but in June 1961 the settlement was incorporated as the Local Improvement District of Labrador City. Between 1961 and 1965 transfer of the townsite administration from I.O.C.C. to the Local Improvement District took place.

The Local Improvement District is controlled by a Board of Trustees, selected and appointed by the Newfoundland Government, which has powers and jurisdiction similar to those of an elected council. The chairman of the Board is the Administration Superintendent of I. O. C. C. and the four other members are also company employees. The Newfoundland Local Government Act, unlike similar legislation in Québec, does not have a time limit imposed on this nominated form of local government. The Labrador City Board now recommends its own replacements. It can be replaced in two ways, either as a result of a local referendum showing opinion in favour of elections or as a consequence of decision by the Newfoundland Government. There is no indication of either in Labrador City. The meetings of the Board are open to the public but attendance is poor. The Newfoundland Government has a permanent representative in Labrador City, he is on the staff of the Department of Labrador Affairs. As provincially, Labrador City lies in the economically homogeneous electoral district of Labrador West, its political representation is adequate.

The functions of the Local Improvement District are similar to those of the town councils in Schefferville and Gagnon. In this case the recreation role has always been associated with the town, unlike Schefferville and Gagnon, and this accounts for $130,000 of the 1967 budget of $700,000. Like Schefferville snow removal, garbage collection, etc., is contracted out but the policing is characteristically for Newfoundland provided by a municipal

contract with the Royal Canadian Mounted Police. The property tax is the major source of income and 80% of this is provided by I.O.C.C., with the mill area outside the Local Improvement District. I.O.C.C. also pays a special tax to keep a balanced budget. The town also gets fifteen percent of its budget in the form of Provincial grants.

Entrepreneurs

The role of entrepreneurs in providing local services and amenities in Labrador City has been slightly different from the Schefferville experience. The first store in town was operated by Bowering's, the Newfoundland Company, which rented space in a warehouse at the station. When the company faced the provision of a permanent commercial zone it did not wish to repeat the Schefferville situation. The Carol Lake Shopping Centre, Ltd., of Montréal obtained a concession from I.O.C.C. for a shopping centre development in 1960. To ensure the success of the venture a number of well established tenants were necessary and the banks, Liquor Board, Bowering's, etc., provided this basis. The first part of the centre was built by 1963, following the mall concept with a large parking lot, and extended in 1965. Branches of large southern stores dominate, e.g., Bowering's, Woolworth's and Dominion and there has been no emergence of a sizeable local initiative.

Operators of commercial establishments face a number of problems in operating in the town, shipping delays and damage and

a high labour turnover for example. Bowering's during 1965 had a labour turnover in excess of 100% and this is partly due to the shortage of private accommodation. Staffing costs are also high, averaging twenty to twenty-five percent higher than in St. John's (84). A similar range of services as in Schefferville are available, with as a consequence of the larger population some additional speciality shops, e.g., an electrical appliance store. There is however no hotel in the town, Wabush Mines offered a better concession in this respect. Feasibility studies for a motel-restaurant recently indicated a return of only four percent and this, combined with the difficulty of obtaining mortgage capital for a single enterprise mining community, means that no competition will be offered in this field. Unless he is a member of the Ashuanipi Club or the Canadian Legion the thirsty miner has to travel to Wabush for a drink! Another deficiency was the existence of a single service station for the whole town. Opportunities for 'moonlighting' are limited with few part time businesses established as a result of the outside specialist companies becoming established at an early stage in the town's development, unlike Schefferville where I.O.C.C. continued in the service function for a longer period.

Communications

The use of air transport is perhaps a secondary indicator of the ties of the population. In the case of the Labrador City - Wabush area, where the population of Newfoundland origin is 60-70% of the total, 1966 saw Québecair carrying almost twice as many passengers to and from Québec points as Eastern Provincial

Airlines carried to and from Newfoundland. In addition, H.U.T. and Wabush Mines aircraft fly to and from Sept-Iles. As much of this travel is for business it indicates the pull of Québec across the provincial 'boundary'.

The air traffic to and from Newfoundland is subsidized by the Newfoundland Government at an approximate annual cost of $400,000. After July 1965 passengers purchase their tickets at the normal rates and are given coupons worth twenty five percent of the ticket price which are cashable at any store or bank in Newfoundland (84). This effectively lowers the Wabush - St. John's fare from $76 to $57 one way.

Little Wabush Lake is used as a floatplane base for the local bush flying. Wheeler Northland operate from this base usually with two aircraft available for charter. Their regular work includes three fishing camps, one of which was 150 miles to the north west on the Kaniapiskau River, and they also serviced the Nitchequon weather station. The base is also used by the Newfoundland Forest Service, E.P.A., H.U.T. and transient aircraft.

The lack of a road is felt locally and is frequently mentioned spontaneously in conversation. The Premier of Newfoundland has promised to build a road into the area by extending the Goose Bay, Churchill Falls 'tote' road currently under construction. This will link with the Brinco road from the powersite to Esker on the Q.N.S. and L., but a southerly line for a 'Trans Labrador Highway' would be needed. Such a highway would be very expensive, the

550 miles in Labrador costing in excess of $100 million (81) and federal financial assistance would be necessary.

WABUSH

As Wabush Mines produce only five and a half million tons of concentrate a year compared to I. O. C. C.'s ten million tons of concentrates and pellets the settlement is much smaller. The townsite, some one and a quarter miles long, containing 405 housing units, including apartments, and 2,500 people in July 1967, lies approximately three miles south of Labrador City. A suitable building site was provided by an esker hugging the east side of a 200 foot high ridge aligned north northwest, south southeast. The sweeping curves of the streets produces a similar effect to Gagnon and the house types and landscaping make it a visually attractive townsite when the elevation produces changing views. The mine complex lies two miles west of the town but is clearly visible across the valley. There has been no departure from the plan.

Construction began in 1961 with the staffhouses, cafeteria and hotel; the first families arrived in 1962 and building proceeded southwards along the ridge. Prior to 1967 all housing was company owned and rents ranged from $60 to $75 a month. The first trailers arrived in 1966 and there are currently 45 units, all non-company owned. As in the case of the other towns no provision was made for a trailer park in the plan but there are no other temporary structures in the townsite. During 1967 the company prepared 140

MAP 20

WABUSH.

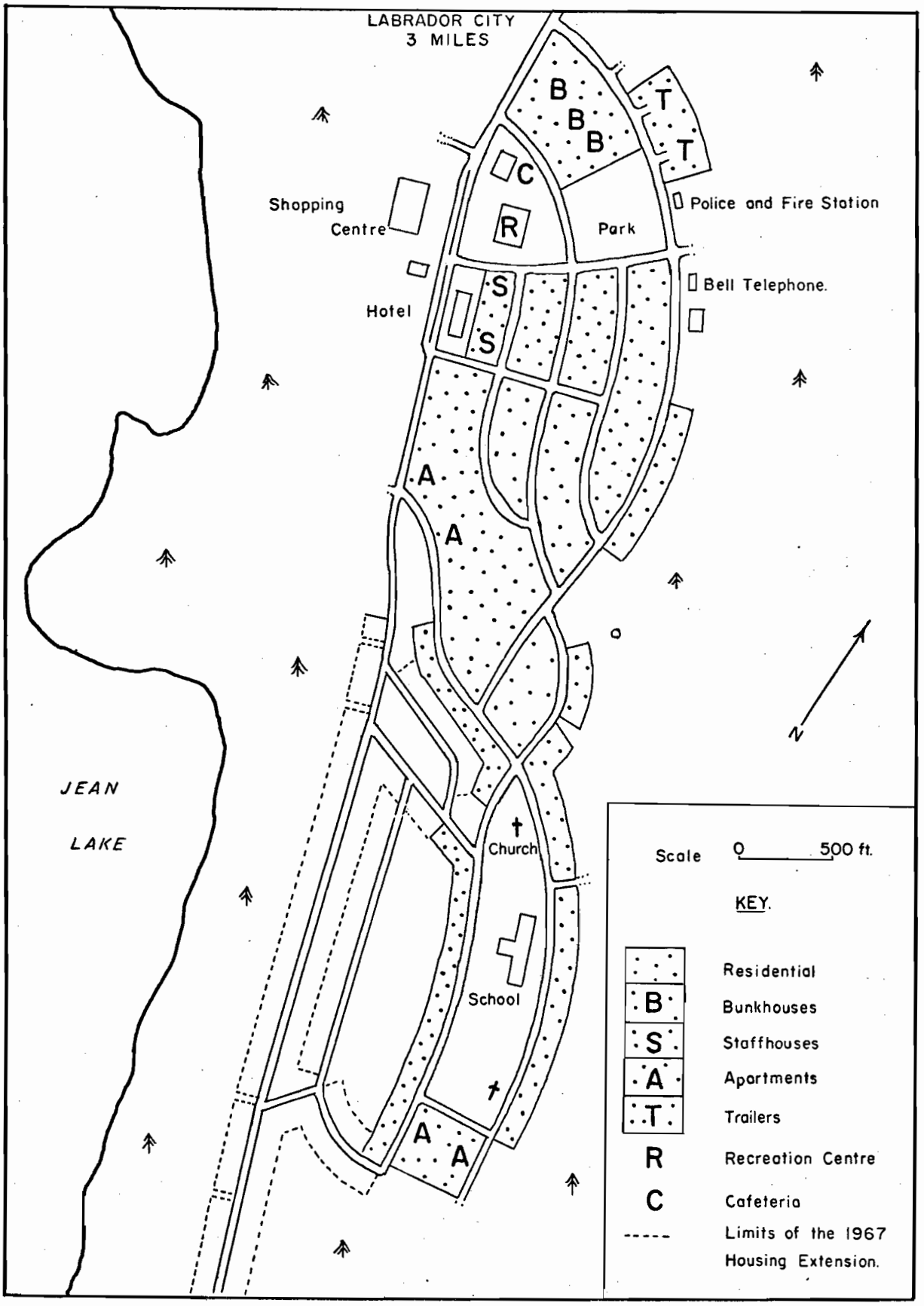


Photo. No. 25 Wabush, view from north west, shopping centre right, recreation and hotel centre, bunkhouses left (Wabush Mines photo)

Photo. No. 26 Wabush, view from south, school centre, mine area left centre, Labrador City in distance across Little Wabush Lake (Wabush Mines photo).

new lots and erected 100 single family homes. The remaining 40 lots were made available for private use, with Wabush mines loaning $2,000 for ten years at one percent to aid its employees who wished to build their own homes. No estimate of the success of this venture has been obtained. Wabush was incorporated as a Local Improvement District in April 1967 but in the summer of 1967 no local administration apart from the Wabush mines townsite office existed (85).

Wabush mines' labour force stood at 916 in July 1967 (86). No current figures were available on the origins of the force but in 1966 some 69% were Newfoundland-born and ten percent Québec. As in the case of I.O.C.C. the technical and supervisory staff show a smaller percentage of Newfoundland labour. The company was not able to provide a detailed breakdown of the origins of the force within the island of Newfoundland but the personnel supervisor had previously been in charge of the St. John's office and he claims the majority were from the outports on the eastern part of the island.

Turnover during 1966 was 5% per month, but the 1967 turnover was running at 3% per month in the period up to July, an equivalent figure to I.O.C.C.'s Carol operation. There are as usual wide departmental variations, with the mine department having the lowest turnover because of the higher pay, overtime opportunities, outdoor work and opportunities for advancement. The percentage of the labour force which is married is close to I.O.C.C.'s at Labrador City, i.e., 70%.

The first families arrived in 1962 and by July, 1967, with 405 families and 450 men in the bunkhouses the population was approaching the planned total of 3,000 (85). That a proportion of the men in bunkhouses are married is evident from the fact that married men make up 70% of the labour force but half of this force is living in the bunkhouses. When the housing expansion is finished there will be slightly over 500 families in the town.

The Wabush Mines annual payroll in Wabush is $9,000,000 so the opportunity for local service business has attracted a number of enterprises. The hotel, which also houses a bank, store, beauty shop, etc., was built in 1962 by M.C.N. Ltd., a company controlled by Crosbies of St. John's. Wabush Enterprises, another company controlled by Crosbies, built the shopping centre which now provides department stores, supermarket, post office, liquor store, drug store, etc. As in the case of Labrador City there have been no opportunities for small scale local businesses.

Wabush is able to receive the Labrador City television and radio services and the other recreation needs are met by the $1,000,000 recreation centre providing bowling, swimming, and theatre facilities. Although built by Wabush Mines it is now run by a no profit citizens association. The schooling provision in the townsite moved from the temporary to a more permanent form in 1964 with the completion of the local school, now run by the Newfoundland Department of Education with a local school board. The school is divided into two segments Catholic and Amalgamated Protestant, with commonly used facilities forming a third wing. Costs however are high reaching $700 per place for the 550 students.

The existence of the two separate towns in such close proximity obviously involves the costly duplication of services. This situation appears to be the result of a combination of decisions made at different company and government levels. I.O.C.C. actually began its townsite planning when Wabush Mines were still negotiating for market contracts. It made no provision for expansion beyond its own forecast needs. When Wabush Mines began construction they were unwilling to participate in a townsite whose planning was outside of their control and they therefore decided to build their own townsite. The complex task of planning and building a single centre for both operations was outside the experience of the provincial government and it did not enforce such a policy on the companies.

CHAPTER EIGHT: CONCLUSION

The Resource Frontier

The face of Québec-Labrador has been profoundly altered during the last 20 years by the investment of more than $1,000 million by the four mining companies. The difficulties imposed by the environment, the size of the area and its isolation, combined with the policies of the provincial governments have resulted in the development of this resource frontier by large companies. Only such large companies could afford the long term prospecting and the heavy pre-production expenditures.

The underlying factor in the timing of the developments in Québec-Labrador was the post-war search for a replacement for the Upper Lake direct shipping iron ores. Although the Knob Lake ores had long been known, they were only brought into production when the return on invested capitcal could be assured by the rising price of ore. The company structures reflect the needs of the U.S. steel industry and the fact that the North American ore trade has been a captive one. The markets guaranteed by this corporate structure enabled the capital costs to be met by a combination of loan capital (i.e., bonds) and the resource of the steel companies. The mining has always been a large scale,

highly mechanized and low unit cost operation favoured by large, easily mined, ore bodies.

Although the existence of the concentrating grade ores was known long before development their re-evaluation as a potential resource was a result of the same market forces. The U.S. steel industry in its constant drive for lower costs had stimulated the development of new techniques in ore preparation. The re-appraisal of ore resources consequent on this development of beneficiating technology increased the attractiveness of large deposits of low grade concentrating ores viz-a-viz the direct shipping ores.

The market for Québec-Labrador's iron ore is in the U.S. and Western Europe. The area is well located for both these markets and the development of winter navigation in the Gulf of the St. Lawrence and the construction of the St. Lawrence Seaway has aided the area's ores in a competitive market situation. The political stability of this area compared with some of its competitors in Africa and South America combined with the close corporate ties will ensure its survival.

The effect of the mining on the two provinces has been apparent at two levels, the provincial level through the tax and royalty income, and the local regional level through the provision of new employment. The companies directly employ approximately 8,000 men and in the actual mining centres the local population lies between three and four times the labour force total. In the regional service centre of Sept-Iles the multiplier is much more dramatic, it has grown from a fishing village of less than 1,000

to a city of 15,000 people in 18 years.

The resource frontier is therefore characterized by large companies, heavy investment and reliance on export markets, predominantly in the U.S. The future of Labrador-Ungava will lie with the exploitation of its minerals and power resources. The mineral developments are unpredictable and linked with world markets. The sulphide zone of the Labrador Trough and a zone along the Grenville Front inland from Makkovik, on the coast of Labrador, are the areas with most potential. Further iron ore developments are unlikely in the near future. The area's power resources are more predictable. The Manicouagan-Outardes project has been designed as an automated operation and once construction has finished very few men will be needed at the power sites. The Churchill Falls project will, on the other hand, require an eventual permanent labour force of 200 men and a community of 800.

The Communities

The communities needed to house the workers for these remote industrial operations presented a set of problems, which though not unique in their type, were in their size. Technically the compromises between mines, plants, transport facilities, ground conditions, aesthetics, etc., for the townsite locations were well made. The human problems of how to organize and administer the community, whether to rent or sell homes, what degree of private investment to encourage, etc., have been less readily solved.

The fundamental problem is the nature of the community itself as a housing facility for a single industry. The interest and expertise of the company lies in the field of mining, the townsite is a necessary evil and complication for the engineers. If its provision is left to chance and speculation the result is likely to be a poor physical and aesthetic quality and efficiency. The companies need as stable a labour force as possible as, if the turnover is high, the mining efficiency suffers. Experience has proved that married men are most stable and to hold these men there has to be a full range of housing, schooling and other services for their families.

In the case of Québec and Newfoundland there is government machinery to provide for establishing these communities. A fundamental problem, however, is their financing. The communities mushroom into full fledged urban form in a few years so the normal gradual provision of services is not applicable. The need is for large capital expenditures and long term planning at the beginning. In the case of these four towns they have been basically built as company towns under some government supervision as the company planned, built and operated the townsite. The later transfer of municipal government to the local inhabitants has then taken place with varied success and speed.

It is often assumed that these communities should as far as possible have the same local political arrangements as in the south. It is often assumed that they should be similar to the south in terms of a housing provision and design. These towns are however not normal, they are instantaneous creations, they house

a diverse migrant population, they are in the subarctic and they depend entirely on an export-oriented activity. What was required, therefore, was a different procedure for the establishing of these communities. This procedure does exist through the C.M.H.C. and the provincial governments but its enforcement is lacking. The company should not have to plan, build and organize the townsite, this should be done by a separate planning organization. The companies, who reap the benefits of non-involvement in another sphere of their employee's lives and whose needs caused the community to be built, should meet the costs. The needs of the pioneer towns also require special administrative arrangements in the transfer to local government, i.e., in eligibility for town councillors, etc. There is often an expensive duplication of services in the field of education such as the three school systems in Schefferville. The prime example of duplication is the separate existence of Labrador City and Wabush, a product of the lack of government policy and experience in the creation of a regional mining centre.

In connection with the physical planning all four towns are low density southern transplants into the subarctic. The later towns are visually more attractive and construction has destroyed far less of the original vegetation. The community centre concept of recreation, education and commercial services in the same building complex, (a complete adaption to the climate as is to be built at Churchill Falls) was never attempted.

The companies' efforts in physical planning were sound if not inspired. In all four cases sufficient flexibility to cope with such problems as diversification, population increases, squatters, trailers, etc., was not built into the plan or its administration. The real omission, however, was in the field of social and community planning. This was a result of firstly, a natural image and secondly, by a lack of any forecasts for the detailed population composition. It is hoped that the material presented in this research will help fill this latter gap.

Migration and Permanence

The northern resource frontier in Canada is a frontier of corporate affluence and opportunity. Unlike the past agricultural frontiers of the south and west, the role of the individual migrant here is without risk and with only limited personal participation. The pattern of migration into the Québec-Labrador area has to be seen in the context of the mining industry and in its regional setting. Mining characteristically has a high turnover and masculinity in its labour force and a specific range of skill requirements. The eastern Canadian setting, into which the iron ore mining was injected, had long established regional economic disparities and associated migratory trends. The development of iron ore mining provided a new focus for these trends.

The migrant moves to the Québec-Labrador area after an evaluation of the push and pull factors. The most important pull

factor is the high income to be gained by moving north. Other pull factors include the attractions of living in the area, the modern homes, schools, recreation facilities and the attractions of working for the mining companies who offer good working conditions, training, experience, promotion and,for many, permanence.

The actual decision to migrate, however, depends on the migrant's perception of these factors. The skilled technician and engineer is often more mobile than the semi-skilled worker. This is shown in the work force analyses. The perception of the push factors will vary with the group. In the case of the migrants from the South Shore-Gaspésie, Newfoundland and New Brunswick, these are very strong and must contribute to the preponderance of workers from these areas. The geographical and social proximity are also important.

In spite of its isolation, harsh climate and seasonal operation the Schefferville operation has evolved into a stable mining community. It is suggested that this is a consequence of firstly, the characteristics of the workers, i.e., their age and mental status, as the older and married men stay longest. Secondly, the origin of the worker is important; the close geographical and social proximity of the major source areas is a contributory factor in permanence. The size of the formative community is also important in the workers perception and evaluation of the mining town, the workers from rural areas and small urban centres adapting best. Thirdly, the provision of amenities in the northern town, ranging from housing provision to recreation

facilities is a contributory factor. The company financial benefits, training and promotion are also significant in lowering turnovers and increasing stability. The perception and evaluation of these factors will vary with the education and skill levels of the migrant.

In the case of the other communities the shorter period of operation and the lack of such complete labour force data made the drawing of conclusions difficult. It will, however, be interesting to see if the privately-owned housing in Labrador City, combined with its larger size and all-year operation, will result in comparative stability or whether the different origins of its labour force will affect the permanence.

This picture of the development of the mining communities in Québec-Labrador has been presented in an attempt to place on record their experiences in the realms of physical planning in labour force and in population growth. As the future of Canada's Middle North depends on the exploitation of non-renewable resources the creation of such new small communities will be a continuing trend. It is hoped that the information presented here has contributed to an understanding of the creation and operation of the communities and increased knowledge of the characteristics of their population.

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APPENDIX

CLIMATOLOGICAL SUMMARY FOR SCHEFFERVILLE

Month	Mean Temp.	Extreme Temps.	Snow (ins)	Rain (ins)	Days with Precip.	Hours Sun	Av. Wind Speed (mph)
Jan.	- 6.9	40-55	17.5	.13	16	76	10.7
Feb.	- 5.5	38-49	12.0	.02	13	117	10.3
Mar.	5.4	42-49	11.7	.07	13	157	10.7
April	19.9	49-25	11.7	.13	11	177	10.3
May	33.1	76- 4	11.0	1.00	15	161	10.8
June	46.8	82-18	2.5	3.25	16	190	10.5
July	54.2	84-32	TR	3.56	17	176	10.2
Aug.	51.2	79-30	.9	4.15	20	145	10.4
Sept.	41.6	80-21	9.0	2.50	19	94	12.1
Oct.	29.9	65- 4	13.0	1.22	18	63	11.8
Nov.	16.5	46-28	21.9	.33	19	43	11.2
Dec.	- 1.5	41-43	16.0	.07	16	62	10.9
YEAR	23.7	84-55	127.2	16.43	193	1,467	10.8

(Source: Summary of 1955-1966 records of the Knob Lake (A) weather station operated by M.S.A.R.L.)