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Title of Thesis/Project/Extended Essay

"Northern Development and National Defence: The establishment
of the DEWLINE in the Canadian North."

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14th April 1980

(date)
ABSTRACT

The establishment of the Distant Early Warning Line of radar stations (the DEWline) in Canada gave a tremendous impetus to the development of northern transportation and communications, and in effect resulted in the opening up of the Canadian North. The impact on local lifestyles and culture was profound. In this thesis, the relationship between the establishment of the DEWline, and the concomitant development of transportation and communications will be examined. The effects of the DEWline on the culture, lifestyles, and the future of the Northern Inuit will also be discussed.

In Part One, this thesis examines the manner in which the DEWline came into being, starting with the historical background of joint United States and Canadian defence co-operation initiated during the early stages of World War II and exemplified by such projects as the Northeast and Northwest Air Staging Routes, Canol, the Alaska Highway, and later by the Joint Arctic Weather Stations. From such experiences and continued post-war co-operation with the United States, it is argued that Canada was able to negotiate a highly advantageous DEWline Agreement in 1954 - document that ensured not only Canadian participation in the project, but also guaranteed Canadian sovereignty over the entire Arctic Archipelago. Part One of the Thesis traces the history of DEWline development up to 1955.

Part Two of the thesis documents the construction phase of the DEWline in Canada and illustrates the significance of the project for arctic transportation, engineering, and northern development. The thesis also provides a summary of the benefits DEWline stations and the System in general afforded to the settlements in the Arctic and the Canadian North.
In Part Three, the political, economic, and social aspects of the DEWline are examined, and the importance of the DEWline is considered with respect to Canadian sovereignty in the North, the impetus the DEWline gave to northern development, and the part the DEWline played in the formulation of the Department of Northern Affairs and National Resources. The manner in which the DEWline was treated by both the Canadian Press and the Canadian government of the day is also discussed.

The thesis examines the impact of wage labour provided by the DEWline for the Inuit, the effects of the DEWline on labour legislation in the Canadian North, and labour relations along the DEWline during its twenty-five years of existence. The consequences of the establishment of the DEWline and its continued presence in the North are also considered with respect to the changes that it brought about among the Inuit, particularly in terms of demography and the growth of settlements in the Canadian Arctic.

Finally, the thesis explores the overall effects of the DEWline on the Inuit and the North in general. It is argued that there are growing problems in the region to which the DEWline has undoubtedly contributed, but it is suggested that the DEWline came into being at a fortuitous time. For all its various drawbacks, the rapid changes precipitated by the DEWline may in the end prove to be beneficial by accelerating the painful and destructive process of acculturation to the point where the Inuit are capable of taking a unified stand regarding the development of their territories.
The question whether the DEW Line will serve any useful military purpose has still to be answered, but there is no doubt that it will have a profound and lasting effect on the Arctic. The main impact will be felt through improved transportation facilities. To this practically inaccessible area it is bringing dozens of new airfields, regular aircraft service, and vastly improved water-transport. These facilities will make fresh food, mail, and regular changes of personnel everyday phenomena. They will also mean that teachers, doctors, traders, missionaries, and government administrators will be able to move with greater ease than was dreamed possible five years ago. They may even mean minerals, the one natural resource that seems capable of development, will be exploited.

Inevitably, the lives of most of the Eskimos in the region will be drastically altered.... The DEW Line is accelerating this change in the Eskimos' way of life but it is not responsible for initiating it. For the past ten years increasing population and decreasing game-resources in the Arctic have forced a trend to greater and greater dependence on wage-employment. The new pattern of life will bring with it an era of material prosperity with both the benefits and the temptations that this implies. The adjustment will not be easy but with reasonable controls and guidance there is no reason why the DEW Line should not be a boon to the Arctic even if it does not prove to be a shield for the rest of North America.

-------- C.J. Marshall, 1957
I should like to express my gratitude to Professor Liora Salter (Senior Thesis Supervisor), Professor Paul Heyer (Thesis Committee Member), and Pamela Parford (Departmental Assistant) of the Department of Communication at Simon Fraser University for the help, guidance, and encouragement provided during the preparation of this work.

I wish also to thank Mr. Doug Tait and members of the Graphics Section of the Audio-Visual Department at Simon Fraser University for the use of their facilities and their advice for the preparation of maps used in this thesis.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE PAGE</td>
<td>(i)</td>
</tr>
<tr>
<td>APPROVAL PAGE</td>
<td>(ii)</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>(iii)</td>
</tr>
<tr>
<td>QUOTATION</td>
<td>(v)</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>(vi)</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>(vii)</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>(x)</td>
</tr>
<tr>
<td>LIST OF MAPS</td>
<td>(xi)</td>
</tr>
<tr>
<td>PREFACE</td>
<td>(xii)</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Methodology</td>
<td>1</td>
</tr>
<tr>
<td>Limitations</td>
<td>5</td>
</tr>
<tr>
<td>Materials and Data</td>
<td>5</td>
</tr>
<tr>
<td>Setting the Scene</td>
<td>7</td>
</tr>
<tr>
<td>The Changing Canadian North</td>
<td>12</td>
</tr>
</tbody>
</table>

PART ONE
THE DEWLINE AGREEMENT: POLITICAL ANTECEDENTS AND CONSEQUENCES

CHAPTER
I. THE OGDENSBURG AGREEMENT AND THE PERMANENT JOINT BOARD ON DEFENCE 18
II. THE ESTABLISHMENT OF U.S. BASES IN NEWFOUNDLAND AND GREENLAND 25
   Newfoundland                                  25
   Greenland                                      30
III. THE ESTABLISHMENT OF U.S. BASES IN CANADA, LABRADOR, AND GOOSE BAY 36
    Goose Bay                                     36
    The North-East Staging Route                  36
    The CRIMSON Project and the Crystal Weather Stations 37
IV. WARTIME ACTIVITIES IN THE NORTH-WEST 41
   The North-West Staging Route                  44
   The CANOL Project and the Mackenzie Air Route  46
   The Alaska Highway (ALCAN)                     47
   The Cost of Military Collaboration            51
## Chapter V
Wartime Communications and Weather Services in the North

- The Joint Canadian/United States Weather Stations in the North... 60

## Chapter VI
The DEWline Agreement

- The Distant Early Warning Line ......................... 65
- The Mid-Canada-Line ...................................... 74
- The DEWline Decision ..................................... 78
- The DEWline Agreement .................................... 79

### PART TWO
DEWline Construction and Aftermath

## Chapter VII
DEWline Siting and Surveys in Canada

- DEWline Surveys and Construction Problems in Canada .... 86
- Construction and Engineering .............................. 93
- Arctic Transportation and Supply ......................... 96

## Chapter VIII
DEWline Communications

- Tropospheric Scatter Communications ...................... 103
- The Upgrading of DEWline Communications ................. 104

## Chapter IX
Civilian Use of the DEWline System

- Ancilliary DEWline Communications ....................... 118
- VHF, UHF, and HF Air-to-Ground Communications .......... 119
- HF Disaster and Emergency Communications ............... 119
- The Benefits of DEWline Ancilliary Communications ...... 119

## Chapter X
The DEWline and Arctic Meteorology

- The DEWline Impetus ....................................... 122
- The DEWline Contribution to Meteorology in the North 122

### PART THREE
Political and Socio-Economic Aspects of the Establishment of the DEWline in the Canadian North

## Chapter XI
The Nearing North: Political Awareness and Preparation for Change

- Early Warning from the North .............................. 127
- Defence and/or Deterrence ................................ 137

## Chapter XII
Northern Defence and Northern Affairs

- Preparations for the DEWline Era .......................... 144
- The DEWline and the Establishment of the Department of Northern Affairs and National Resources .... 146
LIST OF TABLES AND FIGURES

TABLES

Table No.1: Subsistence Activities According to Latitude ........ 10
Table No.2: Evaluation of Different Possible Radio Circuits in the Arctic ........ 112
Table No.3: DEWline Low Frequency Radio Beacons in Canada ........ 120

FIGURES

Figure No.1: PROJECT SURESTOP: DEWline Communications Upgrade .......... 106
Figure No.2: Communications Needs and Determinants in the Arctic .......... 115
LIST OF MAPS

Map No. 1: North American Air Defence in the Early 1960's ........ 16
Map No. 2: The Northeast Staging and CRIMSON Routes ............... 34
Map No. 3: The Northwest Staging and Mackenzie Routes ............ 45
Map No. 4: The Northwest Staging Route and Alcan .................. 50
Map No. 5: Arctic Weather Stations in Canada to 1948 ............... 59
Map No. 6: The Joint Arctic Weather Stations ....................... 63
Map No. 7: North American Air Defence in the 1960's ............... 68
Map No. 8: DEWline Stations in Canada, 1957-1963 .................. 83
Map No. 9: Geographical Design Determinants, Northern Canada .. 85
Map No.10: DEWline Transportation Routes, 1957 ..................... 99
Map No.11: Settlement and Transportation, Western Canadian Arctic .. 101
Map No.12: Tropospheric Scatter Systems in North America, 1966 .... 107
Map No.13: Eskimo "relocation" in Northern Canada, 1934-1947 ... 157
Map No.14: The DEWline and Demographic Change in the Arctic ...... 209
The present thesis owes its origins to the experiences and impressions I gained during approximately ten years employment on various communications systems in the Canadian Arctic between 1962 and 1977.

During this interval of time I was employed at a number of locations in the North - the east and west coasts of Hudson Bay, on the north-eastern coast of Labrador, on the Yukon coast, along the Northwest Territories coastline, and among the islands of the Arctic Archipelago.

Although my background was initially purely technical as far as communications in the North was concerned, the implications of modern technology on these regions and the people living there (both Indian and Inuit\(^1\)) could not fail to register and prompt an interest. I was first at Great Whale River on the south-east shores of Hudson Bay in 1962, and invariably noticed that the mixed community of Eskimos and Indians was divided; that the Indians received less employment opportunities, and that the busy Mid-Canada-Line Main station at that location was an enigma and a clash between the old and the new. Here the Eskimos and Indians still lived mainly by traditional subsistence methods, but the population was large and the availability of game low.\(^2\)

At Great Whale River at this time, while twin-rotor helicopters roared off to remote stations of the Mid-Canada-Line, the Eskimos and the Indians still collected their winter firewood by dog-sled some four miles from the settlement, and when it was necessary to shoot some 200 dogs because of

\(^1\)Although Inuit is the accepted modern usage, the term Eskimo will be used in the present work because the overwhelming majority of references make use of the latter rather than the former.

\(^2\)To the point where Indian hunters flew inland by bush planes over 100 miles to hunt caribou in 1963 (personal observation)
rabies in 1963, the whole base turned out with tracked vehicles, power saws, and much enthusiasm to provide sufficient wood in a single day to fill the entire settlement's requirements for the remaining months of the winter. It is doubtful whether the dog population ever recovered; neither perhaps did the locals from such displays of modern technology. The Indians living near the Mid-Canada-Line base across Hudson Bay at Winisk (Northern Ontario) were affected somewhat less severely, but both these locations were unfortunately to experience "boom and bust" conditions arising from such military projects when the Mid-Canada-Line closed abruptly in 1965 and vanished from the scene almost as fast as it had appeared.

The impact of such projects was possibly even more severe further north along the Distant Early Warning Line (the DEWline) where changes were also taking place with great swiftness. This system lay in a remote area above the Arctic Circle that even in the mid-1960's required a non-stop flight of nine and a half hours (in four-engined aircraft such as the DC-4) from Winnipeg to the nearest DEWline Main station at Cambridge Bay. Leaving Winnipeg in mid-December for the DEWline meant spiralling into the darkness of the polar night, and in all likelihood, not seeing the sun again for weeks.

By 1972, things had changed, with a swift three and a half hour trip in a smartly decorated Boeing 737 jet (complete with Eskimo art adorning the interior) on the same route. Similarly along the DEWline itself, where turbo-propeller transports had replaced the aging and venerable DC-3's and C-46's more changes were evident, while the DEWline itself was to remain in operation for the best part of two and a half decades. I was on the DEWline in the Yukon when the Prudhoe Bay discovery in Alaska was made, and I saw
the increase in activity that accompanied this find in the Canadian North, including the setting up of a base of operations by exploration crews at the DEWline station at Shingle Point in 1968-69. Later (1969) I was at Cape Parry when the S.S. Manhattan made its epic voyage through the Northwest Passage, and during the massive airlift of oil rigs and supplies into the High Arctic from Norman Wells to Rae Point and the Arctic Islands.

Some years later (in 1973) a return to the DEWline and a stay at the DEWline station at Shepherd Bay in the Central Arctic coincided with the use of that station by a Canadian photo-survey aircraft determining a route for a gas pipeline down Boothia Peninsula. Once again in 1976 and at a DEWline station near Cambridge Bay further changes were evident, such as the regular jet flights carried out by Pacific Western Airlines into the High Arctic and the ferrying of exploration crews into the Far North from Edmonton almost on a weekly basis. Things had changed visibly in less than a decade, and yet this was only a small part of the overall picture of the changing Canadian North.

A personal opinion that the DEWline itself may have played a major role in bringing about such changes resulted in the following thesis, which examines the establishment, construction, and operation of the DEWline in the arctic regions of Canada. It is claimed that the effects of the DEWline on the Canadian North were profound, and that among the other changes that the project brought about was an acceleration of the process of urbanisation¹ and indeed the opening up of the North in general.

¹For the purposes of this thesis, "urbanisation" will be considered to be that process associated with a movement off the land and the taking up of an urban lifestyle.
INTRODUCTION

The present thesis is concerned with the effects of the DEWline on the Canadian North and the factors that were instrumental in its establishment in Canada. The DEWline, it will be argued, was perhaps the single most important factor in opening up the Canadian North and finalizing the process of urbanisation in the northern regions, particularly across the Arctic Archipelago.

Methodology

The thesis examines in Part One the historical background of the establishment of military transportation and communications routes in the Canadian North, and those alliances, imperatives, and agreements made with the United States that led ultimately to the construction of the DEWline across Canada's Arctic during the mid 1950's.

Starting from the time of the Ogdensburg Agreement reached between the two countries and the establishment of a Permanent Joint Board on Defence in 1940, the thesis considers the manner in which U.S. military bases were obtained in Newfoundland, Labrador, and Greenland during the early years of the war, and the implications for Canada of the establishment of major transportation routes in the eastern arctic during this period.

In addition, the effects of various wartime ventures carried out by the United States and Canada in the western regions are also considered, particularly the wartime construction of air and land routes across Canada to Alaska such as the Northwest Air Route and the Alaska Highway. Further military projects in the west, such as the Mackenzie River Air route and the Canol Pipeline are also treated, and the value of the wartime endeavours
is considered with respect to northern development and problems (such as costs and sovereignty) arising out of the adoption of a mutual defence alignment with the United States.

Finally, Part One deals with post-war defence co-operation between the United States and Canada and further activities in the North leading to the agreement to establish the Distant Early Warning Line across Canadian territory. The manner in which the DEWline Agreement came into being is discussed and the details are examined in terms of their significance with respect to Canadian sovereignty, industry, autonomy, and the protection that the various clauses of the agreement provided for the Inuit and the Canadian North in general.

In Part Two, the thesis describes the initial difficulties and problems encountered with the planning and construction phases of the DEWline in Canada during the period 1953-1957. In particular, the value of the DEWline to Canada is considered with respect to DEWline related mapping, surveying, and hydrographic work carried out across the entire Canadian Arctic and the considerable upgrading in knowledge that resulted. Further benefits of the DEWline construction stage are described, such as the pioneering and establishment of major sea and air transportation routes into and across the arctic.

The overall effect of the requirements of the DEWline airlift that took place during the construction of the DEWline is considered in terms of its value to Canadian Air Carriers that participated, while the improvements in northern aviation in general are also taken into account. The continued use of the new air routes (both into the Arctic and across it) is noted, and the value of the DEWline to the North is given in terms of its contribution to northern aviation, communications, meteorology, and general access to the
northern regions.

In Part Three the thesis deals with political, economic, and social aspects of the establishment of the DEWline in Canada. The political background to the DEWline Agreement is examined, as is the reception the project received by the Canadian Press and Canadian government of the day. The importance of the DEWline to Canada is seen in the impetus it gave to government activities in the North during the early 1950's, and the relationship between the coming of the DEWline and the formulation of the Department of Northern Affairs and National Resources is explored.

The question of Canadian sovereignty in the Far North is examined from a historical perspective, and the value of the DEWline Agreement is considered in terms of the establishment of full Canadian sovereignty across the Arctic Archipelago in 1954. Further questions involving sovereignty are examined with respect to complications arising out of the joint nature of the DEWline operation, and difficulties associated with security clearances and access to DEWline stations in Canada are noted.

The thesis also considers the awareness and preparations made by the Canadian government for the coming of the DEWline to Arctic Canada, and notes the various steps taken to deal with potential problems that the DEWline might bring to the North. In particular, the attempts made to safeguard the Inuit and also allow them to participate in the construction and operational phases of the DEWline are discussed. The activities of the Northern Service Officers and the Department of Northern Affairs are recognized, and the effects of DEWline employment on both the Inuit and northern labour legislation is also treated, including the formation of fully fledged union (I.B.E.W. local 2085) on the DEWline in 1963.
Lastly, the thesis examines the overall effect of the DEWline in terms of the lifestyle it presented and the changes that it brought to the Far North. It is argued that the DEWline came at a critical time for the North - a time when fur prices were low, when game resources were dwindling, the population rising, and an irrevocable movement off the land was taking hold. The DEWline was not responsible for the trend towards urbanisation in the North, but it undoubtedly hastened the process by drawing Inuit from many outlying areas to work on the DEWline during and after the construction phase. The DEWline, it is suggested, was instrumental in establishing new arctic settlements (at Tuktoyaktuk and Broughton Island) and also played a major role in other regions, such as the Cambridge Bay and Hall Beach areas.

The magnitude of the changes brought by the DEWline and the difficulties that arose as a result are not ignored. The psychological and social consequences of the DEWline are noted, and the current situation in the North is weighed against the inevitability of southern intrusions in the region. Although the DEWline was responsible in some respects, the very rapidity of the changes it brought are seem in a more positive light. The new lifestyle associated with the DEWline is seen as beneficial in so much as it may have acted to unify the Inuit and other northerners prior to the era of extensive mineral and oil exploration in the North rather than afterwards, when in all likelihood it would have been too late to adopt a common stand.

The DEWline is thus seen to have been a many faceted operation, involving the establishment of Canadian sovereignty in the North, the growth of major air and sea transportation routes, the establishment of urban lifestyles, and the final opening up of North itself.
Limitations

There are three basic limitations to the present thesis. Firstly, the DEWline is an integral system extending across Alaska, Canada, and Greenland. The present thesis is limited to the effects of the establishment of the DEWline in the Canadian context alone, and does not deal with the other two regions.

Secondly, the DEWline is still in operation as part of North American Air Defence, requiring that all data used in this thesis be obtainable from previously cleared publications and sources to avoid infringements on national security and the disclosure of unauthorised data.

Thirdly, although the DEWline has been in existence for two and a half decades, the bulk of published data concerns the earlier part of the DEWline era rather than the latter. As a result, published material for the second decade is somewhat sparse, and the earlier material is somewhat out of date in some instances - an unavoidable situation arising from limitation two above.

Material and Data

The material for the historical background of joint U.S./Canadian activities in the North has been taken from U.S. and Canadian military historians to give a balanced approach. Data for the post-war period has been gleaned from a similar distribution, while greater use has been made of Canadian journals where activities of Canadian concerns predominate.

Personal experience on the DEWline itself from 1967 onwards has been useful in providing a time scale and a knowledge of both technical and non-technical aspects of the DEWline in Canada. Participation in the operation and maintenance of the DEWline system was also valuable in terms
transportation, meteorology, and communications, while the collection of data associated with northern aviation was further facilitated by the operational use of various Transport Canada publications and procedures.
Setting the Scene

The establishment of the Distant Early Warning Line of radar stations (the DEWline) across the arctic regions of North America in the mid 1950's brought with it a clash of lifestyles that in a sense represented completely opposing extremes of human social organization. Although totally incidental to its primary purpose, the construction of the DEWline in the North took place en masse across one of the few remaining areas of the world where the hunting lifestyle, while diminishing and changing, still persisted. Here in a remote arctic setting, the old and the new came fact to face in one of the most inhospitable regions on earth, where the hunters had nevertheless managed to maintain a precarious but enduring existence in spite of growing influences from the South.

The coming of the DEWline, although undoubtedly a strong accelerating force to the process of acculturation, was however only one of a number of recent intrusions into the northern regions. As such the DEWline played an important, but nonetheless continuing role in a process of change that had started with the early Voyages of Discovery and had continued with the advent of arctic whaling and trapping, the coming of traders and missionaries, and the establishment of government agencies in the North. Nevertheless, the DEWline's role was crucial, and it might even be argued that the DEWline was in fact one of the major influences in the recent and rapid movement of native peoples off the land into the growing urban centers of the Canadian Arctic.

Whether this was to Canada's advantage or disadvantage, is however, tied to a more general and complex issue, for while I would argue that the northward march of civilisation may have been inevitable, the question of the

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1In the present context, hunting includes fishing and trapping, but not gathering.
desirability of large urban centers in the Far North, particularly in the Arctic Archipelago, poses a number of difficulties that even the arctic explorer and enthusiast, Vilhjalmur Stefansson had failed to understand. Even though Stefansson's predictions made in 1922 concerning the use of Great Circle air routes and submarine transportation in the Arctic were prophetic, his wholehearted enthusiasm for northern development was perhaps entirely misplaced. While Stefansson was to state emphatically that: "the main obstacle to development in the North is ignorance, or rather positive misknowledge - belief in difficulties that do not exist," he for his own part failed to focus his attention sufficiently on what has perhaps constituted an underlying problem in the North, that of the relationship between subsistence and energy.

The assumption that northern development would merely take the form of its southern counterpart ignores the fact that the arctic regions have a limited capacity to provide a subsistence base, and further that transportation into the North is difficult, costly, and cannot be accomplished without a prohibitive expenditure of energy. At present, only in the Mackenzie Valley is there even the possibility of year round transportation into the Arctic other than by air, while distribution across the Arctic still presents a formidable problem, even in summer. Moreover, a large part of the Arctic can only be reached on a year round basis by aircraft, while the summer shipping season is both short (approximately two months) and hazardous.

Given the inhospitable climate, vast distances, and the very limited

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3 Ibid., p.208,
subsistence base of the Arctic, the region (not surprisingly) was somewhat neglected prior to the turn of the present century, although sporadic contact had occurred since the time of the early voyages of discovery in search of the Northwest Passage. Before the end of the 19th Century whaling fleets had entered both eastern and western arctic waters, and additional contact with the South had resulted from the growth of the Fur Trade in the northern regions.

Although contact with the South was relatively limited in the more northerly areas, its effects were nevertheless pronounced, for the introduction of modern technology (particularly firearms), trapping, and a growing trend towards a partial wage economy brought with it a number of problems. In particular, the time honoured and relatively stable (if harsh) lifestyle of the northern hunters began to give way to increasing urbanization. Unfortunately, while such changes have occurred on a world-wide basis, the situation in Canadian North was both extreme and fraught with potential difficulties.

In addition to the effects of climate and distance, the relatively severe and confining limitations of the arctic environment have meant that little further intrusion into the North could be carried out without upsetting the ecological balance established by the indigenous hunters. Although the term "hunter" has come to embrace a variety of subsistence activities, including (and often predominated by ) gathering, in the arctic context, hunting was the prime subsistence base as indicated in a recent survey of subsistence activities grouped according to latitude by Richard B.Lee:

Table 1: Subsistence Activities According to Latitude

<table>
<thead>
<tr>
<th>Degrees from the Equator</th>
<th>Gathering</th>
<th>Hunting</th>
<th>Fishing</th>
<th>Total</th>
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<tr>
<td>More than 60°</td>
<td>---</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>50° - 59°</td>
<td>---</td>
<td>1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>40° - 49°</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>30° - 39°</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>20° - 29°</td>
<td>7</td>
<td>---</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>10° - 19°</td>
<td>5</td>
<td>---</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>0° - 9°</td>
<td>4</td>
<td>1</td>
<td>---</td>
<td>5</td>
</tr>
</tbody>
</table>

World 29 11 18 58

Significantly, the arctic hunters (i.e., those north of 60° latitude) relied entirely on hunting and fishing for their subsistence, and in pursuit of this lifestyle they maintained a seasonal mobility that permitted them to live off the land in small and relatively stable social units. The self-reliance and self-sufficiency of the northern hunters was based on known and workable subsistence methods, and as Abe Okpik, in giving the Eskimo viewpoint on the effects of urbanization in the North points out:⁵

Each individual with his family was the breadwinner for his family and sometimes for other unfortunate ones. Sometimes two or three or more families agreed to stay together to hunt and trap in the same area providing that the surrounding country was economically sound. The people did not dwell in the settlements simply because, in times past, the resources did not allow. So, people in the north never lived together in one place at all times, because the situation did not allow it.

The question of whether the situation at present in the North does or does not allow for urbanization, is unfortunately, merely academic, for along with the establishment of urban lifestyles in the North has come an attendant increase

in population and an irrevocable swing away from traditional subsistence methods.

The effects of such changes on the northern hunter are movingly described by Abe Okpik, who comments:

Once an individual hunter who still thinks as a hunter is absorbed, even without his awareness of it, he loses control of his hunting equipment: his dogs, boats, canoes, traps which were at one time his vital possessions for living off the country. He gives this a thought and soon the whole thing flows over: "I'll be alright." So therefore his beginnings are left in the mist, and this new life starts eruption. At first he is without bewilderment but then his first wages are earned, and more and more necessities are required to settle the mind. Now, the ideal life is a mystery to him. In his own opinion the whole dream will be over when he gets out on the land again. Then the expectation of this dream is not fulfilled; it materializes into the facts of a new way of life. This gives him no point of return, and he loses all livelihood since his life possessions are now gone. As time carries on, he is watching for an opportunity to go somewhere. But where?

Unfortunately, for the northern hunter there is essentially nowhere left to go. They and their territories have been bracketed by the DEWline and more northerly mineral and oil exploration on one hand, and the northward march of urbanization on the other. This turn of events, although unfortunate in its way is hardly new, and in sense represents a near completion of a process that started thousands of years earlier with the rise of civilisation in the Fertile Crescent.

The beginnings of modern civilisation in the river valleys of the Nile, Tigris and Euphrates, and the Indus have given rise to a remorseless encroachment on the territories of the hunters throughout the world. The rise of intensive agriculture, industry and increasing urbanization have seen the few remaining outposts of the hunters reduced to a handful of regions that are basically inhospitable and of little known or envisaged economic worth. Thus it is largely in such remote areas such as the Western Desert of Australia, 

\[\text{\textsuperscript{6}Ibid., p.49.}\]
Kalahari, and the Northern Polar Regions that pockets of the few remaining hunters still exist, although even in the latter region rapid changes have been well under way for some time.

The Changing Canadian North

The process of change and assimilation in the North has in general followed an often repeated pattern. First, contact (often incidental) as a result of voyages of discovery seeking new trade routes and new lands; second, a closer contact arising out of trade in local resources followed by some form of administration; and third, exploration and exploitation of sub-surface resources occurring in the region. In the Canadian North, however, an important and additional event took place between the second and the third stages, the establishment of the Distant Early Warning Line.

While military expeditions have historically played their various roles in expansion and assimilation, in the more modern context military projects have generally been somewhat short-lived and of the "boom-and-bust" variety. Moreover, they have largely resulted from the imperatives of wartime activity that fluctuated and changed with the directions taken by the conflict. After the final cessation of hostilities military activities have usually decreased as tensions between nations lessened. In the years following World War II a different situation prevailed and improvements in weapons technology and the Cold War between the East and the West precipitated an unprecedented increase in peacetime military production and deployment.

Largely as a result of the devastating capabilities of nuclear weaponry and the proven utilisation of the long-range aircraft as a means of delivery, the threat of an airborne attack on the continent of North America had been a
growing concern that had become acute following the detonation by the Soviets of a thermo-nuclear weapon in 1953. In response to this latest development and also the increasing speed of the manned nuclear bomber, the need for adequate warning of any impending air attack via the polar route became both urgent and immediate. Thus in addition to the first line of defence provided by the Pinetree Line of radar warning and control stations running along the U.S./Canadian border, two further warning systems situated progressively farther north were hastily constructed in the mid 1950's.

The first, situated in the Canadian sub-arctic and generally along the 55th Parallel was a doppler detection system giving blanket coverage (against aircraft) that stretched from Hopedale (Labrador) in the east, to Dawson Creek (British Columbia) in the west. This system - designed, built, operated, and paid for entirely by Canada - was known as the Mid-Canada-Line, or: McGill Fence (after its designers) and functioned from the time it became operational in 1957 until the mid 1960s as part of Canada's contribution to North American Air Defence.

The second system, situated some 400-500 miles further north than the Mid-Canada-Line, was located roughly along the Arctic Circle and ran continuously across the top of Alaska and the arctic regions of Canada. This latter system - the Distant Early Warning Line, or DEWline, as it was subsequently to be known - was perhaps one of the most massive peacetime operations ever to be attempted, and unlike the Mid-Canada-Line, it was also to be a durable and long-lived project. Since the time of its construction phase started in 1955 the DEWline has in fact remained continuously in operation, and still flourishes in the North at the present time after an interval of almost a quarter of a century.

The primary reason for the construction of the early warning systems had originally stemmed from the need to give adequate warning of air attack from
over the Pole, but the continuing advances in weapons technology and means of delivery were soon to alter the overall picture of continental defence. The warning time originally estimated by the DEWline planners at the time of its inception in 1952, of approximately 4-6 hours, had by 1956 been reduced to some two hours, and by the time that the DEWline became operational in 1957, the warning time had been cut to a mere 100 minutes. In addition to the improvements in the manned bomber, however, came an even more radical change and the advent of the Inter Continental Ballistic Missile, against which the DEWlines (and all conventional radars for that matter) were totally ineffective.

This new development did not render the DEWline completely obsolete, for the manned bomber threat still remained, and the construction of new facilities in the North in response to the threat of the Inter Continental Ballistic Missile (ICBM) gave further importance and use for the DEWline's communications system. Moreover, while the location of the DEWline along the Arctic Circle was nominally intended to provide warning against air attack and to alert air defences in the South, its total function must be viewed from a somewhat wider perspective.

Even by the time of the inception of the distant early warning concept, it was becoming increasingly apparent that there could be no absolute defence against an all-out nuclear attack, and thus both defence and the status quo were becoming dependent on the threat of retaliation in kind rather than on defensive measures per se. In this sense the defensive nature of the various

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detection systems had become an integral part of offensive strategy, while effective deterrence, as P. Williams has pointed out, requires clearly defined boundaries, reliable communication, and credibility of response to the detection of transgressions or threats.

From this viewpoint the construction of the DEWline along the Arctic Circle, in addition to its early warning function, also provided a recognizable boundary, a military presence of sorts, and a warning voice across the northernmost reaches of the North American continent. To this situation however, must be added the further construction from 1960 onward, of the Ballistic Missile Early Warning System (BMEWS) with two of its three main locations in arctic Alaska and Greenland. Thus in the overall picture of North American Air Defence in the 1960's, as illustrated in Map No.1, the DEWline was still an integral part of a large complex of detection networks and communications systems, even though the threat of the manned nuclear bomber was no longer of primary importance.

The DEWline, as mentioned earlier, was not confined to the Canadian North alone, but extended continuously from the Aleutians in the west, across Alaska and Northern Canada, and by 1965 had been further extended to the east coast of Greenland. This wide-ranging network of radar installations, with its attendant communications and support facilities, was erected with great rapidity and at enormous cost borne by the United States alone. The Canadian section of the DEWline was nonetheless subject to considerable input and control by

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10 P. Williams, Contemporary Strategy: Theories and Policies (London: Cromm Helm, 1975), pp.70-76.
11 Estimated to be $600,000,000 (E.J. Dosman, The Arctic in Question, Toronto: Oxford University Press, 1976, p.26.)
Map No. 1:
North American Air Defence in the early 1960's
(after Englehardt, 1966)
Canadian authorities to the extent that Canada benefitted from the DEWline construction phase alone to the tune of $310,000,000. In addition, the operating costs for the DEWline in Canada were borne entirely by the United States, while the manning of the Canadian portion of the system has been predominantly Canadian (over 90 per cent).

The main reason why Canada benefitted so handsomely from this project can be found in the terms of the DEWline Agreement between Canada and the United States governing the establishment of the DEWline across Canadian territory. Because of the unique nature of this agreement and its many consequences for Canada, the events leading up to its acceptance by both parties are worthy of further consideration and analysis, starting with the historical background to joint Canadian and United States military alliances forged during the early years of World War Two.

CHAPTER I
The Ogdensburg Agreement and the Permanent Joint Board on Defence

The formal basis for the mutual defence of the North American continent by Canada and the United States is generally acknowledged to have had its modern origins in the Ogdensburg Agreement reached between the two countries on August 17, 1940. The primary result of this agreement made during the early months of World War II was the setting up of a Permanent Joint Board on Defence by Canada and the United States, an alliance that both unique in its scope and purpose. The uniqueness stemmed from the status of the two countries at the time the agreement was formalised, for as R.M. Dawson has pointed out: "The board was not only the first permanent organization of its kind, but it was the more remarkable in that it unified the military planning of a neutral and a belligerent."

The belligerent in this case, moreover, was Canada, while the broadness of the commitment made by the neutral United States can be gauged from the wording of the agreement and the goals to be pursued by the Permanent Joint Board:

This Permanent Joint Board on Defence shall commence immediate studies relating to sea, land, and air problems including personnel and material. It will consider in the broad sense the defence of the north half of the western hemisphere.

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2 As stated in a press release on August 18, 1940 and also mentioned by W.L. Mackenzie King (Canada, House of Commons Debates, November 12, 1940, Vol.1, p.56)
While the main impetus for such an unprecedented arrangement between the United States and Canada may have resulted from the precarious situation in Europe in 1940 (which for a time included the possible defeat of Great Britain and an unprotected Atlantic flank as a consequence) the decision to form a Permanent Joint Defence Board appears to have originated a number of years earlier during discussions between W.L.Mackenzie King and Franklin D. Roosevelt.

The first public statement concerning American willingness to aid in the defence of bordering territories, as Stanley W.Dzuiban has noted, was made at Chautauqua, New York on August 14, 1936 when Roosevelt had declared:
"Our closest neighbors are good neighbors. If there are remoter nations that wish us not good but ill, they know that we are strong; they know that we can and will defend ourselves and defend our neighborhood." Almost two years later, on August 20, 1938 in replying to the following assurances made by Roosevelt at Kingston, Ontario on August 18, that:

The Dominion of Canada is part of the sisterhood of the British Empire. I give you assurance that the people of the United States will not stand idly by if domination of Canadian soil is threatened by any other empire.

Mackenzie King for his part had answered:

We, too, have our obligations as a good friendly neighbour, and one of them is to see that, at our own instance, our country is made as immune from attack or possible invasion as we can reasonably be expected to make it, and that, should the occasion ever arise, enemy forces should not be able to pursue their, either by land, sea, or air to the United States, across Canadian territory.

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3 Stanley W.Dzuiban, Military Relations Between the United States and Canada 1939-1945 (Washington: Office of the Chief of Military History, Department of the Army, 1959), p.3.


5 Quoted by W.L.Mackenzie King (Canada: House of Commons Debates, November 12, 1940, Vol.1, p.54.)

6 Ibid., p.54.
Although Mackenzie King was to further emphasize that this dialogue was: "the first public recognition by both countries of their reciprocities in defence," the later Ogdensburg Agreement and the simultaneous establishment of a permanent joint board on defence was a radical departure for both countries which saw a re-alignment towards continental defence by Canada and a final farewell to isolationism on the part of the United States. Edgar McInnis summed up the situation with the following remarks:

Such an agreement followed logically from the recognition by both countries that their strategic interests were inseparable; it served as the embodiment of a completely new relationship whose enduring character, at least in intent, was emphasized by the deliberate use of the word "permanent," and by King's assertion that the agreement was no temporary axis, but "part of an enduring foundation of a new order, based on friendship and good will."  

Even though the resulting alliance was largely born of necessity on one hand, and based on "good will and friendship" on the other, the terms of the agreement concerning the permanent element and the geographical area to be defended ("the north half of the western hemisphere") had raised potential problems that were not entirely unforeseen on the Canadian side. Thus while the reciprocal responsibilities for continental defence had to be weighed against the disparities in the respective populations and industrial capabilities of both nations, the question of decision making and control were troublesome areas, particularly for Canada as the weak sister in the new continental alignment.

This was nothing new, for even before the Ogdensburg Agreement had been reached the consequences of military co-operation with the United States had

7Ibid., p.54.
9Discussed further on the following page.
been cause for concern in Canadian circles, and by June of 1940 this concern had become even stronger, as Dzuiban was to note in the following:

A group of influential people within and without the Canadian Government, viewing the quickened preparations of the partly aroused colossus to the south, realized that new problems might present themselves from that quarter too, unless some means of collaboration on a basis satisfactory to Canada could be established. This group reached conclusions along the following lines: A United States bent on large-scale preparations for its own defense and that of the hemisphere would be determined to take adequate measures wherever they might be needed. If concerned about the inadequacy of the meager Canadian defenses, it might and probably would insist in acting to augment them. Canada would have to co-operate voluntarily or involuntarily. If, in considering the U.S. defense requirements in Canadian territory, Canada unduly emphasized its independence of action, it might provoke the United States to a strong attitude that could threaten loss of Canadian national identity. It appeared that the best way to prevent such a turn of events would be frankly to admit Canadian inability to adequately protect its air, sea, and ground frontiers and to request U.S. co-operation in providing such protection on a continental or even perhaps hemispheric basis.

From this viewpoint, once the United States had committed itself to the defence of the "north half of the western hemisphere," Canada had little choice in the matter but to acquiesce with good grace on one hand, and to co-operate on the other. Although F.R. Scott was to stress that the Ogdensburg Agreement was not binding in any legal sense, since:

No formal treaty was concluded at Ogdensburg.... There was no exchange of diplomatic notes of any kind, incorporating the published terms of the agreement, as in the destroyer-bases deal. Ogdensburg did no rest on sanction by the United States Senate, nor does it bind His Majesty on behalf of Canada. Technically it is liable to termination at any time by either party.\(^{11}\)

after Ogdensburg, neither country could actually proceed on a completely\(^{12}\) independent course or simply opt out of the alliance, even though this remained theoretically possible. This awkward bond was in time to be further

\(^{10}\) Ibid., p.18.


\(^{12}\) Without endangering the security of the other party.
complicated by the strategic importance of the Canadian Arctic during the post-war years, while the non-isolationist stance adopted by the United States after Ogdensburg produced an immediate change in U.S./Canadian relations that was to set the pattern for the future.

Once committed to the role of an active participant in the defence of "the north half of the western hemisphere," the United States, while still nominally neutral, had moved promptly to strengthen immediate weak spots in its local defences, and for good measure had also extended its military presence to a number of areas outside the continental boundaries of North America. In a matter of months following the agreement at Ogdensburg, the United States had established military bases in such areas as the Caribbean and Greenland, Canada, and Iceland. Soon after, the attack by the Japanese on Pearl Harbour in December of 1941 in turn generated an urgent need for U.S. bases in Western Canada in support of a threatened Alaska and possible military advances from this quarter also.

As far as U.S. bases in Canada were concerned, the Ogdensburg Agreement, despite its vagueness had nevertheless touched on this subject by the mention of "studies relating to sea, land, and air problems including personnel and material," while on a more particular note, Canadian bases were at the roots of the Ogdensburg Agreement in any case, as were a number of underlying factors that were summed up by Dzuiban as follows:

13 Within days of Ogdensburg in both cases; Caribbean bases were both a general requirement and also to help maintain U.S. Naval mobility between the Pacific and the Atlantic via the Panama Canal, as Stetson Conn has pointed out in "Changing Concepts of National Defence in the U.S. 1937-1947," Military Affairs, Vol.XXVIII, No.1, Spring 1964, p.4.
14 By March 1941; see Dzuiban, ibid., pp.149-155 for details.
15 By July 1941 after Iceland became a republic in May of that year.
The Ogdensburg press release stated that the Board would make defense studies, including problems of personnel and material. These terms of reference highlighted for the Board, as it embarked on its endeavours, two major Canadian problems. The terms also limited the Board to an advisory function, with no executive powers, since the Board's recommendations would be submitted to the two governments for their approval. In the Board the vote of the great United States would count for no more than the vote of Canada with one tenth as large a population. The arrangement promised to allow full expression of the Canadian view and to give Canada adequate control over the defense measures that might be proposed for northern North America. The President's stated purpose for arranging the Ogdensburg meeting - to obtain for the United States one or more bases in Canada - found no expression in the joint press release.16

The equal participation by Canada in the decision-making process was nonetheless more theoretical than practical in view of the marked disparity between the two countries.17 Moreover, in addition to difference involving economics, industrial capability, and manpower, there were further factors that were to have a bearing on the final decisions made. During the period 1939-1941 Canada was not only a belligerent in a foreign war while the United States was ostensibly neutral for almost two years, but in addition, Canada was also obliged to play a military role within the British Empire.

Although it is not the purpose of the present work to dwell at length on the various nuances and political factors that influenced U.S. and Canadian policies during this early period, the process by which the various U.S. military bases were obtained in Canada and adjacent areas nevertheless has some bearing on later activity in the Canadian North during the post-war years. During World War II the United States, first as a neutral with an increasing concern for the developments of the war in Europe and later as an ally

in the conflict itself, developed the expertise required to construct and maintain military bases in remote and uncompromising regions of the Far North. Additionally, once committed to a definite course of action, the United States also demonstrated both the willingness and the wilfulness to extend its sphere of influence well beyond the continental boundaries of North America. Given the amount of military activity carried out by the United States in the northern regions of the western hemisphere between 1940 and 1945, the later establishment of the DEWline, although a project of great magnitude, was in sense a continuation of both the imperatives and the capabilities developed during the wartime era.

Canada, for its own part also had a number of lessons to learn from the experiences gained during the same period, more so perhaps with respect to the political and economic factors arising from the wartime alliance with the United States and the facts of life resulting from the recommendations of the Permanent Joint Board on Defence.
CHAPTER II
The Establishment of U.S. Bases in Newfoundland and Greenland

Newfoundland
The need for U.S. military bases in Newfoundland and the Caribbean had become apparent some months prior to the agreement reached at Ogdensburg, mainly as a result of the disastrous turn of events in Europe during the first half of 1940. This critical period had in quick succession seen the occupation of the Low Countries by the Germans, the British retreat at Dunkirk, and finally the Fall of France, all by June of 1940. Because of the possibility of Great Britain also falling before the German onslaught, the exposed Atlantic seaboard and the Caribbean had both become areas of immediate concern to Canada and the United States. Meanwhile Great Britain for its own part was experiencing great difficulties providing sufficient warships to police the Atlantic on one hand, and to defend the English Channel against an imminent threat of invasion on the other.

This extremely grave situation had precipitated a series of high level communications between Britain's Prime Minister, Winston Churchill, and Franklin D. Roosevelt concerning the possible transfer to Britain of 50 U.S. destroyers of World War I vintage. Although much has been written concerning this transaction, ranging from "Gift Horses" to "Horse Trades," the pertinent element as far as our present treatment is concerned arises


from the virtual exclusion of Canada from the ensuing negotiations, even though U.S. bases in Newfoundland were initially a partial issue in the Destroyer Deal. At that time Newfoundland was under British jurisdiction, and this factor, coupled with an attendant need for U.S. bases in the Caribbean, determined that the negotiations would be carried out primarily by the United States and Great Britain. The final transaction, which saw the granting of bases in both the Caribbean and Newfoundland early in September of 1940, thus resulted in Canada being relegated to the position of an interested onlooker, and Newfoundland, as R.M. Dawson was to put it: "coming in a bad fourth." 20

The granting of bases in Newfoundland was not ultimately concluded as a direct trade-off in the destroyer transfer, as had been anticipated by Franklin D. Roosevelt in his letter to David I. Walsh, the Chairman of the U.S. Senate Naval Affairs on August 22, 1940, which stated:

"... our weakness in the past has lain in the fact that from Newfoundland to Trinidad our sole protection offshore lies in the three contiguous islands of Porto Rico, St. Thomas and St. Croix. That, in the nature of modern warfare, is a definite operating handicap. If for fifty ships, which are on their last legs anyway, we can get the right to put in naval and air bases in Newfoundland, Bermuda, the Bahamas, Jamaica, St. Lucia, Trinidad and British Guiana, then our operating deficiency is largely cured..." 21

Instead, the bases were obtained through ninety-nine year leases (as opposed to outright purchase) with the following rider added by Churchill in a letter to Roosevelt on August 15, 1940 which noted:

"... it will be necessary for us to consult the Governments of Newfoundland and Canada about the Newfoundland base in which Canada has an interest. We are proceeding to seek their consent." 22

20 Ibid., p.213.
21 Quoted by Lainger and Gleason, ibid., p.760
22 Ibid., p.761.
Within days, in a further communication on August 22, Churchill was to stress that the granting of U.S. bases in the Atlantic region was more in the nature of a "gift" to avoid the complete abrogation of rights or any contractual difficulties; thus he stated:

We had decided in Cabinet to offer you naval and air facilities off the Atlantic coast quite independently of destroyers or any other aid. Our view is that we are two friends in danger helping each other as far as we can. We should therefore like to give you the facilities mentioned without stipulation of any return and even if tomorrow you found it too difficult to transfer the destroyers, et cetera, our offer still remains open because we think it is the general good. 23

Nevertheless, in Canadian circles, both the manner in which the bases had been obtained and the implications of the act for both Canada and Newfoundland were cause for some concern, as Donald Creighton noted in the following:

This cessation of the keys of the old island British Empire for some obsolescent ships was full of sinister significance for the completion of the Canadian union. Ever since a united British North America had first been planned, Canada had hoped and believed that Newfoundland would eventually become a province of the federation. Since the beginning of the war, Canadian statesmen had spoken and acted on the assumption that the defence of Labrador and Newfoundland was vitally necessary to the defence of Canada. 24

Thus while the security of the western hemisphere was to be enhanced by the extension of U.S. military bases northward into Newfoundland, there was an uneasy acceptance on Canada's part and an attendant fear of the possible effects of U.S. military and economic presence on Newfoundland itself. Nor was this an unwarranted concern, although Dzuiban in assessing the implications finally concluded that such fears were not entirely justified. He noted that:

During the World War II and postwar years, a significant amount of consideration was given by Newfoundlanders in public discussion and


24 Ibid., pp.522-523; and also on this topic in his: The Story of Canada (London: Faber and Faber, 1959), pp.245-246.
the local press to the desirability of political association with the United States as a possible solution to the problem of Newfoundland's political status. To many this solution promised a brighter economic future than any other solutions such as association with Canada. Any encouragement by the U.S. officials would probably have increased the sentiment favouring a link with Washington. No such encouragement was offered, and in consequence of this attitude, Newfoundland became increasingly interested in union with Canada, which saw this step as politically and strategically desirable.  

Perhaps more significant than the limited and unrealised political threat was the economic aspect of U.S. military activity in Newfoundland itself. During the wartime period and as a result of the defence requirements, both transportation and communications in Newfoundland saw considerable improvement. In addition to the construction of a road between Argentia and St. John's, the Newfoundland Railway was upgraded; an aircraft warning system was constructed (involving bases in both Newfoundland and also at adjacent location in Canada) while communications were drastically revamped to meet the needs of the new military installations.

Existing communication facilities in Newfoundland (particularly landlines) proved during the winter of 1941-1942 to be both unreliable and inadequate. As a consequence an improved system was brought into operation, as Dzuiban relates:

The United States decided to install a telephone cable line adequate to meet the requirements of the several users - the railroad, local officials and police, and the military garrisons of Canada and the United States. The costs were to be borne by the United States, which in turn would be re-imbursed on a suitable basis by the users. The telephone cable was expected to be less vulnerable than wire lines. Using a $3.5 million appropriation made available for the purpose, the Newfoundland Base Command in June 1942 contracted with the Bell Telephone Company of Canada for installation of a telephone

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25 Ibid., p.171.
26 For details see Dzuiban, pp.170-186.
cable line along the Newfoundland Railway between Whitbourne and Stephenville, the materials to be supplied by the U.S. Army. This project included the necessary repeater stations and other auxiliary features, and an open wire from Shoal Harbor to the radar station at Bonavista. Concurrently, a contract was let to the Western Union Telegraph Company for a smaller project involving the construction of a telephone cable between Forts Pepperell and McAndrew at a cost of $213,000.\textsuperscript{27}

The upgrading and development of new transportation and communication networks were not to be limited to Newfoundland alone, but rather became extended further northward as dictated by the directions of the War both in Europe and the Far East. The ensuing expansion into hitherto remote regions was thus not so much a function of what Stefannson had termed two decades earlier: "The northward course of empires,"\textsuperscript{28} but rather the result of a combination of factors that were not directly concerned with northern development itself.

The fortunes of war, the state of military technology, and not least of all, the geographic importance of Canada had in fact combined to generate a need for air and communications routes by way of Iceland, Greenland, and Canada en route to Britain in the east, and support Alaska further land and air routes across Canada in the northwest also became necessary.

\textsuperscript{27}Ibid., p.180.

Greenland

While a proportion of the military projects carried out during World War II were inevitably to be of the boom and bust variety, where neither cost nor commercial considerations were factors in their construction, the results of wartime excursions into the northern regions nevertheless had important consequences in later years. Thus the increase in activity in the North, although it was not geared towards development per se, nonetheless helped to pave the way by providing the necessary expertise to operate in northern climates and by the establishment of transportation and communication routes in previously inaccessible areas.

A secondary and largely unforeseen consequence of northern military expansion during World War II was the unexpected value of certain bases in the North as the strategic importance of the region became more evident during the post-war period. A prime example of the later value of wartime bases can be seen in what R.J. Sutherland was to term: "The American discovery of Greenland." 29

The initial establishment of U.S. bases in Greenland is also of interest in so much as it is another example of independent action on the part of the United States, for while the events of the first half of 1940 had prompted Britain to occupy Iceland, the securing of Greenland was somewhat more complicated. Nevertheless, in 1940 overtures were made by Britain towards Canada for a similar occupation of Greenland for the following reasons: Firstly, Greenland in 1940 was a vital source of cryolite, a mineral needed for the production of aluminum; secondly, Greenland was considered to be a key

location for transportation, communications, and weather bases; and finally, the occupation of Greenland was considered vitally necessary to prevent a similar use by Germany. There were also additional political and economic factors that came into play, and even after the German occupation of Denmark in April 1940 and during one of the darkest periods of the War, the still neutral United States nevertheless felt obliged to inform both Canada and Britain: "that the United States did not recognize the right of any third government, even Canada or the United Kingdom, to occupy or otherwise interfere in Greenland." 

Although Canada for its own part was to stress that its primary concerns were for the protection of the cryolite mines in Greenland and the simultaneous denial of bases to the Germans, the question of Canadian interest in the cryolite mines itself aroused suspicions in the United States that Canadian action here was not based entirely on defence considerations. In the meantime, after Ogdensburg (which included Greenland as part of the western hemisphere) the idea of establishing air bases in Greenland had also come under serious discussion. Following months of jostling between the United States and Canada over the construction of these bases (including the possible but unlikely construction of the new facilities by the Greenland authorities themselves) it was finally resolved in March 1941 that: "because of the complexity of considerations of defense, jurisdiction, and operations and maintenance of facilities, construction by the Greenland authorities was impracticable and should be undertaken by the United States." This

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30 Dzuiban, ibid., p.149
31 Dzuiban, ibid., pp.149-150.
32 With perhaps some justification; for details see Dzuiban, ibid., p.151.
33 Dzuiban, ibid., p.152.
arrangement did not completely exclude Canada, but nevertheless relegated it to the status of a mere user of the facilities, as permitted by the fine print of the agreement made between the United States and Greenland, as Dzuiban has pointed out:

In the agreement, the United States related its acceptance of responsibility for the status of Greenland to the Act of Havana of July 30, 1940. Declaration XX of the Act of Havana had authorized emergency action by any of the American republics to forestall threatened transfer of territory in the Western Hemisphere. The agreement also provided for the use of the facilities to be constructed by "airplanes and vessels of all the American Nations for purposes connected with the common defense of the Western Hemisphere." The use of the term "American Nations," rather than the usual Pan American Union usage of "American Republics," brought Canada within the scope of this provision. 34

Although the costs and the responsibilities for the military bases to be constructed in Greenland were borne by the United States, the importance of the bases extended beyond the requirements of immediate continental and even hemispheric defence by providing a much needed "Atlantic Bridge" between North America and beleaguered Britain. 35 Prior to the establishment of the bases in Greenland, the ferrying of aircraft across the Atlantic during the early stages of World War II had been limited to relatively long-range aircraft proceeding over a direct route from Newfoundland Airport (Gander) to Prestwick in Scotland, a direct flight of over 2000 miles.

Following the securing of Greenland by the United States in 1941, immediate steps were taken to provide intermediate air bases to expedite the ferrying of short-range aircraft to Britain by a new route extending through parts of Canada, Greenland, and Iceland. 36 In July of 1941 the construction of a

34 Ibid., p.153.
35 Dzuiban, ibid., p.181.
base on the lower west coast of Greenland was constructed at Narsarsuak (code-named BLUIE WEST ONE: BW-1), and in September of the same year construction commenced on another staging point further up the coast at Sondrestrom Fjord (BLUIE WEST EIGHT: BW-8). As aircraft ferrying activity increased during World War II, further bases were constructed in Greenland, including another important stop-over point at Itaqeg on the east coast (BLUIE-EAST EIGHT: BE-8) associated with an alternate ferrying route to Europe. While both routes were to see considerable service during World War II, at the cessation of hostilities a number of the Greenland bases were returned to Denmark in 1946. The remainder of the bases remained under United States control, and this factor was in turn to have its effects on Canada as the Cold War intensified. For Canada, U.S. military activity in Greenland was to have a two-fold effect, both immediately and later during the post-war years.

Firstly, the wartime imperatives that had dictated the need for the ferrying of medium and short-range aircraft via the northern routes to Britain and Europe had in turn precipitated considerable construction work in Northern Canada, paving the way for future activities in the region. Secondly, during the aftermath of World War II, the value of military bases in the Far North became increasingly apparent, particularly in such key locations such as that of the U.S. military installation at Thule in Greenland. The significance to Canada of the early establishment of this U.S. base at this location has been noted by R.J. Sutherland, who commented:

The American interest in Greenland led in the post-war period to the great American base at Thule. The existence of this base has had a

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37 See Map Number 2 for these locations and the attendant air routes.
significant effect upon the military importance of the Canadian Arctic and upon Canadian-American relations. If Thule had not been available to the United States the question of a major US base in the Canadian Arctic Archipelago would certainly have arisen.\textsuperscript{38}

The question of the establishment of a major U.S. base in Arctic Canada may well have been settled with the construction and expansion of the base at Thule, yet the possible construction of future installations in the Arctic Archipelago might still arise in view of recent developments in weapons technology and the 1979 Strategic Arms Limitations Talks (SALT II). Thus the threats to North America posed by Soviet "Cruise missiles," and their jet bomber ("Backfire") might result in either an upgrading of the DEWline's known low-level deficiencies, or the possible implementation of an airborne manned interceptor system (AWACS/IMI) operating out of the Canadian Arctic.

During World War II, to return to the present topic, the northern regions were principally by-passed\textsuperscript{en route} to the various active theatres of the War, in spite of the establishment of a number of bases in the North. The Greenland bases were to have a wider effect than their immediate area, for they were an integral part of larger networks and this in turn was to lead to further pioneering and construction in Canadian territory. Even prior to the establishment of the sites in Greenland there had been a growing requirement for alternate and more suitable staging points for the planned air ferry routes than that provided by the congested and often weather blighted base at Gander, Newfoundland. The result of these requirements was a tremendous increase in military activity in the Canadian North.

CHAPTER III
The Establishment of U.S. Bases in Canada, in Labrador, and at Goose Bay

Goose Bay

The air base at Gander in Newfoundland was to render vital service during World War II by providing (in addition to its airport facilities) important communications and weather services, but its location and associated drawbacks had necessitated the selection of a more suitable base of operations for the planned short-range air ferry route. During the winter and spring of 1940-41 surveys of Labrador had resulted in the final selection of a site near North-West River Labrador, and additional locations further north along the Labrador coast were also under consideration. The construction of the North-West River site (subsequently to be named Goose Bay) was undertaken by Canada in September 1941, and within a year the new base was in operation (under joint U.S./Canadian control) and the short-range ferry route to Britain had become a reality.

The North-East Staging Route

This route, which was to give an early pre-eminence to Goose Bay, and which was primarily responsible for the passing of more than 24,000 aircraft through the base during World War II, was named the North-East Staging Route. The actual itinerary involved an initial flight from Presque Isle to Goose Bay (570 miles), then on to Bluie-West One in Greenland (775 miles), a further flight of 775 miles to Reykjavik in Iceland, and another 840 miles to the

39Gander was still an important base in the mid 1960's; J.R.K.Main, in his: Voyageurs of the Air (Queen's Printer, Ottawa, 1967, p.130) noted that: "As the job of ferrying aircraft increased, Gander became known as a world centre of communications systems - radio, cable, air traffic control and weather forecasting: it still is. "


destination point at Prestwick in Scotland.

Goose Bay was in addition, to play a larger role during the post-war era, for during this later period the site was to become an important Strategic Air Command (SAC) base, with all the ramifications that such an installation on Canadian soil carried with it.

The CRIMSON Project and the CRYSTAL Weather Stations

Although the North East Staging Route permitted the ferrying of short-range aircraft to Britain and the European theatre of operations, the need for alternative routes and the hazards of operating in the northern regions led in turn to further extensions into the Canadian Arctic and Sub-Arctic and the establishment of additional airfields, weather bases, and communication sites. These facilities and the reasons behind their construction were described by Conn and Fairchild as follows:

Space could be conquered, but the weather could only be coped with. No amount of human ingenuity could still the hurricanes, dissipate the impenetrable fogs, or moderate the extreme cold that made the Arctic weather the enemy it was. It was possible only to avoid and cover and against it, and then only provided there was sufficient warning. Three small detachments were therefore sent north late in September 1941 to set up meteorological stations at Fort Chimo (CRYSTAL 1), Frobisher Bay (CRYSTAL 2), and Padloping Island (CRYSTAL 30, from which movement of the weather could be observed and reported. As outposts against the formidable enemy in the north, they were essential adjuncts to the flying fields. When operations over the staging route began in the summer of 1942, the maintenance of fully dependable weather and communications services demanded constant attention.\(^\text{40}\)

The CRYSTAL weather stations were manned by U.S. military personnel, but Canada retained the right to replace the three stations with its own at a later date. Weather forecasting and overall control of this service had (at Canada's behest) been allocated to the Canadian authorities, but the

\(^{40}\text{Ibid., p.400.}\)

CRYSTAL stations were in fact only a small part of what was to follow, for early in 1942 a decision was made by U.S. military planners to transport the U.S. Eighth Air Force overseas by way of the northern air routes. This plan resulted in what became known as the CRIMSON Project, which called for the construction of many more staging and support posts in the Canadian North, with major bases at The Pas and Churchill (Manitoba), and at Coral Harbour and Frobisher Bay in the Northwest Territories.

Here once more there was the attendant need for additional supporting stations, particularly for weather reporting and communications as the new routes extended farther into the remoter regions of the North. The sheer size of the CRIMSON Project was to both aid and complicate matters for Canada, for it revealed once again the recurring problem of Canada's limited capabilities for such large-scale projects as opposed to the enthusiasm and willingness of the United States to proceed alone and irregardless of the cost. The actual size of the undertaking and the areas involved can be seen from the following data given by Dzuiban:

A greatly expanded meteorological network was needed for the CRIMSON Project, and under the Twenty-sixth Recommendation of the Permanent Joint Board on Defence the two countries agreed to collaborate in providing it. The requirements for additional service, as presented in a U.S. plan of 7 September 1942, exceeded Canadian capabilities, and on 17 October Canada authorised the United States to establish weather stations at the following points: (italics supplied)

<table>
<thead>
<tr>
<th>Coral Harbour</th>
<th>Cape Dorset</th>
<th>Herchmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amadjuak Lake</td>
<td>Churchill</td>
<td>Repulse Bay</td>
</tr>
<tr>
<td>Northern Indian Lake</td>
<td>Nueltin Post</td>
<td>Winter Outpost</td>
</tr>
<tr>
<td>East Hope Lake</td>
<td>Baker Lake</td>
<td>York Bay</td>
</tr>
<tr>
<td>Padloping Island</td>
<td>Douglas Harbour</td>
<td>Etawney Lake</td>
</tr>
<tr>
<td>Bowman Bay</td>
<td>Cormoran</td>
<td>Thicket</td>
</tr>
<tr>
<td>Lake Harbour</td>
<td>Eskimo Point</td>
<td>Tavani</td>
</tr>
<tr>
<td>Le Pensie</td>
<td>Sandy Lake</td>
<td>Stanley</td>
</tr>
<tr>
<td>Ilford</td>
<td>Cape Low</td>
<td>Rat River</td>
</tr>
<tr>
<td>Wager Bay</td>
<td>Sherridon</td>
<td>Nuwata</td>
</tr>
</tbody>
</table>

1^Ibid., p.191.
This wide-spread series of stations never did become fully operational, for by 1943 the CRIMSON Project was cut-back and the North East Staging Route proved to be an adequate replacement for the direct long-distance flight between Gander and Prestwick. Nevertheless, a significant number of meteorological stations intended for the CRIMSON Project remained in operation, particularly those in the arctic, such as the stations at Padloping Island, Lake Harbour, Eskimo Point, Fort Chimo and Coral Harbour in the Northwest Territories, and The Pas and Churchill in Northern Manitoba.42

The actual need and the value of the CRIMSON bases, particularly after the project became greatly reduced was perhaps debatable, but Conn and Fairchild for their part noted that even after the project faded in importance that: "There was no intention .... of abandoning the air bases under construction at Fort Chimo, Southampton Island, Frobisher Bay, and Churchill, even though the original need for them no longer existed, for it was considered ' gross waste ' not to finish what had been started. " 43

Canada's viewpoint on the question of " waste " was perhaps not so clear cut, and in the end Canada would pay for this work in any case, in spite of the high cost and the questionable value of the facilities."4 This is perhaps an overly harsh assessment, for in the long-run this wartime legacy would prove to have its effects on the Canadian North, for as Main has noted:

Nothing came of the project from a purely military standpoint.
But some of the airports built, notably those at The Pas,

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42The above is only a partial list of stations that remained in operation; for details refer to Dzuiban, ibid., p.191.
43Ibid., p.403.
44The total cost of the CRIMSON bases amounted to $39,500,000, of which the sum of $31,630,000 was finally paid by Canada (Conn and Fairchild, ibid., p.404.); Main (ibid., p.179) gives the Canadian payment as $27,460,330.
Churchill, Coral Harbour, Frobisher and Fort Chimo are unique in that they have played a very important part in the development of the Arctic during the post-war years. This assessment by Main concerns the products of wartime activities in the north eastern regions, and further wartime expansions in the west were to play their part in the opening up of the Canadian North.

Ibid., p.178.
CHAPTER IV

Wartime Activities in the West

The wide-ranging concept of mutual defence of the "north half of the western hemisphere" inevitably involved both Alaska and the Canadian North West, although at the time of the Ogdensburg Agreement (August 1940) the main emphasis for hemispheric defence remained predominantly in the North-East and along the Eastern Seaboard. On the other hand, in spite of less urgent requirements in the West, mutual defence necessarily included improvements in both transportation and communications in the region, and this in turn directly involved Canada, particularly with respect to the development of land and air routes to Alaska.

Although the requirements for the defence of Alaska were more direct and closer to home for the United States, Alaskan needs up till the attack by the Japanese on Pearl Harbour in December 1941 were not considered to be as pressing as the projected build-up of bases in the North-East. Thus Alaska and the Pacific Northwest, while included in defence planning prior to Pearl Harbour, nevertheless came second to the main task at hand, which was outlined in U.S./Canadian Joint Basic Defense Plan 22 (ABC-22), as Conn and Fairchild have explained:

The 1941 plan, officially known as Joint Basic Defense Plan No.2 or ABC-22, was not directed towards hemispheric defense as an end in itself. It was intended instead to supplement the agreements reached in the United States-British staff conversations, the aim of which was to bring to bear against Germany the combined might of the United States and the British Commonwealth when the United States entered the war, assuming that it did. According to this conception, Newfoundland, for example, would be the first line of outposts from which to catapult the invasion of Europe, or it would at least be one of the piers in a vast bridge of ships and planes leading to Britain.  

"Ibid., pp.383-384."
The overall defence plan, in addition to the aforementioned, also called for four further tasks - the defence of Newfoundland (task two), the defence of Eastern Canada (task three), the defence of Alaska (task four), and finally, the defence of Western Canada and the Northwestern United States in task five. The defence of Alaska, although obviously not ignored, was initially given a somewhat low priority, the main reasons being assessed by Joseph Bykovsky and Harold Larsen as follows:

General Staff planners believed that the underdeveloped states of the Territory, poor means of communications, rugged terrain, and adverse climate made unlikely the operation of major land forces in Alaska and that air and land invasion of the United States via Alaska was not to be expected. Nevertheless, before the end of 1940 the construction of a series of airfields linking Edmonton to Fairbanks was begun, and as a result of the greatly increased threat from the Japanese after December 1941, both air and land routes to Alaska became (for a time at least) an urgent necessity. Here again the military requirements (in this case for the defence of Alaska) necessitated hasty and massive construction projects across Canadian territory, and once more such projects gave rise to fears and concerns over possible threats to Canadian sovereignty in the carrying out of what Conn and Fairchild were wont to term: "The difficult task of giving a shape of mutuality to the War Department's unilateral plans for defending the northern part of the Hemisphere." Both American presence on Canadian territory (albeit as a strong and willing ally) and the question of co-ordinated control over both U.S. and Canadian Forces were sources of continuing concern. Nevertheless,

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*Conn and Fairchild, ibid., p.384.*


*Ibid., p.380.*
some benefits were to result, for the bifurcation between Canada and the U.S. at least emphasized the need for improved communications, as exemplified by the problems associated with the mutual defence of Vancouver Island and the Pacific Northwest, and discussed by Conn and Fairchild below:

On the Pacific coast, co-operation between the services of the two countries, although just as close (as Newfoundland) it was more compartmented. Geographically and strategically, Vancouver Island occupied a position roughly comparable to that of Newfoundland, but its defenses were determined by the international boundary. American troops co-operated in the defense of the Island, but they stayed on the American side of the strait. Much emphasis was therefore placed on the interchange of information — the integration of the respective communications and air warning systems — and on the co-ordinated disposition of harbor defenses.50

While the distance involved in the lower Vancouver Island and Puget Sound area was not excessive, the development of improved communications and transportation to Alaska via the overland and air routes required a different order of planning, co-operation, and effort. C.P. Stacey noted in this respect that:

A question which inevitably arose was that of military communications between the United States and its territory of Alaska across Western Canada. In various forms, this question was responsible for much international discussion and for a great proportion of the American military activity in Canada.51

Thus the solutions to this problem were to lead in turn to the development of further wartime routes across the North both by land and air, and these new projects were again to play their parts in the development and opening up of Canada's northern regions.

50 Ibid., p. 388
51 C.P. Stacey, Arms, Men, and Governments (Queen's Printer, Ottawa, 1970), p. 379.
The Northwest Staging Route

Canadian interest in the establishment of air routes to Alaska and beyond as early as 1935 had resulted in the construction in 1939 of a series of airfields at Grande Prairie, Fort St. John, Fort Nelson, Watson Lake, and Whitehorse stretching through the Northwest towards Alaska. Although the route was completed in September of 1941, it initially proved to be inadequate, and heavy losses were incurred during an attempt to ferry aircraft to Alaska a few days after the Japanese attack on Pearl Harbour in December of the same year.

The increased urgency in the Alaskan sphere and these early losses resulted in a hasty re-vamping of the air route with the addition of eight more intermediate airfields along the way and the establishment of a major air base near Edmonton at Namao. Once more the thorny questions associated with the costs incurred and the control of facilities surfaced, although the final product, the Northwest Staging Route was to render yeoman service to the war effort. Trevor Lloyd, in assessing the value of the various wartime air routes considered that the Northwest Staging Route was of far greater importance than the CRIMSON Route, and even rivalled the North East Staging Route in its strategic value. Lloyd also pointed out that the Northwest Staging Route had in fact three purposes, since:

It enabled supplies and men to be flown to Alaska in the critical days following Pearl Harbour, and thereafter functioned continuously as an operating air supply route. Secondly, it was the main route by which aircraft were flown from the United States to Alaska to be used on combat missions for the defence of the Territory and for

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52 See Stacey, ibid., pp.380-381 for details.
53 See Map Number 3 for this route.
Map No. 3  The Northwest Staging & Mackenzie Routes (after Lloyd, 1948)
North Pacific patrolling. Thirdly, it served the important purpose, appropriate in view of the history of early flying in Alaska, of providing a link with the Soviet Union. Many thousands of aircraft were flown to the U.S.S.R. between 1942 and the end of 1945. Although it has continued to be of military importance, the route is also of interest as a commercial air line. Scheduled flights are now being made to Asia by way of Alaska and the Aleutian Islands.\textsuperscript{55}

The Northwest Staging Route was the most important wartime air route in the west, yet there was a lesser known and only partially completed route constructed in the Canadian Northwest in connection to another project, Canol.

\textbf{The Canol Project and the Mackenzie Air Route}

In addition to the establishment of a major air route to Alaska during World War II there were two further projects of some magnitude that were to have their effect on Canada and the Canadian North. The Canol Project was another expensive U.S. endeavour, which like many of the other wartime efforts was received by Canada with little or no enthusiasm (or choice, for that matter).

Associated primarily with catering for Alaskan defence requirements, the Canol Project involved the construction of an oil pipeline running between the Canadian oil fields at Norman Wells in the Northwest Territories, and Whitehorse in the Yukon, then on to Alaska. In conjunction with the Canol Project was a series of airfields intended to link Edmonton in the South with Norman Wells by way of Macmurray, Fort Smith, Fort Resolution, Fort Providence, Fort Simpson, and Wrigley\textsuperscript{56} to provide a low-level air route that ran roughly parallel to the Mackenzie River Route leading North.

\textsuperscript{55}\textit{Ibid.}, p.169.

\textsuperscript{56}See Map Number 3 for this route and the Mackenzie River Route.
Although uncompleted at all locations, the Mackenzie Air Route (as it was to be called) nevertheless had its effect on the Canadian North by providing a basis for future expansion, while the overall assessment of the impact of the wartime air routes on Canada have been summed up by Trevor Lloyd as follows:

There were ... in 1946 at least four air routes across the Canadian sub-Arctic and Arctic, which were reasonably well supplied with modern equipment and could be used by large aircraft. The best was the Northwest Staging Route to Alaska and Siberia. Of perhaps equal quality was the route by way of Montreal or Mingan to Goose Bay, Labrador. The former Crimson Route, although no longer used as a route, was still serviceable. The Mackenzie Route, although not in first-class condition, could be put in the front rank if the existing airfields were improved and other built at sites already surveyed, extending northward almost to the Arctic Ocean and the westward to link with Alaskan airways.\(^5^7\)

Although the twin obstacles of distance and mountainous terrain, in addition to the urgent need to defend Alaska if necessary, had resulted in the rapid establishment of the wartime air routes, one further project of importance was the construction of a major roadway from the United States(via Canada) to Alaska during World War II.

The Alaska Highway (Alcan)

Interest in a highway to Alaska had been expressed as early as 1930, but even by 1940 the need for a road to Alaska was considered by both U.S. and Canadian military authorities to be less urgent than the projected air staging route. Although the subject was revived during this time, with inevitable political and economic problems to complicate matters,\(^5^8\) the situation quickly came to a head following the events at Pearl Harbour in December 1941.

\(^5^7\)Ibid., p.169.

\(^5^8\)The political and historical background of the decision to build the Alaska Highway are discussed by Conn and Fairchild, ibid., pp.391-395.
The resulting highway was not so much a separate or competing project divorced from the air routes, but rather, it was the product of a need to supplement and improve facilities along the air staging route itself. Although neither the air route or the highway were received with undue enthusiasm by Canadian authorities, the urgency of the situation in Alaska in December of 1941 lent critical weight to arguments in favour of the new highway. Conn and Fairchild described how this development came about, and gave the following assessment of the motivating factors involved in the decision to build a roadway to Alaska:

New interest in an overland road as a guide path for fliers and as a means of more readily improving the facilities at the staging fields was precipitated in January 1942 when the first attempt to reinforce Alaska by air, over the Northwest Staging Route, ended in disaster. These fields and the airways to Alaska were being built by the Canadian Government, which was not convinced that either highway or additional landing strips along the route were needed.\(^59\)

In spite of the above Canada still remained reluctant to view the highway as a necessity,\(^60\) but nevertheless quickly agreed to the construction of the project early in 1942. The United States in turn agreed to bear the entire cost, while the highway itself would revert to Canada at the cessation of hostilities. The resulting roadway, as intended, ran through Canadian territory connecting Edmonton with Fairbanks by way of the Northwest Staging Route locations \(^61\) at Grande Prairie (Alberta), Dawson Creek, Fort St. John, \(^59\)Ibid., p.394.

\(^60\)C.P.Stacey remarked on this aspect in his: *Arms, Men, and Government* (Ottawa: Queen's Printer, 1970, p.383), that: "When all due allowance has been made for the fact that the highway had been thought of after the Pearl Harbour disaster mainly as an emergency facility in the event of sea communications being interrupted, it still seems evident that the opinion often expressed earlier by Canadian and United States military authorities was thoroughly sound; apart from its utility in connection with the airway, there was no real military requirement whatever for the Alaska Highway.
Beatton River, Fort Nelson, Smith River (British Columbia), then on to Watson Lake, Teslin, Whitehorse, west of the airfield at Aishihik, and finally to Snag (all in the Yukon) before reaching Alaska.

Once again, as in the case of the eastern air routes, the related activities of the Northwest Staging Route and the Alaska Highway resulted in major inroads into remote and inaccessible areas of the Canadian North - not for the purposes of either development or profit - but for reasons essentially external to Canadian needs and requirements. On both flanks of the country the major wartime projects were concerned with a larger viewpoint associated with hemispheric defence, or defence of neighbouring territories, or even continental developments elsewhere. Nevertheless, what was in effect merely an accident of geography generated both the needs and the funds for massive wartime expenditures largely associated with transportation and communications. Once set in motion, the northward trend could not fail to have a continuing effect on development in the Canadian North.

Much pioneering work in the Arctic, primarily by air (but also to a lesser extent by land and sea in the west and the east respectively) had been carried out during the wartime years. This period in turn was to see the final advent of Air Power and the establishment of air transportation on a grand scale, and with this change came a rapid but expensive means of transportation on a year-round basis across the entire northern regions, paving the way for the final opening up of the Far North.

1See Map Number 4 for the relationship between the Northwest Staging Route and the Alaska Highway.
The Cost of Military Collaboration during the War Years

The Canadian wartime experience was both beneficial and costly; the actual benefits were perhaps to be realised in later years by the establishment of footholds in a number of areas in the Canadian North, but a huge outlay was incurred by the Canadian Government to preserve wherever possible Canadian sovereignty by the purchase of all the wartime installations erected in Canada. J.R.K.Main noted in his assessment of the costs of these various military projects that:

The Prime Minister, Mackenzie King, had made up his mind that no loophole would be left for American legislators to claim property or any other special rights in Canada after the conclusion of hostilities, and rightly judged that the few millions involved would be a low price to pay for the avoidance of any misunderstanding on this score.62

The final settlement was to be considerably more than a "few millions", and (as Main noted) it was made by the Permanent Joint Board on Defence, with the final result that Canada paid out the following sums to the United States for the various military projects carried out on Canadian soil:63

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Northwest Staging Route</td>
<td>$31,311,196</td>
</tr>
<tr>
<td>Flight strips along the Alaska Highway</td>
<td>$3,262,687</td>
</tr>
<tr>
<td>Flight strips along the Mackenzie River</td>
<td>$1,264,150</td>
</tr>
<tr>
<td>Hudson Bay air route (Crimson Route)</td>
<td>$27,460,330</td>
</tr>
<tr>
<td>Mingan Airport, P.Q.</td>
<td>$3,627,980</td>
</tr>
<tr>
<td>Goose Bay Airport</td>
<td>$543,000</td>
</tr>
<tr>
<td>Telephone Line from Edmonton-Alaska boundary</td>
<td>$9,432,208</td>
</tr>
</tbody>
</table>

63 Ibid., p.179.
The total cost of the military projects carried out in Canada during the war years was $76,811,551\textsuperscript{64} with a further sum of $29,599,963 for additional cost incurred on the Northwest Staging Route ($18,359,953), in North West Canada ($1,290,010), and at Goose Bay ($9,950,000) plus a further $5,161,000 for improvements to the Northwest Staging Route. All in all, a grand total of around $111,000,000 was paid out by Canada, as Main was to put it: "To preserve Canadian peace of mind and keep Canadian sovereignty unblemished."\textsuperscript{65}

Whether the $111,000,000 expenditure was exorbitantly high or a reasonable amount to pay for the maintenance of Canadian sovereignty, there seems little doubt that nothing close to this amount would normally have been made available for improvements to existing transportation and communications networks in the Canadian North. Nor would such activities have proceeded at such a dizzy pace or on such grandiose scales but for the twin needs of mutual defence and the transfer of personnel and supplies to the various overseas theaters served by the East and West Staging Routes.

While a "boom and bust" situation was bound to arise as the military requirements of the various projects in the North diminished or disappeared with the ending of the War, the benefits of the associated airfields, air routes, roads, railways, and communications facilities still remained. Moreover, while some areas in the North inevitably experienced diminished air traffic and contact with the South, the very technology that had produced the air staging routes in turn was to generate a new and vital importance for aviation both in and over the Canadian Arctic during the postwar

\textsuperscript{64}The total cost of these facilities was computed to be $90,683,571; the amount $76,811,551 was assessed as the permanent value of the installations to Canada, and this was the amount paid out.

\textsuperscript{65}\textit{Ibid.}, p.180.
period. As Stanley S. Dzuiban noted in the Foreword to his: Military Relations between the United States and Canada 1939-1945,

The impact of advancing technology since World War II on time and space factors has demonstrated even more forcefully that the defense problem of the two countries is a continuing one requiring joint solutions. In consequence, the two countries have in recent years been drawn into even closer co-operation.  

In the Northern context in particular, it was the improvements in aviation technology that were largely responsible for both the conquering of space on one hand, and the general reduction of the time factor on the other. Even here there were the attendant services associated with communications and meteorology, and once again it was the wartime impetus that was to bring a considerable increase of facilities during World War II in support of the air staging routes.

CHAPTER V

Wartime Communications and Weather Services in the North

Although the increasing use of aircraft in the North has reduced the problems of distance, terrain, and climate that have collectively hindered and restricted northern transportation, the increasing use of this mode of transportation has in turn contributed to the growth of communications in the North by emphasizing the need for adequate meteorological reporting in and from the Arctic itself. The relationship between aviation requirements, meteorological observations, and communications in the North during the Second World War was evident, as Stanley S. Dzuiban noted below:

A major problem for both Canada and the United States in northwest Canada was posed by the extremely limited scale of communications facilities in a region whose size and attendant physical phenomena, such as the aurora borealis, made communications particularly difficult. The need for adequate meteorological data for safe air operations also presented a problem. 67

Dzuiban further noted that even for the purpose of construction and administration of the various wartime projects, unified communications posed formidable difficulties. During the early stages of the Alaska Highway and the Canol Projects, for example, there were three separate and independent United States military radio networks and one Canadian military network all associated with the projects. In September 1942 the United States Northwest Service Command (military) was eventually established to integrate the three U.S. radio networks and also to operate the telephone and telegraph land-line system that was associated with the Alaska Highway and the Northwest Staging Route. 68

67 Ibid., p. 236.
68 Constructed by the U.S. Army Signal Service and the help of U.S. and Canadian civilians, this system ran between Edmonton and Fairbanks connecting up with the various air strips, air bases, and support facilities of the Staging Route. Providing for a capacity of six voice and thirteen teletype channels, the system used 14,000 miles of wire, 23 booster stations, and 95,000 poles (Dzuiban, ibid., p. 237.)
This communications network, while primarily associated with the Northwest Staging Route and the Alaska Highway, was in addition capable of being linked up to both Canadian and American commercial communications carriers, and thus was able to serve as an alternative route during periods of radio blackout and poor reception. On the other side of the coin, the land-lines themselves were subject to disruption from time to time, as Dzuiban explains in the following summary of conditions in the Northwest up to 1943:

Because the wire network was subject to frequent interruption by falling trees, thaws and floods, and fire and winds, radio networks were required not only to link points not served by the line, such as those in the Mackenzie River Valley, but also to insure continuous service to points on the line. In June 1943 all U.S. radio nets were consolidated into a single network comprising sixty-five fixed, semi-fixed, and mobile radio stations that served the Northwest Service Command operations. Canadian needs for communications continued to be provided independently, through the radio net for the airfields and intermediate fields of the Northwest Staging Route.69

Dzuiban also mentions70 that while there was little integration between the U.S. and Canadian communications networks in the Northwest during the period under discussion, an element of co-operation nevertheless existed between the meteorological services of the two countries, with American stations adding their own observations to those made by the Canadian personnel at the various locations along the Northwest Staging Route. Further meteorological observations were also carried out by both countries in conjunction with the Mackenzie River Air Route, this time involving co-operation between a U.S. Army Air Force radio network and an 11-station reporting system operated by the Royal Canadian Corps of Signals in the Mackenzie region.71

69 Ibid., p.237.
70 Ibid., p.237.
71 The Royal Canadian Corps of Signal had been in the North for many years; for details see: Herbert Fairlie Wood, "They Broke the Arctic Silence," Canadian Geographic Journal, Vol. 64, No.1, January 1962, pp.21-27.
The result of this combined meteorological reporting network nevertheless did not extend to a unified weather forecasting system, and as Dzuiban put it:

The U.S. Army saw fit to operate its own forecasting services and established stations at Whitehorse, Calgary, Edmonton, Fort Nelson, Fort St. John, Prince George, and Watson Lake. There undoubtedly was room for economy of operations through the better co-ordination of the weather services. However, fundamental differences on the question of airway control and operation made fuller co-ordination infeasible.\textsuperscript{72}

Given the mixture of civilian and military agencies involved and the magnitude of the projects carried out in the Canadian Northwest, complete co-operation between the United States and Canada was perhaps understandably difficult to attain. In matters of meteorology, on the other hand, co-operation between the two countries dated somewhat surprisingly from 1882,\textsuperscript{73} and during the post-war years as aviation in the North expanded, co-operation between the United States and Canada increased in turn.

Before discussing the post-war activities in this area it is perhaps worth while noting the vital importance of communications to the meteorological services, for in addition to requirements associated with accurate and synchronised weather observations, there has also been a need for reliable and swift transmission of the meteorological data to a central office for collation, analysis and redistribution. From this point of view it was only following the establishment of telegraphic and radio communications that such immediacy was gained, and here again it largely the result of expanding transportation needs and networks that provided the means.

R.W.Rae, in discussing the development of the Canadian Meteorological Service gave the following capsule summary of events:

\textsuperscript{72}Ibid., p.238.

\textsuperscript{73}R.W.Rae, "Joint Arctic Weather Project," \textit{Arctic}, Vol.4, No.1, 1951, p.19.
The most important periods of growth of the Meteorological Division occurred during the following years: In the 1880's, when telegraphic reporting stations were opened up across the western provinces concurrently with westward expansion of the Canadian Pacific Railway; the 1920's, when advances in the technique of radio transmission made it possible to install radio reporting stations along the Mackenzie River and the Hudson Bay and Strait area; and during the years 1947-50, when radio reporting stations were established on some of the remote islands of the Arctic Archipelago.

For many years the region covered by Canada's Arctic Islands appeared on weather maps as a large blank area. The need for weather reports from this blind spot was recognized but the difficulty and the expense involved in the establishment and maintenance of communities in these inaccessible regions were prohibitive.  

The blank area referred to above by Rae was partly covered by the establishment of five weather stations in the Arctic Archipelago by 1950, but as will be seen later, the coming of the DEWline in the mid 1950's was to add considerably to the area by providing a whole chain of weather reporting stations and improved arctic communications. The value of these additional weather stations can readily be seen from the following assessment of the importance of arctic meteorological observations given by Andrew Thompson, Controller of the Canadian Meteorological Division of the Department of Transport in 1948:

The maintenance of an arctic network of meteorological stations is exacting and expensive. Nevertheless, it must be not only continued but expanded. The consensus of meteorological opinion the world over holds that in the arctic data lies the clue to more accurate short-range forecasting and to the development of long-range forecasting technique. To this must be added a recent requirement for meteorological services to new trans-arctic air-routes.

Just as the collation of meteorological data in the South had been facilitated by the initial use of the telegraph, the situation in the Canadian North dictated that the radio would play a crucial role. Andrew Thompson, in discussing the development of arctic communications and its relationship to the

74Ibid., pp.18-19.
75Andrew Thompson, "The Growth of Meteorological Knowledge in the Canadian Arctic," Arctic, Vol.1, No.1, 1948, p.43.
field of meteorology pointed out that:

By 1941, besides a dozen stations maintained by the government, all the larger Hudson's Bay Company trading posts in the North West Territories had short-wave key and telephone transmitters, while flying and mining companies had radio equipment wherever it was needed.

The period of modern meteorological observations can be said to date from the introduction of the radio to the North. Observations are now (1948) taken not only by personnel of the meteorological Division but by those of the Royal Canadian Corps of Signals, the Radio Telegraph Branch of the Department of Marine, the Royal Canadian Mounted Police, Hudson's Bay factors, missionaries, and employees of commercial and mining companies.76

Both Rae,77 and Thompson78 have commented on the increased interest in Arctic Meteorology brought about by northern military activities carried out during World War II, and Thompson in addition has pointed out that it was during this period that: "If upper-air observations in the north had previously been desirable as an aid to forecasting in southern Canada, they are now vital to flying within the arctic area itself."79 As a consequence, radiosonde stations were established in 1941 at Gander (Newfoundland) and at Fort Nelson (British Columbia), Aklavik (Northwest Territories), at Prince Albert (Saskatchewan), and at Moosonee (Northern Ontario) in 1942. Once again, co-operation between the United States and Canada hastened the development of meteorology in the North, as Thompson records in the following:

By way of assistance to the Canadian Department of Transport and to the Allied war effort in general, the United States provided radiosonde equipment and personnel for new upper-air stations at Arctic Bay, Frobisher Bay, Clyde River, Padloping Island, Fort Smith, Norman Wells, Churchill, Whitehorse, Fort Chimo, Coral Harbour and

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76 Ibid., p.38.
77 Ibid., p.19.
78 Ibid., p.40.
79 Ibid., p.41.
Southampton Island in the arctic area, and at Edmonton, Prince George and Grande Prairie further south. In addition, the U.S. government supplied radiosondes for two Canadian operated stations, Nitchequon and Port Harrison, both established in 1943.⁸⁰

Of the stations listed above, Arctic Bay, Fort Smith, Norman Wells, Prince George, Churchill, Coral Harbour and Whitehorse all came under the Canadian Department of Transport as World War II came to a close, while the larger installations such as those at Frobisher Bay and Fort Chimo remained in operation by United States military personnel.

The Joint Canadian United States Weather Stations in the North

The need for arctic weather reports had long been recognized, but owing to the difficulties associated with transportation, communications and not least of all, cost, the establishment of a network of weather stations in the Far North had been somewhat limited to the lower regions up to the onset of World War II. Even following the tremendous increase in meteorological activity in the North during this latter period, the high cost factor still remained, even though improvements in aviation and communications had helped to overcome in part the problems of inaccessibility in the northern regions.

Although Canada was to take over the operation of the vast majority of the wartime weather stations in the North, construction projects in the arctic were still complicated by the lack of major ports and airfields in the region. This was particularly so in the Arctic Archipelago, where even the wartime activities had hardly penetrated. In spite of the many problems, by 1947 it was considered necessary to construct a series of weather stations

⁸⁰Ibid., p.40., see also Map Number 5 for the locations of these stations.
at high latitudes in the Canadian North - necessary in the words of C.D. Howe, Minister of Reconstruction and Supply: "To enable Canada to provide more accurate and longer-range weather forecasting to meet her domestic and international obligations." 81

Owing to the general lack of commercial transportation facilities, the high costs involved, and the mutual benefits envisaged from weather stations situated in the Far North, the United States and Canada decided to co-operate in the construction and manning of the project. The original plan for this new network of stations called for a centrally situated weather station in the Arctic Archipelago and a series of four more weather stations reporting to the main base. The location of the central control station was intended to be at Winter Harbour on Melville Island, but the two vessels involved in the transportation of material for the base (the U.S.S. Wyandot, and the icebreaker, the U.S.S. Edisto) were prevented by heavy ice from reaching their destination. 82 As a result the main base was established instead at Resolute Bay on Cornwallis Island, and although the choice was accidental, it to to prove to be a happy one. In addition to Resolute Bay's central position within the Arctic Archipelago, the location was more accessible by sea and also possessed a suitable area for an airstrip.

The overall program to establish the network of weather stations within the Arctic Archipelago involved the costly construction by air of four or more stations; in two cases this was carried out from the main base at Resolute Bay, and the remaining two stations were constructed from the U.S. military base at Thule in Greenland. The pertinent construction data for

the five Joint Arctic Weather Stations are given below:

EUREKA, on Ellesmere Island (80°13N., 86°11W), established by air in April 1947 from Thule, Greenland.

RESOLUTE, on Cornwallis Island (74°41N., 94°55W), established by sea in September 1947 (from Boston).

ISACHESN, on Ellev Ringnes Island (78°47N., 103°32W), established by air in April 1948 from Resolute Bay.

MÖULD BAY, on Prince Patrick Island (76°14N., 119°50W), established by air in April 1948 from Resolute Bay.

ALERT, on Ellesmere Island (82°29N., 62°15W), established by air in April 1950 from Thule, Greenland.

The final establishment in 1950 of the weather station at Alert on Ellesmere Island - also one of the most northerly location in North America - had in effect crowned ten years of military co-operation between Canada and the United States in the Northern Regions. Born from wartime necessity and the Ogdensburg Agreement of 1940, this co-operation had in turn resulted in massive expenditure on projects involving the establishment of large-scale transportation routes in the Canadian Northwest, the Northeast, the sub-Arctic, Hudson Bay, Newfoundland, Labrador, and also Greenland. In addition to these transportation routes (intended primarily to serve overseas areas of the War) there had been further activities associated with local defence, while the very magnitude of the wartime projects had in turn generated an attendant need for vastly improved communication and support services, particularly with respect to aviation in the North.

By the close of World War II, the non-isolationist stance adopted by the United States since 1940, in keeping perhaps with the stated "permanent"

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See Map Number 6 for the location of these stations; a description of them and the annual air-supply from Resolute and Thule is given by Andrew H. Brown, "Weather from the White Arctic," *National Geographic Magazine*, Vol.107, No.4, pp.545-571.

Rae, *ibid.*, p.21.
Map No. 6 The Joint Arctic Weather Stations (after Rae, 1951)
element of the Permanent Joint Board on Defence, had seen the establishment and the continued operation (albeit in reduced numbers) in peacetime of air bases on both Canada and Greenland, and an attendant need for related transportation and communications facilities.

Although many of the airfields and transportation routes constructed during World War II were to see a decline in use (if not closure), their construction and the pioneering activities in the North had nevertheless come at an opportune time. Interest in the Northern Regions was within a very short time to be enhanced once again by the growth of trans-arctic commercial aviation on one hand, and a growing Soviet threat to North America from over the Pole on the other. While considerable expertise in arctic construction had been gained during the War years with transportation and communications networks established over a wide area of the North, access to and from the region, although now feasible, still remained largely the domain of military and government agencies.

The Canadian Arctic during this period was still largely an unrewarding region for oil and mining interests, and apart from its growing strategic importance, it commanded little interest in the South. While Air Power had played a major role in the growth of the wartime air routes in the North, the threat of atomic weapons delivered from over the Pole in the 1950's was in turn to trigger another wave of arctic military construction. The result was the DEWline - the Distant Early Warning Line that was to extend from the Aleutians, across Arctic Canada, and ultimately across Greenland. This project, the most massive of all the northern military ventures was also the most long-lived, and was in addition the most important single factor in paving the way for the development of the Canadian North.
CHAPTER VI

The DEWLine Agreement

The Distant Early Warning Lines

Wartime activities in the Canadian North between 1940 and 1945 had for the most part been the result of air ferry requirements for medium and short-range aircraft en route to distant theatres of the war. The next major phase of military construction in the northern regions was concerned with problems closer to home - specifically the threat of the long-range nuclear bomber and the difficulties that this threat posed for North American Air Defence.

Writing in 1947, Trevor Lloyd\(^5\) noted that the use of Great Circle routes had been forecasted by the arctic explorer Stefansson as long ago as 1922,\(^6\) and in the present context Lloyd commented further that:\(^7\)

> Twenty-three years later, he (Stefansson) returned to the same question, with a statement that, far from sounding prophetic, was all too obvious. "If you shoot robot bombs (as heaven preserve us from ever doing), they will cross the Arctic on their way from London to Seattle, from Peiping to New York, from San Francisco to Moscow. That is the way the bombers will fly, if ever we permit them to."\(^8\)

Unfortunately, Stefansson's sombre forecast in 1945 had become a reality before the end of the year, while the development of a long-range bomber (the Boeing B-29) and the explosion of the atomic bombs over Hiroshima and Nagasaki brought the Second World War to a close and heralded in the Nuclear Age.

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\(^6\) Vilhjalmur Stefansson, \emph{The Northward Course of Empire} (New York: MacMillan, 1924), p.169.

\(^7\) Ibid., p.163.

\(^8\) Vilhjalmur Stefansson, \emph{The Arctic in Fact and Fable} (New York: Foreign Policy Association, 1945), p.65.
The development of nuclear weaponry by the United States, along with the means of delivery and a growing rift between the Western Powers and the Soviet Bloc led in turn to a very uneasy peace. The situation was further exacerbated by worsening East-West relations, the Berlin Crisis less than three years after the end of World War II, and it took a more critical turn when the Soviets detonated a nuclear device of their own in 1949. This disquieting development was followed closely by the Korean Conflict which was a "conventional" war fought with conventional weapons at a time when a nuclear holocaust was rapidly becoming a possibility.

The Korean War, in spite of its waste and destruction, was nonetheless a contained war where fear and common sense at least prevailed to prevent any expansion of the conflict or an escalation of weaponry to include the nuclear arsenal. More significantly, a basic pattern had now emerged, for the threat of retaliation and the appalling consequences of nuclear attack had produced in turn the concept of nuclear deterrence. Thus the balance of power was in future to rest on nuclear strike capability, while fear of massive retaliation was to act as a brake on any major expansions or open global conflict between the nuclear powers themselves.

While the nuclear deterrent had effects on the balance of power, it also brought about changes in defence strategy, particularly with respect to an increasingly urgent need for the total destruction of hostile aircraft well before they could reach any urban area. Nor was it now a matter of percentages, or numbers of attacking aircraft destroyed, for by 1952 the United States had developed a Hydrogen Bomb many times more powerful than the Atom.

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Bombs that had devastated Hiroshima and Nagasaki, and within a year the Soviets for their part had detonated a thermo-nuclear weapon.

The rapidity with which the Soviets had developed powerful nuclear weapons of their own was alarming to the West, and although nuclear stand-off was achieved via deterrence, a silent technological war was nevertheless quickening on both sides of the Iron Curtain. In the early stages of this struggle the primary means of delivering nuclear weapons to their intended targets rested almost entirely on the long-range manned bomber. Although this threat remained, the placing in orbit of the Soviet satellite, "Sputnik," in 1957 was a technological breakthrough that once more boded ill for the West. From this point on the technological war took on a new dimension and entered new arenas. Thаrafter followed a series of complex moves and counter-moves that involved new types of missiles, anti-missile-missiles, firing bases underground, elusive launching platforms roving beneath the sea, spy satellites in space, and the still present (if diminishing) threat of the manned nuclear bomber.

It was against this changing and increasingly complex background of nuclear and global strategy that the DEWline first surfaced as an integral facet of North American Defence policies of the 1950's at a time when the manned bomber was still a major threat to the North American continent. The desirability of an early warning radar network in the North was not subject to serious consideration in the immediate post-war period, although Canada's Prime Minister, W.L.Mackenzie King in 1947 found it necessary to inform the House of Commons that with respect to this question:

some quite unfounded suggestions have been put forward. There is a persistent rumour, for example, that the United States government has asked for bases in the Canadian North. This is a rumour
I should like to deny emphatically. There has been talk of Maginot lines, of large scale defence projects, all of which is unwarranted and much of it fantastic.90

Nevertheless, within a few scant years the large scale projects in the North had become a reality; the Maginot lines had been constructed, and the rapidly changing technology had complicated continental defence even further. In addition to the need for the detection of aircraft came an urgent requirement to detect inter-continental missiles. Thus a ballistic missile early warning system (BMEWS) came into being in the North during the early 1960's, and by this time the overall situation regarding North American Air Defence was as indicated below in Map Number 7:91

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91 After Stanley L. Englebardt, Strategic Defenses (New York: Crowell, 1966), p.110B.
Although the various underlying factors responsible for the establishment of the early warning systems of the 1950's and 1960's can be discussed in terms of changing technology and a response to an increased threat from the Soviets, the overall picture of North American defence remains complex. Discussing this aspect, R.J. Sutherland described the situation with respect to the North in the following words:

It is extremely difficult to describe in a few words the process by which the North American Air defence system, including the Arctic warning lines, was conceived and implemented. One reason is the sheer magnitude of the endeavour. Between 1951 and 1961 the United States and Canada invested more than $50,000,000,000 in continental air defence. Another reason is the very great numbers of points of view and influences which played some role in the planning of the air defence system. But the most fundamental reason is the rapid pace of events. During the fifties there was not one but a series of genuinely revolutionary changes in military technology and in strategic concepts. A crucial factor was the more than four-fold increase in North American defence budgets which occurred after the outbreak of the Korean War in June, 1950.92

Notwithstanding the above, Sutherland provides an illuminating capsule summary of events leading to the construction of the early warning lines,93 while his comments elsewhere94 on long-term aspects of Canada's strategic position in the North gives some indication of the complexities involved. More general treatments of the construction of the DEWline and the Ballistic Missile Early Warning system (BMEWS) have been given by Morenus95 and Englebardt96 respectively, while the evolution of the early warning systems have

93 Ibid., pp.264-275.
also been dealt with by Conant.\textsuperscript{97} The on-going problems of mutual defence have been discussed in detail by James Eayrs,\textsuperscript{98} Colin S.Gray,\textsuperscript{99} and James Warnock Jr.,\textsuperscript{100} and the treatment of this topic in the present work will be therefore confined to the highlights that contributed to the construction of the DEWline and those factors that were responsible for its continued operation in the Canadian North.

During the immediate post-war period, although Canada had taken over the control of the wartime projects, the Permanent Joint Board on Defence on 29 April 1946 nevertheless recommended that the Northwest Staging Route be maintained at a high level of readiness; that the Mackenzie River Air Route should be retained (subject to later re-assessment), and also that the airfields of the Crimson Route should likewise be retained. An even more important conclusion of the Permanent Joint Board was the retention and the building up of the U.S. base at Goose Bay, since the Board stressed that it considered Goose Bay vital to the defence of the United States and Canada. Canada, although concerned about the proposal and the implications of the use of the base for operations by the United States Air Force bombers of Strategic Air Command (SAC) nevertheless agreed within the year. Even at this early date the concept of deterrence appears to have been a factor in the decision, for as James Eayrs noted as follows: "An enemy was not

\textsuperscript{97}Melvin Conant, \textit{The Long Polar Watch} (New York: Harper and Brothers, 1962)

\textsuperscript{98}James Eayrs, \textit{In Defence of Canada} (Toronto: University of Toronto Press, 1972)

\textsuperscript{99}Colin S.Gray, \textit{Canadian Defence Priorities} (Toronto: Clarke, Irwin, and Company, 1972)

\textsuperscript{100}John W. Warnock, Jr., \textit{The Defence Policy of a Middle Power} (Washington: The American University, 1968)
deterred by concealment of the mechanism of massive retaliation. Here was the Canadians' first lesson in the school for strategy. By the end of 1947, US B-47 bombers were parked at the end of the Goose Bay runways. "101

Meanwhile in Europe relations between the East and the West were deteriorating rapidly. In 1948 came the Berlin Crisis; in April of 1949 the United States and Canada, along with ten other western nations formed the North Atlantic Treaty Organization (NATO), and in 1950 followed the onset of the Korean War. Sandwiched in between was a highly disturbing development, for in September of 1949 the Soviets detonated a nuclear device and also demonstrated what appeared to be a strategic air force. U.S. military planners were highly alarmed by this development, for such capabilities were years ahead of even their most pessimistic estimates. The immediate outcome of the Soviets' demonstrated nuclear capability was a drastic re-evaluation of North American Air Defence, with an increased focus on the North and the means of countering an all-out attack from this quarter.

In response to the increased threat of nuclear attack launched from over the Pole a study of air defence problems was carried out for the United States Air Force by a group at Massachusetts Institute of Technology in 1951. Known as Project Charles, this study led in turn to a more permanent arrangement in the same location by the Lincoln Laboratory between 1951-1952. During the summer of 1952 this group surveyed the problems of northern air defence and made recommendations for the future air defence of the continent. The results of the Lincoln Summer Study Group (as it was to be known) were summarised by Samuel P. Huntington as follows:

The report recommended the construction of a distant early warning line across northern Canada, an integrated and fully automatic communications system for air defense forces, and improved fighter planes and homing missiles for interception. Finally, the report urged that the distant early warning system be given to priority. The estimated costs of these improvements varied greatly, but all of the study group's recommendations together probably required several billion dollars.\textsuperscript{102}

The defence of Southern Canada and the United States entailed the construction of the Pinetree Line of radar stations running roughly along the Canada/U.S. border in the early 1950's,\textsuperscript{103} while the automatic communications system was to be realised with the SAGE system (Semi-Automatic Ground Environment) involving a comprehensive filtering of defence data and control information for the air defences of North America.\textsuperscript{104}

The distant early warning system envisaged by the Lincoln Study Group was intended to add to the above by the inclusion of two more radar systems set further north and separated by some 400 miles; each of these additional systems was to stretch across the continent and be extended seaward by air and naval radar pickets.\textsuperscript{105} Partly because of the high costs involved and divergent views as to the most effective utilisation of U.S. air power, the Lincoln Group's recommendations were to immediately implemented. The Group's conclusions were nevertheless responsible for an engineering and systems study to assess the feasibility of operating an early warning system in the arctic regions. The result was a contract awarded to the Western Electric


\textsuperscript{103} Costing $450 million and including station in Canada, for which the United States paid two-thirds of the cost.


\textsuperscript{105} See Map Number 7 for the approximate location of the various radar systems.
Company for the construction of a trial section of the projected radar and communications system in the arctic regions. Installed in great secrecy, the trial segment was subsequently erected along part of the North Slope of Alaska near Barter Island in late 1952 and early 1953, while overtures were made to the Canadian government for the erection of two further trial sites on Canadian territory in the Yukon.

This request and the choice of Barter Island, some 70 miles west of the Canadian border was to have an immediate consequence for Canada. In January of 1953 the United States had made an urgent request to construct additional sites in the Yukon in the vicinity of Herschel Island (Project Corrode). The request was reduced to one site, although the urgency remained. Canada was quick to grant permission, but with two important provisos: first the site would have to be built entirely at the expense of the United States; and second, there was to be the immediate creation of a Joint U.S./Canadian military study group to discuss matters relevant to air defence and early warning systems in the North. James Eayrs noted that as a result of this arrangement the Canadian government:

hoped by this device to escape a situation wherein it would be presented with plans for radar construction which its own expert advisers had had no opportunity to scrutinize and study. That had happened, to Canada's disadvantage, more than once in the past: the Canadian Government was determined that it should not happen again.  

Canada thus obtained access to these new activities in the North and also was provided with a platform for its own opinions on such matters.

Meanwhile construction and testing of the trial installations continued in the first half of 1953. Opinions regarding the desirability of a distant

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early warning system in the Far North among U.S. military planners at this
time, but matters came to a head when the Soviets detonated a thermo-nuclear
device on August 12 1953. This event, which brought into sharp focus the
need for an arctic early warning system also initiated the hurried construct-
ion of the early warning lines following the go-ahead decision of the Nat-
ional Security Council on October 6 of the same year. James Eayrs summed up
the situation with the following remarks: " The Lincoln Summer Students had
at last prevailed. Their programme for continental defence had been adopted
almost intact. It would cost roughly $20 billion over a five-year period.
Most of the expense would be for Arctic early warning. " 107

The question of expense was a potentially troublesome one for Canada,
while the likely size of the projected warning systems and their construction
in inaccessible regions of the Canadian North posed a possible threat to Cana-
dian sovereignty. It was partly to allay such fears that Canada, following
the recommendations made by the Joint Military Study Group, embarked on its
own feasibility study of a Canadian early warning system to be located in
the sub-Arctic. As a result of this study and work carried out by the Cana-
dian Defence Research Board (DRB) Canada decided in June 1954 to proceed with
a completely Canadian warning system situated approximately along the 55th
Parallel.

The Mid-Canada-Line (McGill Fence)

The construction of an early warning system at sub-arctic latitudes was
in effect part of the original recommendations made by the Lincoln Study
Group to extend the warning systems progressively northward from the last

107 Ibid., p.364.
line of defence, the Pinetree Line located along the U.S./Canadian border. Partly because of the anticipated costs involved in the more northerly system Canada had opted for its own construction of the Mid-Canada-Line, although this was not the only consideration. Further reasons for the Mid-Canada-Line decision lay in a desire to employ both Canadian technology and Industry and at the same time gain absolute control of expenditure by embarking on an entirely Canadian venture. James Eayrs made the following comments on Canada's decision to proceed independently:

Canada possessed not only the geography in which to go it alone: she possessed, as well, the technology. (That was, for her, an unusual combination.) Nor was this the sole aspect of feasibility. An all-Canadian effort, mainly due to the technology embodied in the radar apparatus contrived by the McGill scientists, would be relatively modest in cost. Keeping the project under Canadian control would enable the Government to avoid the inflated an excessive expenses which, as the wartime experience of the Alaska Highway and the Northwest Staging Route had shown, was the inescapable consequence of joint participation with the United States.

Although Canada was thus able to avoid the greater expense of the more northerly early warning system by demonstrating its willingness to share in the burden of northern defence by the lone construction of the Mid-Canada-Line, the costs were still high. Canada in fact spent almost twice the amount of the total wartime expenditure ($111,000,000) on the project, in all some $210,000,000. This amount in turn was to be dwarfed by the cost of the DEWline, which reached an estimated $600,000,000.

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109 Ibid., pp. 369-370.

The Mid-Canada-Line, although constructed closer to the South, still ran through vast regions of largely uninhabited and inaccessible parts of the sub-Arctic. The system was constructed during the period 1955-1957 and was phased out some ten years later in 1965, and thus had neither the longevity or the impact that the system constructed further north was to have. This does not mean that the Mid-Canada-Line did not have a significant effect on the areas it encompassed, or on the various sectors of the Canadian economy associated with the project, but simply that its effects were less pronounced.

Because of its very nature, the McGill Fence did not make use of conventional radar and radar installations but instead employed a doppler detection technique and largely automated stations - as many as 98 in all, and a new microwave communications system expressly designed for the purpose. There were also additional communications facilities, including two tropospheric scatter systems in the James Bay region running both southward from the north west tip of James Bay and also across the Bay from Cape Henrietta Maria to Cape Jones. Further communications facilities were provided for military and support requirements by air-to-ground equipment and radio navigation beacons.

The Mid-Canada-Line, or McGill Fence was in effect a remotely controlled "electronic fence" and posed peculiar problems in terms of logistics.

maintenance, and control. One result of the automated approach was the
greater use of air transport, particularly helicopters (both during construc-
tion and during the operational phase) by the Royal Canadian Air Force in
the first instance, and later by civilian operators in the second. In
addition, northern aviation also received a considerable boost by the use of
small commercial aircraft (such as the DC-3) and amphibious aircraft in a
number of supporting roles along the Line.

The Mid-Canada-Line closed down some ten years after its inception, but
at its height it ran completely across the sub-arctic from Hopedale on the
Labrador coast, through Northern Quebec, along the lower reaches of Hudson
Bay and Northern Ontario, across Northern Manitoba and Saskatchewan, and as
far west as Dawson Creek in British Columbia. It unfortunately might be
classified in the "boom and bust" category given the duration of its opera-
tion, yet there were nevertheless concrete benefits that accrued from the
system. Expertise in both northern transportation and communications were
gained from the project, while inaccessibility in the northern regions of
the Provinces underwent a further an irrevocable reduction as the northern
frontier was once more extended.

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115 R.T.Heaslip, " Molding the Mid Canada Radar Line, " Canadian Aviation,
Vol.30, No.10, November 1957, pp.54-55; also: Peter Corley-Smith, " Mid
31-32. See also: Larry Milberry, Aviation in Canada (Toronto: McGraw-
Hill, 1979), pp.251-252.
The DEWline Decision

The decision made by the Canadian Government on June 23 1954 to proceed with the construction of the Mid-Canada-Line marked not only the beginning of an era of increased activity in the Canadian sub-arctic, it in addition also signalled the start of what was in effect a major assault on the Arctic in general. The Mid-Canada-Line was an integral part of a far greater scheme for continental air defence, and only a few weeks earlier, on April 8 1954 the United States and Canadian Governments had issued a joint statement concerning the planned establishment of two early warning systems in the North.

The first of these early warning systems, situated: "generally to the north of settled territory in Canada, " became the Mid-Canada-Line, while the second system, to be located: " across the most northerly practicable part of North America, " became in turn the DEWline. The rationale for the addition of these two costly and complex warning systems was also given in the April 8 communique, which stated:

In developing the complete system for warning of the approach of hostile aircraft and for the control of interceptor forces, the two governments have followed a policy building outward from the

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116 What James Woodford, in: The Violated Vision (Toronto: McClelland and Stewart, 1972, p.2) has termed: " the radar rush. ")
117 Released on September 27 1954 in a statement issued by the Defence Departments of the two countries and published in Canada on October 1 1954 in the Canadian Weekly Bulletin, Vol.9, No.48, p.6.
118 Ibid.
119 Ibid.
likely target areas. Thus the first step, which has now been largely completed, was the construction of the main control and warning radar installations in the continental United States and populated part of Canada. The second, which is now under way, is the provision of the Mid-Canada-Line. A third measure, the need for which has now been agreed upon between the two Governments, will be the provision of a distant early warning line across the most northerly practicable part of North America. Portions of the complete warning and control system in Canada will be extended to seaward on both flanks of the continent by the United States.¹²⁰

The question of cost had not been fully examined at the time of the April 8th statement, although it was mentioned in passing, along with the allocation of construction contracts, i.e., it was stated: "The basis of participation by the two countries in the construction and operation of the line, and the division of costs, will be determined after detailed plans have been considered and agreed."¹²¹ Following Canada's decision to proceed at its own expense with the design, construction, and operation of the Mid-Canada-Line, the costs of the more northerly system were finally left to the United States, although Canada nevertheless expressed its desire to participate in both the construction and operation of the DEWline in Canada.

The DEWline Agreement

Finally, after an exchange of notes between Canada and the United States on May 5 1955 the full conditions¹²² for the construction of the DEWline were tabled in the Canadian House of Commons on May 20 1955. The resulting agreement for the DEWline was detailed and explicit in a number of significant areas and was a far cry from the wartime projects that Canada had paid for after the fact to preserve its sovereignty. The situation in the mid 1950's was perhaps somewhat different in any case, but the fact that Canada

had studied the early warning question in detail on one hand, and had established a close liaison with the United States via the Joint Military Study Group on the other, no doubt proved to be advantageous. In any case, the very magnitude of the project and its intended duration (originally for a period of ten years, with provisions for further extensions) obviously called for careful assessment and safeguards since the Canadian North was clearly to be affected by the forthcoming intrusions.

The DEWline Agreement laid down twenty-one conditions in all, by which Canada ensured that it was able to retain title and rights to all lands used; had rights of inspection; had access to, and use of all ports, roads, and airfields; and included clauses for the protection and employment of Eskimos, for the protection of archaeological sites and wildlife, and an arrangement by which Canadian contractors obtained priority for construction, supply, and manning of the system in Canada. A further important proviso was that a high degree of liaison between Canada and the United States was to be maintained at all levels, while Canada also obtained the right of take-over of the complete system if it deemed this necessary in the future.

The importance of the DEWline Agreement was not lost on commentators concerned with Canadian/United States relations, while the single most important result of the Agreement was not only the protection of Canadian sovereignty it afforded, but the actual consolidation of Canadian claims to the High Arctic that the Agreement provided. This point was brought out

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\footnote{122}{The complete text of the conditions of the DEWline Agreement is given in Appendix B.}
\footnote{123}{An assessment of the terms of the Agreement is given by James Eayrs in \textit{Canada in World Affairs, October 1955 to June 1957} (Toronto: Oxford University Press, 1959), pp.148-151.}
clearly by R.J. Sutherland, who stated: "as a result of the DEW line Agreements, Canada secured what the United States had up to that time assiduously endeavoured to avoid, namely, an explicit recognition of Canadian claims to the exercise of sovereignty in the Far North."  

At the time of the DEWline Agreement the High Arctic was still an area of largely unknown mineral and oil potential, and was in addition virtually inaccessible. As time was to show, the DEWline Agreement not only assured Canada the vast resources that lay beneath the Arctic Archipelago, the DEWline itself by its very presence over a decade after the agreement was reached was also instrumental in aiding Canadian exploration in this huge region.

The terms of the DEWline Agreement were no doubt the product of past experience and the awareness of the opportunity afforded by what promised to be a wholesale onslaught on Canada's North. If the Agreement itself was evidence that Canada had driven a "hard Bargain," as Leslie Roberts was to state in July 1955, the true price paid by Canada was nevertheless high, since Canada's links with the United States became even stronger. As James Eayrs has pointed out:

There is interdependence in defence. The two North American members of NATO had been thrown closer together by external events not always of their own making or their own liking, and a whole new range of opportunity for friction and misunderstanding has thus been opened up. To build and man the radar chains that guard our common continent, we have admitted to remote portions of our nation United States servicemen and civilians in circumstances and in numbers no sovereign nation would ordinarily allow. This has been nothing less than a condition of our survival, and we are grateful - or we should be. All the


same, the presence of so many Americans in our north country, coming and going pretty much as they please, has had an unsettling effect. Disturbing rumours trickle down from the northlands into parliament and the press, having a greater influence on public opinion that the fine print of the Statement of Conditions to Govern the Establishment of a Distant Early Warning System in Canadian Territory, ' an agreement negotiated in 1955 and made public by the government in an attempt to allay just such misgivings. 126

Misgivings or not, within months along the entire northern rim of the continent an extensive network of stations came into being (see Map No.8) situated less than 50 miles apart from the western areas of northern Alaska clear across Canada to the east coast of Baffin Island. This was the start of the DEWline era, and it was to signal a new phase in the urban revolution and to bring great changes to the Canadian North.

DEWLINE CONSTRUCTION AND AFTERMATH

CHAPTER VII

DEWline Siting and Surveys in Canada

The construction of the DEWline across the top of North America was to take place with great swiftness and secrecy entirely above the treeline, within the permafrost region, and in accordance with a winter design temperature of $-30^\circ$ fahrenheit, as indicated in Map Number 9 overleaf. Before the DEWline could be constructed, however, much preliminary work was necessary, particularly as far as the building of the section of the DEWline across the Canadian North was concerned. Initially there were a number of areas that gave rise to serious problems that only the coming of the DEWline itself was to solve; these were:

[1] The lack of adequate transportation routes, facilities, and equipment for carrying out large scale movements across the North.

[2] The lack of communication networks to and from the South, and across the North

The lack of these facilities rendered the gathering of hard data for the DEWline feasibility studies all that more difficult, and there were further complications arising out of the additional needs for haste and secrecy.
These problems were further complicated by limited access to the North, a lack of information in the region, and concerns and criticisms voiced in the South as news of the project was released to the public.

DEWline Surveys and Construction Problems in Canada

The problems raised initially by DEWline activities in the Canadian North may well have stemmed in part from the interval of time between the DEWline feasibility studies carried out during 1952-1953 and the final disclosure of the DEWline Agreement in May 1955. During the early period associated with the feasibility studies the situation was clouded by a need for security as well as a need for information about the Canadian North. Even so, as early as January 1953 Canada had agreed to the establishment of part of the trial installations along the Yukon coast, while further studies concerning the extension of the system across the Canadian Arctic also took place during 1953-1954.

The technical problems of constructing a complete early warning system across the top of the North American continent were complex and required much planning, extensive surveying, and the gathering of a great deal of data. J.D.Brannian,127 in describing how the initial DEWline sites were selected, states that by April 1 1953 all the locations had been made and were ready for confirmation by the siting crews. These locations were those near Barter Island in Alaska and in the Yukon near Herschel Island; Brannian noted that the project did not stop at this point however, for:

Within six weeks, the installations were laid out, sketches were provided the local construction supervisor, and the siting personnel returned to the New York headquarters for the second phase

of their assignment, the determination of a "practical route" across Arctic Canada.\textsuperscript{128}

Unfortunately, while the terrain in Alaska was more or less similar to that encountered with the trial sites, and thus presented few new problems for the westward expansion of the DEWline across Alaska, the situation in the Canadian Arctic was complicated by a number of factors. Firstly, the terrain varied considerably across the Canadian North, and required the DEW-line siting engineers to identify and deal with problems associated with at least three distinctly different types of terrain.\textsuperscript{129} Secondly, while the work in Alaska was aided considerably by previous government and military projects involving mapping, aerial photography, hydrographic work, and detailed documentation of the terrain, no such store of information on the Canadian Arctic was available. The situation in the Canadian North in 1953 was summed up by Brannian as follows:

Until recently, this vast treeless area of islands, plains, plateaus and mountain ranges was of interest only to the commercial fur industry and a few scientific expeditions that concentrated on studying animal and plant life, geological formations, and the native Eskimos. ....Transportation facilities consisted of aircraft, small boats, and dogsleds. Existing installations were small Eskimo villages (Tuk Tuk, Bathurst Inlet, Cambridge Bay, etc.), remote government weather stations (Mould Bay, Eureka, etc.) and several government airfields of varying size and serviceability (Coral Harbour, Resolute Bay, etc.), none of which were capable of supporting a radar station without an extensive construction program and an expansion of their usual supply routes.\textsuperscript{130}

While the coming of the DEWline was to drastically alter the transportation, supply, and communications routes in the Canadian North, the immediate need in 1953 was the gathering of information and assessing the the feasibility of the system across this still largely inaccessible region. Initially

\textsuperscript{128} Ibid., p.171.

\textsuperscript{129} These were: (1) Tundra; (2) Raised limestone beaches or terraces; and (3) Granite schists and gneiss (Brannian, \textit{ibid.}, p.178.)

\textsuperscript{130} Ibid., p.173.
the DEWline siting staff contacted as many people as possible who possessed first-hand experience of the areas under consideration, and in addition contacted the following Canadian agencies: the Department of Transport, the Department of Northern Affairs and National Resources, the Army Survey Establishment; the Canadian Hydrographic Service; the Royal Canadian Mounted Police; and the Royal Canadian Air Force.  

Although the data gathered in this manner was of value, part of it was of a non-technical nature and the survey also pointed to a number of critical areas where the data was inadequate and in need of updating. The suitability of a particular DEWline location was subject to technical considerations based on the following criteria:

1. **Operation**: that is, can the proposed location fully perform its assigned missions (of detection, communication, and support) or must the missions be modified by transferring positions to adjacent installations.

2. **Construction**: that is, can the proposed location be built, using the facilities available, and within the scheduled time.

3. **Logistics**: that is, can the proposed location be practically supported by the facilities available, to the extent required, and within the scheduled time.  

These requirements in turn dictated the site selection, for the vital factors involved concerned:

A. **Spacing**. The distance between sites was important from a detection coverage point of view.

B. **Elevation and other terrain features** were also important for efficient electronic operations.

C. **Logistics**. Factors involving sea-support and air-support.

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D. **Engineering Design.** Stability of soils, including permafrost characteristics, was evaluated. Suitable ground areas for buildings, outside plants and airfields were selected.

E. **Fresh Water supply points and refuse disposal areas to be determined.** (italics supplied)\(^{133}\)

In the case of Alaska, most of the data had been readily available, but the Canadian data was quite limited, for maps of the regions of interest lacked vital details such as information regarding terrain and contours; the hydrographic charts were limited also; and in some cases the possible locations for the DEWline in Canada ran through areas about which there was little or no first hand information. Nevertheless, the information was desperately needed for the feasibility study, and as J.D. Brannian describes,\(^{134}\) the problem was overcome to some extent by the use of aerial photography. This in turn involved the use of both the United States and Canadian Air Forces; on-the-spot inspections carried out by DEWline siting engineers accompanying the annual re-supply ships of the Canadian Government and the Hudson Bay Company; and low level air reconnaissance carried out during the Summer of 1953.

Following the decision to proceed with the construction of the DEWline made late in 1954, the problem of inadequate maps and lack of information for the Canadian section resulted in a crash program of aerial photography involving the United States Aeronautical Chart and Information Center plus the gainful employment of a number of Canadian aviation operators.\(^{135}\) Thus even before the actual construction phase of the DEWline commenced, Canadian companies began to reap the benefit of the projected onslaught on the

\(^{133}\)Brannian, *ibid.*, p.55.

\(^{134}\)Ibid., p.175.

\(^{135}\)Spartan Air Services, Canadian Aero Services Ltd., Arctic Wings Ltd., Associated Airways, and Martitime Central Airways Ltd. (Brannian, p.202)
North. Although no total figures or complete breakdown of the costs involved have been released, the value of the DEWline phase to Canada was considerable. For example, C.W. Walker reported that by June 1 1957:

Approximately 87,000 purchase orders for materials, tools, food, fuel, equipment etc., have been issued to 4300 different companies. 48.2% to Canadian and 51.8% United States. The overall procurement figure to February 1, 1957 is $320,000,000, of which 56.4% was spent with Canadian firms and 43.6% spent with firms in the United States.\(^{136}\)

The DEWline became operational in August 1957, and thus even six months prior to this date the Canadian Economy had already benefitted from the DEWline to the tune of at least $180,000,000. In addition to procurement, Canadian companies were also awarded the major construction contracts for the Canadian section of the DEWline, which was divided into eastern and western sections to ease logistic difficulties associated with sea transportation through the Central Arctic. The Eastern Sector went to the Foundation Company of Canada, while the Western Sector was awarded to the Northern Construction Company and also James W. Stewart of Vancouver.\(^{137}\)

The construction of the Alaskan section of the DEWline was carried out by the United States firm of Puget Sound and Drake, and was accomplished under somewhat easier circumstances than either of the two Canadian sections. The reasons for this were given by M.S. Cheever as follows:

In Canada, there was no establishment such as Point Barrow where they could base, no stock of materials on hand, no complement of tractors, sleds, wannigans and other equipment tailored for Arctic operations available in the general area in which they would have to operate. Neither was there any air carrier who had pilots with immediate knowledge of the terrain in which operations must be conducted. Therefore, development of facilities in these sections was of greater concern initially than actual construction.\(^{138}\)

\(^{136}\) Ibid., p.61.

\(^{137}\) Brannian, ibid., p.61.

The construction of the DEWline in Canada represented far more than the development of the missing facilities and information. In addition to an upgrading of information and knowledge about the Canadian North, the coming of the DEWline provided ready access routes north to south and also laterally across the top of the continent. Not only were these new transportation routes established they were also maintained on a year-round basis. Further, the establishment of a series of self-contained DEWline stations (in effect permanent settlements) spaced approximately 50 miles apart stretching from the Alaskan border to the east coast of Baffin Island greatly enhanced air safety while at the same time bringing a new wide-band communications system, new airfields, new weather stations, and employment opportunities. Writing in 1967 before the upswing in arctic exploration that followed the discovery of oil at Prudhoe Bay on the North Slope of Alaska, J.R.K.Main commented on the value of the DEWline as follows:

Prior to the advent of the DEWline, a flight beyond the Arctic Circle was something of an adventure: hazardous, and undertaken with some trepidation even in summer. After the baptism of complete immersion in the worst the Arctic had to offer, endured during the winters of 1955-'56 and '56-'57, catching a plane to the Arctic meant no more than catching a street car. The psychological barrier was down; the snow curtain was dissipated and the Arctic, as far as the rim of the continent, now lies open to such developments as the discovery of mineral wealth, favourable world markets, and improved methods of transportation may dictate.139

Within a year of Main's comments above came a period of intensified mineral, oil, and gas exploration in the Canadian North, and while the use of DEWline aerodromes and support facilities was not authorised for purposes of air tourism (except under cases of extreme emergency etc.) they

had long been available\textsuperscript{140} to northern air operators, government personnel, researchers, and exploration companies. The true value of this form of support provided by the DEWline is perhaps difficult to assess, given the alternative of operating in the North without such facilities. There can be little doubt though, that during the late 1960's the exploration of the northern regions of Canada was both hastened and facilitated by the presence and the assistance provided by the DEWline. The authorized use of DEWline facilities - the legacy of the DEWline Agreement of 1955 - has been in effect now for over two decades, and has acted as a tremendous booster to northern transportation and northern development. The use of such facilities has been neither fully documented nor generally appreciated, and thus the total value of the DEWline to Canada has yet to be assessed completely. The establishment of the system in the Canadian Arctic, on the other hand, was well summarised in an editorial published in 1958 in the Canadian Architect which stated:

In its way, the DEW Line crystallized many of the human and technical problems of northern living. It involved extraordinary and intricate construction which had to be carried out under appalling conditions; it involved problems of supply and transportation on a greater scale than any previous northern projects; it involved training men to live under conditions many had never dreamed of; it involved a mass descent upon the Eskimo, and even his absorption into white man's living.\textsuperscript{141}

The DEWline obviously can be considered from a number of viewpoints, but the above summary indicates the three main areas where its effects were most relevant to northern development:

\textsuperscript{140}With prior permission; for information concerning civilian use of the DEWline aerodromes and facilities, see the IFR Terminal and Enroute Data, IFR Supplement, Canada and the North Atlantic\textit{(N)} (Ottawa: Department of Energy, Mines and Resources, 1979), pp.c52-c53.

\textsuperscript{141}The Canadian Architect, Vol.3, No.11, November 1958, p.43.
1. Construction and Engineering in the Arctic

2. Arctic Transportation and Supply

3. Socio-Economic Impact

Documented information regarding these three areas is somewhat dated, and although this is no problem in the case of construction and engineering data, information regarding both transportation and socio-economic effects is greatly in need of updating. In most instances, what available data there is deals predominantly with the DEWline construction phase (1955-57) and the years immediately following, while information covering the last decade is somewhat sparse.

**Construction and Engineering**

Although the construction and engineering aspects of the DEWline have been well documented,\(^{1,2}\) the solutions to the various problems posed by operating in the harsh arctic environment have not perhaps received as wide an application as might reasonably have been expected. In addition to the value of the DEWline siting surveys, the DEWline project also involved the application of special techniques to cope with the arctic climate and the problems posed by permafrost and a wide variety of difficult terrain. The DEWline also had to tackle and solve the problems posed by the requirements for year round habitation in what were essentially to be a series of specially constructed self-contained settlements. Thus it was necessary to design a compact, weatherproof, and durable form of arctic

\(^{1,2}\) In addition to C.W.Walker, J.D.Brannian, and M.S.Cheever mentioned previously, see also: H.F.Flanders, "Contributions of the DEW LINE in Arctic Engineering," 8th Alaska Science Conference, Edited by Albert W.Johnson (Anchorage: American Association for the Advancement of Science, 1957), pp.53-65.
housing and also to attend to complex problems associated with heating, water supply, electric power, and waste disposal in remote areas further complicated by severe weather and temperatures.

The manner in which these various problems were solved indicates that in some respects the DEWline was ahead of its time. A particular example of this is seen in the manner that the triple problems of high fuel costs, and the need to supply both electrical power and heating sources on the DEWline stations was tackled. Even in the mid 1950's the cost of fuel oil in the North was estimated to be four times as high as in the South if delivered to the North by tanker; seven times as high if delivered by drum, and nineteen times as high if delivered by air.\textsuperscript{143} To maximise the available fuel oil and to cope with the twin requirements of electric al power and heating supplies, the DEWline engineers designed an ingenious recycling system whereby the hot exhaust gases from the diesel-generators that provided the electrical power were also used to heat the station water supply and the entire site.\textsuperscript{144}

The construction of the sites themselves was also subject to careful planning, including alignment with respect to prevailing winds, and specially designed prefabricated "modules" raised off the ground (the piloti approach to drifting snow) arranged in the form of "trains."\textsuperscript{145} These modules were fire resistant (made largely of treated timber) and could be transported by sled where necessary or carried by aircraft in

\textsuperscript{143}Henry Vaugle, "Waste Heat Recovery System Keeps Arctic Outpost Warm," Heating, Piping, and Air Conditioning, February 1959, pp.130-134.

\textsuperscript{144}Vaugle, ibid., p.131.

\textsuperscript{145}For details, see Flander, ibid., pp.55-56.
other instances. The modules themselves - each 28 feet long, 16 feet wide, and 10 feet high - served to meet all the various requirements of the DEW-line stations (living quarters, power and electronic equipment housing, culinary, and recreational areas etc.) with each Auxiliary station making use of over 25 such modules, and the Main stations over 50.146

A radical and unrealised approach to the problem of supplying electric power to the individual DEWline stations even included the possible use of small nuclear power units,147 while the very remoteness of the DEWline (away from both a national grid and sources of industry) was an additional factor requiring consideration during the planning phases of the DEWline. Flanders that with respect to the DEWline:

Civilized man with his manufacturing and fabrication centers, established supply lines, recreational facilities, and ready manpower areas has sensibly chosen more compatible areas in which to settle. What we usually can fix by placing a phone call in our normal surroundings, becomes a tactical problem in logistics at a point so remote as the DEWline.148

Not only were the facilities lacking in the areas that the DEWline was to be established, but in addition there was a similar lack of resources. It has been said that: "the Arctic provided only gravel and water," 149 for the DEWline, and even here the amount of gravel used was staggering - enough in fact to build an 18-foot highway from New York to Los Angeles,150 or in the Canadian context, enough gravel to build the same 18-foot highway.

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146Flanders, ibid., p.56.
148Ibid., p.57.
from Toronto to Vancouver.

On a more general note, the gathering of DEWline construction data (i.e., such as the type of terrain, availability of gravel and water, plus general information about the regions through which the DEWline was situated) has filled in vital gaps about the Canadian North, while the DEWline stations have more than stood the test of time and the rigours of one of the most severe climates in the world.

**Arctic Transportation and Supply**

Although air transport was obviously destined to play a central role in both the construction and operation of the DEWline, the part played by sea and river transportation was also important and valuable to the development of the Canadian North. In the case of DEWline transportation and supply, as with the construction phase, the operation was well documented, in particular the effect of the DEWline airlift on Canadian air carriers. While both the Royal Canadian Air Force and the United States Air Force were also to play their parts in this airlift, particularly the latter, the major portion of the work - as promised in the DEWline Agreement - was given to Canadian air carriers. The part played by Canadian carriers has been well acknowledged, but it is still not generally realised that most of Canada's

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151 A capsule summary of the effects of the DEWline airlift on the Canadian air industry is given by Larry Milberry, *Aviation in Canada*, (Toronto: McGraw-Hill, 1979), pp.73-78; a more detailed treatment is given by J.R. Mair, *Voyageurs of the Air* (Ottawa: Queen's Printer, 1967), pp.211-248. The part played by the Royal Canadian Air Force in the construction of the DEWline has also to be mentioned, for it was the expertise gained by RCAF helicopter operations on the Mid-Canada-Line that was applied to difficult transportation problems in the Baffin Island area, and the RCAF also provided a valuable service with ice reconnaissance flights during the sea supply operations of the DEWline (Leslie Roberts, *There Shall Be Wings*, Toronto: Clarke, Irwin, and Company, 1959, p.99 and p.253)
present air carriers practically owe their origins to the lucrative contracts associated with the DEWline airlift. Both Quebecair and Pacific Western Airlines expanded into the domestic market after working on the DEWline construction phase, as did Nordair and Transair while also maintaining year round supply contracts involving respectively flights laterally along the DEWline, and flights to and from the South.

In all, 15 Canadian air carriers were employed on the DEWline airlift; a general assessment of the value of this work is given by Victor Koby, "DEW-Line Airlift," Canadian Aviation, Vol.28, No.9, September 1955 pp.27-30 and p.106; an appreciation and critique is given by Ernie Hemp-hill, "Air Transport Crossroads," Canadian Aviation, Vol.30, No.6, June 1957, pp.41-43 and p.114. A criticism regarding the manner in which the DEWline airlift was carried out with respect to regulation and safety was given in an editorial published by the Canadian Airline Pilot's Association (CALPA) in Pilot, April 1956, pp.16-21, and p.31.


Other Canadian air carriers involved in the DEWline operation were: Associated Airways, Central Northern Airways (prior to its merger with Arctic Wings to form Transair in 1956), and Wheeler Airlines. Maritime Central was most active in the east; see: "Lion's Share of DEW-lift for MCA," Canadian Aviation, Vol.28, No.6, June 1955, p.42. For Wheeler Airlines see Canadian Aviation, Vol.28, No.10, October 1955, p.32; and Associated Airways in Canadian Aviation, Vol.28, No.9, September 1955, while Central Northern Airways is also mentioned in the same issue (September 1955, p.46).

Worth $3.5 million to Transair in 1962 (Nick Nickels, "Wings of the North," Flying, Vol.71, No.1, July 1962, p.46.)
Equally important to the North in its own right were the large-scale maritime operations carried out during the construction phases of the DEW-line and annually (although at a reduced level ) ever since. During DEWline construction it was necessary to move as much material as possible via sea routes, and thus huge convoys made their way into the Canadian Arctic: from the east to Baffin Island and into Foxe Basin, and from the west via the Bering Straits into the Central Arctic by way of the Beaufort Sea and the Arctic Archipelago as far as Simpson Peninsula.\textsuperscript{154}

In addition to the participation of large elements of the United States Air Force and Navy in the DEWline sea-lift, many other routes and carriers were involved. Morenus reported that:

The Northern Construction Company with its barge facilities fed freight from a railhead at Waterways, Alberta, Canada, down the Mackenzie River to Aklavik, some 1,500 wilderness miles........ Such freight reaching Aklavik, an Eskimo trading settlement on the Mackenzie Delta, was stored for redisposition by boat and by "cat" train and by air. Alaska too was taking part in this over-all logistic plan. Alaska Freight Lines opened trails for overland transportation and by unique utilization of specialized equipment hauled approximately 1,100 tons of petroleum products from Fairbanks to the Arctic coast. And by this same means thousands of tons of cement and stell bars were hauled north.... In all, during the summer of 1955, more than 200,000 tons of cargo was landed at the DEW Line by the efforts of the Navy, plus the thousands of Army men in practical support. Besides that, the sturdy barges on the Mackenzie River transported another 8,000 tons into the Arctic; 1,100 tons arrived via Alaska. In total, approximately 209,100 tones reached the Arctic beaches. And all within the scant period of less than two months of open navigable water.\textsuperscript{155}

The very magnitude of the DEWline supply operation, which it is said

\textsuperscript{154}See Map Number 10 for the location of the DEWline sea-lift routes.
required: "the biggest task force since the invasion of Europe and the largest air operation since the Berlin Airlift," resulted in further valuable experience and data concerning operations in the Canadian North, this time with respect to maritime operations over a wide region where the majority of arctic settlements were generally situated. Thus ports, sea routes, knowledge of ice conditions, and the general requirements for sea operations became applied to the annual DEWline Sea-lift, which at the same time benefitted the arctic settlements that were also served during the summer re-supply season.

The initial construction convoys were organised and controlled by the United States Navy Maritime Sea Transport Service, while the Royal Canadian Navy also played a role, and over the past two decades as activity in the North has increased Canadian Coast Guard icebreakers have also played their part in the annual re-supply operations. An important accompanying benefit of the DEWline maritime activities has also been the use of the Mackenzie River Transportation System in the Western Arctic, both during the construction phase and later on an annual basis. Here again the arctic settlements were able to benefit from the DEWline supply activities, in particular settlements as far east as Spence Bay.

156 C.J.Marshall, ibid., p.616.
159 See Map No.11, and also: William Dunstan, "To the North by Sea," North, Vol.26, No.5, May 1969, p.45.
CHAPTER VIII
DEWline Communications

The DEWline communications system, to fulfill its primary task of transmitting the necessary information concerning any and all aircraft that came within its radar detection area, obviously posed somewhat strict requirements in terms of security, reliability, and effectiveness. Prior to the coming of the DEWline, radio communications in the Canadian North had been limited to the use of High Frequency (HF) techniques and equipment, with all the various drawbacks of this particular technology. In addition to the lack of security, limited channel capacity, and the fixed allocations within the HF spectrum, communications in the Arctic using such technology were not only subject to the usual vagaries associated with seasonal and diurnal changes, but in addition were further affected by operation at high latitudes and through the auroral zone.

Any alternative means of radio communication was bound to be prohibitively expensive, for there were no roads or railways in the Far North to provide natural paths or to reduce the construction costs of telegraph and radio relay systems. In the case of the DEWline there were other factors that needed to be taken into account, for the requirements of the radar detection system dictated that the stations be located 90-100 miles apart, and thus a radio relay network operating on line-of-sight principles would require one or two additional sites between adjacent radar stations. Here again the high cost factor, both for construction and operation, could not be ignored. Also, there were additional (and even worse) problems involved in the need to develop a reliable means of transmitting the DEWline data far to the South, over distances of thousands of miles.
Tropospheric Scatter Communications

The resolution of the problems associated with effective DEWline communications was accomplished by the application of a new technique known as Tropospheric Scatter, which was designed to cope with the following problem: "How to move high quality radio-telephone signals over long distances without landlines, and with a minimum of station installations."  

Interest in this problem with respect to the DEWline appears to have had its origins with the Lincoln Summer Study Group in 1952, and obviously, consideration of the feasibility of an early warning system in the Far North would necessarily entail a study of the attendant communications systems and their requirements. While line-of-site radio relay systems depended essentially on short links with repeater stations positioned 25-40 miles apart, the use of tropospheric scatter techniques allowed for over-the-horizon radio transmission, although a price was paid in terms of a requirement for high power transmitters, special low noise receivers, and large antennas.

Early testing of the tropospheric scatter technique took place in Newfoundland from October 1953 to October 1954 over distances of 170 miles (from St. Anthony to Gander), and 290 miles (St. Anthony to Harbour Main). One of the first applications of the technique was the "Polevault" link.

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162 See Gunther, ibid., p.81 for the difference between the two methods.

from the Canadian Arctic (south from Frobisher Bay) in 1955, while the first commercial application was a tropospheric scatter system from Goose Bay in 1957.\textsuperscript{164} Tropospheric scatter systems since that time have found application throughout the world,\textsuperscript{165} including its use as the main means of communication between DEWline stations and more ambitious projects in the North such as the one-hop tropospheric link from Hall Beach to the USAF base at Thule in Greenland (number 87 on Gunther's map). Since the 1950's there have been radical changes in communications technology with the advent of satellites, but it is relevant to note that during the DEWline era no such facilities were available, and even as late as 1959 Satellite Communications was still considered to be in the realm of the exotic rather than the practical.\textsuperscript{166}

\textbf{The Upgrading of DEWline Communications}

Although the DEWline communications system served its primary purpose, it was, curiously enough, a further change in technology - the launching of the Soviet satellite, "Sputnik" that in all likelihood gave the DEWline a new lease of life. The DEWline had been constructed between 1955 and 1957 expressly to combat the threat of the manned bomber, but the entry of the satellite into the picture (and particularly the rocket technology involved) refocussed problems of defence around the intercontinental ballistic missile (the ICBM). As James Eayrs noted:

\begin{quote}
It is the way with weapons systems to become obsolete on becoming operational. In this respect the DEW Line ran true to form. No
\end{quote}

\textsuperscript{164}Jim Roper, \textit{ibid.}, p.3.

\textsuperscript{165}Gunther (\textit{ibid.}, pp.91-98) gives details and locations for 100 tropospheric scatter systems in operation between 1955 and 1965; for the DEWline tropospheric system and systems in North America see Map No.12.

\textsuperscript{166}For details, see: John. R. Pierce, "Exotic Radio Communications," \textit{Bell Laboratory Record}, Vol.37, No.9, September 1959, pp.323-329.
sooner has the system detected its first intruder - no doubt a
civil airliner on a Great Circle Route - than the Soviet Union
issued its historic communique of 26 August 1957. 'A super
long distance intercontinental rocket has been released, 'it
claimed, which flew 'at a very high unprecedented altitude, 'cov-er- ed a huge distance in a brief time, 'and 'landed in
the set area.' It did not take long for the message of this
delphic communication to be interpreted. Henceforth the mis-sile was the message.\textsuperscript{167}

While this form of technological advance and the ability to launch a satell-ite into orbit heralded the era of the intercontinental missile, the actual
use of such weapons posed new problems for defence, particularly with respect to detection and communications.\textsuperscript{168} To warn against the threat of the
ICBM, three Ballistic Missile Early Warning System stations were constructed
at Clear (Alaska), at Thule (Greenland), and at Fylingdales (Britain) using
new detection techniques and requiring a vast amount of communications. The
communications aspect in turn called for alternate routes and back-up paths
over the considerable distances that separated the three BMEWS stations\textsuperscript{169}
and this requirement in essence was responsible for the upgrading of the
DEWline communications system.\textsuperscript{170}

Originally, the DEWline tropospheric scatter system employed 1 kW trans-mitters operating in the 750-950 Mc band and handled 24 multiplex channels,


\textsuperscript{168} For details, see: W.H.Tidd, "BMEWS Communications System," \textit{Bell Laboratory Record}, Vol.34, No.11, November 1961, pp.383-387.

\textsuperscript{169} Nilo Lindgren, commenting on the requirements of the BMEWS communications system stated: "no single BMEWS station can be down for more than 12
minutes in an entire year. Furthermore, two routes, preferably through
two different media, had to be set up for all BMEWS messages." ("Ten

\textsuperscript{170} See Lindgren, \textit{ibid.}, pp.61-62 and as indicated in figure no.2.
Figure 1. Project SURESTOP: DEWLINE Upgrade (after Lindgren, 1968)

- THULE
  - 12 ch via 100 kW Tropo
  - 24 ch via SSB Tropo

- Barter Island
  - Expanded to 72 chs.
  - 24 ch original DEWLINE
  - 2 kW Tropo via four relays

- Cape Parry
  - Expanded to 72 chs.
  - 24 ch original DEWLINE
  - 2 kW Tropo via three relays

- Lady Franklin Point
  - Expanded to 72 chs.
  - 24 ch original DEWLINE
  - 2 kW Tropo via one relay

- Cambridge Bay
  - Expanded to 72 chs.
  - 24 ch original DEWLINE
  - 2 kW Tropo via five relays

- Hall Beach
  - Expanded to 72 chs.
  - 24 ch original DEWLINE
  - 2 kW Tropo via five relays

- Cape Dyer
  - 72 ch to DEWeast & NARS

- Fort Nelson
  - 36 ch via 50kW Tropo
to Ft. Yukon & Pedro Dome

- Waterways
  - 4 ch TTY Ionospheric Scatter

- Bird
  - 36 ch via two-hop Tropo to Hay River

- 132 ch via four-hop Tropo to Goose Bay
Map No. 12  TROPOSCATTER Systems in North America, 1966
(Frank A. Gunther, IEEE SPECTRUM, Vol. 3, No. 9, Sept., 1966.)
Reproduced with permission of the Publishers
while rearward communications involved a VHF Ionospheric scatter system\textsuperscript{171} in addition to tropospheric scatter. The more stringent requirements of BMEWS communications resulted in the expansion of the DEWline system from a channel capacity of 24 to 72; the use of 2kW transmitters, and the standardization of the interface between the DEWline and the BMEWS networks. This modification was carried out in 1966 by "Project SURESTOP"\textsuperscript{172} and resulted in greater control of the circuits along the DEWline via two main switching and testing centers in Canada at Cape Dyer on Baffin Island and at Lady Franklin Point in the Central Arctic.\textsuperscript{173}


\textsuperscript{172}Lindgren, \textit{ibid.}, p.61; see Figure No.2 for the changes involved.

\textsuperscript{173}Lindgren, \textit{ibid.}, p.62.
CHAPTER IX

Civilian Use of the DEWline System

The overall cost of the DEWline upgrading was given by Lindgren as $45 million, while the benefits of the improvements were to extend far beyond the military application of DEWline and BMEWS circuits. To provide secure and reliable communications to the South, a 120-channel microwave system was installed from Edmonton (via Grande Prairie and Peace River) to Hay River in the Northwest Territories. From Hay River to the DEW-line at Lady Franklin Point a three-hop tropospheric scatter system (run by Canadian National) was constructed at a cost of $7 million and the complete system was in operation by 1965.

Tom Ringereide, in describing the communications facilities and user problems in the Canadian North in 1967 stated that: "The military DEWline system .... has little civilian significance," he nonetheless also pointed out that:

the tropospheric scatter system from Lady Franklin Point on Victoria Island to Hay River provides both a connection to the DEWline system and circuits for civilian use. Similarly the Quelab troposcatter system connecting Goose Bay in Labrador to the Quebec telephone network serves a dual military/civilian purpose.\(^{178}\)

\(^{174}\) Ibid., p.62
\(^{176}\) "Scatterwave," North, Vol.12, No.4, July 1965, p.35.
\(^{178}\) Ibid.
Ringereide further noted that both the Quelab and the DEWline facilities connected with BMEWS rearward facilities from Goose Bay to Frobisher Bay with a provision for civilian traffic, while the Polevault South System from Goose Bay to Newfoundland was in the process of being upgraded to include further civilian circuits.\footnote{\textit{Ibid.}, p.400.}

In spite of the expansion and improvements carried out on the DEWline communications system (Surestop II) Ringereide nevertheless stated:

As previously mentioned, the DEWline system has little civilian significance, and it is expected that it will, in the future, become more economical to provide civilian communications to remote communities by means of communications satellite systems rather than through the use of troposcatter systems. The satellite communications system would also have the advantage of being able to carry television channels.\footnote{\textit{Ibid.}, p.407.}

This assessment, based on the high cost factors involved in tropospheric scatter systems, and also the very limited bandwidth compared to that provided by satellite communications, did not completely preclude the use of the DEWline facilities by the civilian sector. In certain locations the DEWline was in fact well situated to provide civilian access at relatively low cost. In a study of the relative merits of High Frequency (HF), Low Frequency (LF), radio relay, and tropospheric scatter communications in the North in 1971 it was noted that in spite of the high cost factor of the last named: "when reasonable communications facilities were required in the North, troposcatter systems were, and in many cases still are, the only method of achieving them."\footnote{\textit{Telecommission Study 8(c) Northern Communications Study} (Ottawa: Queen's Printer, 1971), p.82.} Furthermore, during the same study it was
A finding of the Telecommission Study is that the DEW Line and Polevault systems can be used for the benefit of communities that are adjacent or close to stations of these systems. Communities could be tied into these excellent trunk facilities if simple and inexpensive VHF links were installed. The main stumbling block is the cost of renting circuits for long distances in the DEW Line and Polevault systems.\textsuperscript{182}

The Polevault system was unfortunately phased out within a short time of the above assessment, but the DEWline remained, and by 1973 the recommendations of the Telecommission Study had been implemented. In certain instances the DEWline stations were close enough to the settlements to need only landlines to connect into the system (such as at Tuktoyaktuk, Cambridge Bay, Pelly Bay, and Hall Beach) while others required the installations of the VHF links, such as Lady Franklin Point (VHF link to Coppermine), and the station at Shepherd Bay (VHF link to Spence Bay). As a result, all the above mentioned settlements were coupled into the DEWline wide-band network, which also provided access to the South via the Hay River-Lady Franklin Point tropospheric scatter system.

Although the use of the tropospheric scatter technique has been expensive, the ability to act as an "effective gap-filler"\textsuperscript{183} by providing a means of over-the-horizon communication has in the context of the DEWline taken on a secondary meaning, by filling in the gap between the limitations of High Frequency (HF) communications on one hand, and the more recent application of satellites on the other. The use of satellite communications will no doubt increase, but for a while at least the DEWline was nevertheless

\textsuperscript{182} Ibid., p.7.
\textsuperscript{183} Gunther, ibid., p.79. The use of some DEWline facilities had in fact been quite early in some instances, for Hall Beach settlement had been connected into the system at least by 1965 (G. Anders, Northern Foxe Basin, Ottawa: Department of Northern Affairs and National Resources, 1965, p.78).
able to provide a valuable communications service for a number of arctic settlements, and is still doing so to the general benefit of the North.

On a more technical note, the use of tropospheric scatter in the Far North (prior to the advent of satellite communications with wide bandwidths, high channel capacity, and relatively low-cost ground installations) compared favourably with all other means of communications then available. In discussing the relative merits of (1) Submarine Cables; (2) Very Low Frequency (VLF/LF); (3) High Frequency (HF); (4) Very High Frequency (VHF) Scatter; (5) Very High Frequency (VHF) Meteor techniques; (6) Ultra High Frequency (UHF) tropospheric scatter (as used on the DEWline) N.C.Gerson gave the following comparison: 18n

Table 2. Evaluation of Different Possible Radio Circuits in the Arctic*

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Interference potential</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Quality of being jammed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar cycle effects†</td>
<td>3†</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Initial cost</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Operating cost</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>22</td>
<td>35</td>
<td>24</td>
<td>23</td>
<td>17</td>
</tr>
</tbody>
</table>

* Scale 1-9 (1= excellent, cheapest cost, most reliable, etc.)
† Comparison of conditions at time of maximum of solar activity as compared to conditions at time of solar minimum.
¶ Effect of earth current storms.

By the early 1970's the situation in the Canadian North had changed considerably by the establishment of satellite communications, as predicted by D.S. Loftus, who in 1970 had stated:

All forms of northern communications will be significantly influenced in the future by the domestic satellite 'Anik' which will be launched in late 1973. It will bring live television and, eventually, high quality telephone and data services to the North.\(^{185}\)

Anik I was launched ahead of the predicted date late in 1972, and as Loftus again noted, its launching: "changed dramatically the possibilities for improving the performance and reliability of northern communications services and extending services to areas that cannot be reached by terrestrial systems."\(^{186}\) The problem of how best to meet both present and future communications needs in the North was also discussed by Loftus in the same work, and was reduced to the following three categories:

1. Transmission, switching, and distribution facilities must be provided to tie remote communities into the national telephone network and to eliminate communication disparities between developed and undeveloped areas. Each northern community, in the long term, must have available the full range of telephone, telex, data, radio, and television services at virtually southern standards of performance and reliability.

2. Telecommunication facilities must be available to serve mobile and transportable needs that may be separate from or partially integrated into the national telephone network. Mobile stations in the north are required for defence forces, mineral and fuel exploitation parties, and search-and-rescue operations.

3. Special systems, or the adaptation of conventional facilities, must be established to provide for the social development and education of the native peoples.\(^{187}\)


\(^{187}\) Ibid., p.680.
The application of communications technology, although providing an alternate means of communications for many areas of the Canadian Arctic, particularly those settlements that had relied heavily on HF techniques, has not rendered the DEWline facilities completely redundant, and the DEWline may still be able to play a useful, if reduced role in modern arctic communications. The limited bandwidth (72 channels) of the DEWline tropospheric scatter system obviously does not compare favourably with the far greater bandwidth provided by satellite communications (with bandwidths capable of handling both television circuits and hundreds of voice channels) yet the DEWline facilities at certain locations still lend themselves to adaptation for the needs of users in the Arctic at a relatively low cost.

The users viewpoint on communications in the North, and the complications arising from it, have been outlined by S.E.Probst in 1967, and D.S.Loftus has also given the present and future needs from a government planning perspective. Probst broadly defined three types of service for the North under the following headings: (1) Safety (including air traffic control, navigational aids, military surveillance, and air-sea rescue), followed by (2) Commercial considerations (including both civilian and military control, northern administration, and logistics communications of a non-crisis nature) and (3) Personal Communications (involving private correspondance, News, and entertainment such as that provided by television and radio broadcasting).

These three general categories were further related by Probst to the speed of service, the kind of information transmitted, and the bandwidth requirements associated with the various services under consideration. The

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## Communications Needs and Determinants in the Arctic

**Determinants** | **Safety** | **Commercial** | **Personal**
---|---|---|---
Impact of Failure | Existence | Economics | Emotions
Speed of Service | Message Length | ASAP[^\textsuperscript{\Psi}] | ASAC[^\textsuperscript{\Phi}]
Content | bits | bits/voice/TTY | bits/voice/TTY
Band Width | f(info) | f(Cost, Development) | f(P, SOL)[^\textsuperscript{\Delta}]
Complexity | Sophisticated | f(bits/\$) max | Simple
| Redundant | | Equip. Reliable
| Adaptable | | Ease of Maintenance
Accuracy | Absolute | Ultimate | Desirable
Cost Determinant | Budget | Profit/Loss | SOL
Research Effort | Maximum | Moderate | Minimum
Reqm't to Predict | Design | Design | Design

[^\textsuperscript{\Psi}]: As Soon As Possible. 
[^\textsuperscript{\Phi}]: As Soon As Convenient. 
[^\textsuperscript{\Delta}]: Population, Standard of Living.

Figure 2: Communications Needs and Determinants in the Arctic (S.E. Probst, Ionospheric Radio Communications, Edited by Kristen Folkestad, New York: Plenum Press, 1968, p. 446. Reproduced with permission from the publishers)
cost were also considered for each category, and it is in this particular area that the DEWline facilities have further potential value for the North.

Although the DEWline is still in operation, the question of its continued used in its present form has recently come under evaluation, while such alternatives as the adoption of either a series of robot radar stations or airborne warning and control aircraft (AWACS/IMI) have also come under serious consideration. Obviously, the future of the DEWline in its present form will be limited, and the entire system may even be phased out if a more suitable system can be found. Either way, such changes would at least provide an opportunity to make further use of DEWline facilities and stations, largely minimising the enormous costs arising from transportation and construction of installations in the Far North.

DEWline stations, particularly those at Tuktoyaktuk, Cambridge Bay, and Hall Beach, would all provide electric power plants, buildings, and attendant facilities - all readily adaptable as commercial or civilian communications centers, with or without the use of the DEWline wide-band system. The latter, while fading in utility, might also be replaced to some extent by satellite communications, while the possibility of a series of unmanned remotely controlled radar stations opens up further avenues for improved communications along the rim of the continent.

The possible threats posed by the Soviet "Backfire" bomber, that of low-level approach, have given greater impetus to both the manned bomber threat to North America and the upgrading of defences against low-level

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190 See Figure No.2.

191 In an article entitled: "DEW Line changes seen in the wings," Vancouver Province, Monday, September 10th, 1979.
penetration against aircraft in general and such devices as the "Cruise" missile. The requirements for detection against such weapons entails detection at low altitudes, either by a series of unmanned radar stations expressly designed for the purpose, or the application of other techniques, such as Over-the-Horizon-Backscatter Radar (OTHB). In the former case the possible re-activation of the old DEWline Intermediate sites plus perhaps changes for the present DEWline stations would also involve reliable communications between stations 40-50 miles apart. The implications of this requirement lead in turn to the possibility of another microwave system across the entire northern regions.

Against this it might well be argued that existing communications, particularly those associated with satellite ground stations in the North render the need for additional microwave systems unnecessary, while instead of re-opening the previously redundant Intermediate sites along the DEWline the new concept of Over-the-Horizon Radar coupled with Airborne Warning and Control Systems involving the use of the Improved Manned Interceptor (IMI) may herald a new phase in North American Air Defence.

Whatever the changes, an important and troublesome point remains as far as communications in the Canadian North are concerned. While the needs for facilities as pointed out by D.S. Loftus (p. 122) and S.E. Probst (p. 124) are apparent, there still remains the fact that a financial base for the payment of communications services in the North is still largely lacking apart from

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the government and military sectors. Both transportation and construction costs in the North are high, and thus the use of existing facilities is doubly important. If the DEWline is to go finally, then its facilities may still serve to benefit the North and the northern communities by providing buildings, switching centers and power plants at low cost.

Ancillary DEWline Communications

Although the DEWline wide-band communications network was to expand during the period 1963-1966 to include both BMEWS and civilian traffic, each DEWline station from the start was provided with a variety of ancillary communications equipment for purposes of support and for the effective execution of the primary mission, that of surveillance, identification, and early warning. All DEWline stations were therefore provided with facilities to communicate with aircraft as well as adjacent stations, and in addition were equipped with navigational aids and back-up communication channels to cover a wide range of disasters and emergencies.\(^{193}\)

Additional communications equipment (other than the wide-band facilities) included both VHF and UHF transmitters and receivers, HF receivers, and LF radio beacons for aviation purposes, while further HF equipment was installed at every station as emergency and disaster stand-bys. Another feature of DEWline communications was the use of a VHF line-of-sight radio link between the Intermediate stations and the Auxiliary Stations - a facility that also doubled for communications with all DEWline vehicles operating on the same frequency. When the Intermediate stations were phased out in 1963,\(^{194}\) the need for a powerful base station was eliminated, but the use of the VHF mobile system was retained for communication for DEWline station vehicles.


\(^{194}\)Nilo Lindgren, *ibid.*, pp. 60-61.
VHF, UHF, and HF Air-to-Ground Communications

DEWline air-to-ground facilities provided for communications with both military and civilian aviation sectors, with equipment operating on VHF at 122.2 MHz (plus distress on 121.5 MHz), at UHF on 236.6 MHz (plus distress on 243.0 MHz), and HF monitors (two) on 3.0235 MHz, and again these facilities were installed at each DEWline station across Canada, thus providing aviation communications on a line-wide basis.

HF Disaster and Emergency Communications

In spite of the excellent wide-band communications along the DEWline, the remoteness of the locations coupled to the severity of the winters posed strict requirements in terms of safety and uninterrupted operation. The consequences of a complete power failure or a fire at any DEWline station, particularly during the winter months could conceivably result in loss of life and a breakdown of the entire system. To counter this possibility the DEWline stations were therefore equipped with a number of safety features, including auxiliary power units and an auxiliary oil burner, two sets of HF equipment, and a disaster monitor (on HF) strategically located in separate buildings.

The Benefits of DEWline Ancilliary Communications

The obvious need of DEWline VHF and UHF aviation facilities in the North for purposes of national defence brought with it distinct benefits for civilian aviation. The use of these facilities, particularly the DEWline VHF

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195 For details of DEWline aviation facilities, see The Northern Supplement, IFR and Enroute Data: Canada and the North Atlantic (Ottawa: Department of Energy, Mines, and Resources, 1980)
channels and the LF radio beacons has in fact made it possible to fly along the entire rim of North America while never being more than 50 miles from an airfield, and never being out of radio contact. The value of the DEWline radio beacons alone is difficult to estimate, given the problems associated with arctic navigation, and although part of the DEWline radio beacons' function relates to DEWline support, the stations themselves are prominently indicated on World Aeronautical Charts, along with the air routes connecting them, as are the DEWline Lf radio beacons, frequencies, and identifiers as given below:

Table 3: The DEWline Radio (LF) Beacons

<table>
<thead>
<tr>
<th>DEWline Station</th>
<th>Beacon Frequency</th>
<th>Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Komakuk Beach</td>
<td>239 Khz</td>
<td>AJ</td>
</tr>
<tr>
<td>Shingle Point</td>
<td>221 &quot;</td>
<td>UA</td>
</tr>
<tr>
<td>Tuktoyaktuk</td>
<td>380 &quot;</td>
<td>UB</td>
</tr>
<tr>
<td>Nicholson Peninsula</td>
<td>214 &quot;</td>
<td>UC</td>
</tr>
<tr>
<td>Cape Parry</td>
<td>203 &quot;</td>
<td>UE</td>
</tr>
<tr>
<td>Clinton Point</td>
<td>209 &quot;</td>
<td>UH</td>
</tr>
<tr>
<td>Cape Young</td>
<td>260 &quot;</td>
<td>UI</td>
</tr>
<tr>
<td>Lady Franklin Point</td>
<td>227 &quot;</td>
<td>UK</td>
</tr>
<tr>
<td>Byron Bay</td>
<td>272 &quot;</td>
<td>UJ</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td>245 &quot;</td>
<td>CB</td>
</tr>
<tr>
<td>Jenny Lind Island</td>
<td>218 &quot;</td>
<td>UQ</td>
</tr>
<tr>
<td>Gladman Point</td>
<td>300 &quot;</td>
<td>UR</td>
</tr>
<tr>
<td>Shepherd Bay</td>
<td>321 &quot;</td>
<td>US</td>
</tr>
<tr>
<td>Pelly Bay</td>
<td>201 &quot;</td>
<td>UF</td>
</tr>
<tr>
<td>Mackar Inlet</td>
<td>212 &quot;</td>
<td>UU</td>
</tr>
<tr>
<td>Hall Beach</td>
<td>388 &quot;</td>
<td>UX</td>
</tr>
<tr>
<td>Longstaff Bluff</td>
<td>275 &quot;</td>
<td>UV</td>
</tr>
<tr>
<td>Dewar Lakes</td>
<td>315 &quot;</td>
<td>UW</td>
</tr>
<tr>
<td>Cape Hooper</td>
<td>287 &quot;</td>
<td>UZ</td>
</tr>
<tr>
<td>Broughton Island</td>
<td>230 &quot;</td>
<td>VM</td>
</tr>
<tr>
<td>Cape Dyer</td>
<td>248 &quot;</td>
<td>VN</td>
</tr>
</tbody>
</table>

See Appendix E for the DEWline air route (Red Route 30)

Given in The Northern Supplement, ibid., pp. 29-83.

DEWline aerodromes are nominally under USAF/RCAF control, while Tuktoyaktuk and Cambridge Bay are operated by Transport Canada.
On a related note the problems posed by air navigation during the long polar night and the winter months are also reduced by DEWline runway lights, by strobe lights, by tower obstruction lights, and rotation beacons installed at each and every DEWline station.

The services provided by DEWline air communications and navigational aids (and also the considerable value of the DEWline radars in an air advisory capacity) are further augmented by the capability of the DEWline stations to communicate laterally with each other (via the wide-band system) and with various government agencies throughout the North. Reliable communications in this instance thus extends to the liaison between the DEWline and such agencies as Transport Canada and the Aeronautical Environmental Service concerning such areas as flight information (departures, arrivals, changes,) flight safety and emergencies, weather observations and forecasts, and in addition any messages that might need to be forwarded to aircraft.

The safety factor afforded by these services to aviation in the North is further complemented by two little known and little appreciated aspects of the DEWline operation. The location and the various facilities of DEWline stations have rendered them extremely useful as potential bases for local air-sea rescue operations across a wide area of Arctic Canada.200

200 For example, the RCAF military commander of the DEWline Main station at Hall Beach was directed by the RCAF Search and Rescue Center in Winnipeg to direct a search over Foxe Basin in November 1959 for two missing Eskimo hunters. In conjunction with the search the civilian contractor for the DEWline (Federal Electric Corporation) and the USAF 4601 Support Wing (DEW) released a charter aircraft for the search which took place in poor visibility and high winds, but resulted in the location of the missing hunters (Canadian Weekly Bulletin, Vol.14, No.47, November 1959 p.4)
The DEWline and Arctic Meteorology

The DEWline Impetus

The massive transfer of materials and personnel into the North that took place with the construction phase of the DEWline during the period 1955-1957 gave rise to a need for additional and specialised meteorological services in support of air and sea transportation. Just as the Northwest and Northeast Air Staging Routes of World War II had generated a requirement for additional weather stations and improved weather forecasting for the remote regions, the construction and operation of the DEWline further accentuated the need for improvement in arctic weather facilities and services.

The task of providing the additional weather services in Canada was handled by the Department of Transport's Meteorological Branch, who in addition to establishing temporary and new arctic facilities made use of an automatic weather map transmission system and a special arctic forecasting team to cater to the DEWline's particular requirements. This service was also of general value and its importance was stressed in the Canadian Weekly Bulletin as follows:

An all-Canadian contribution to the DEW Line, without which the construction of the northernmost radar defence network would be impossible, is the specialized Weather forecast system provided by the Department of Transport's Meteorological Services ... Since construction began some 18 months ago, the Department's meteorological services have been geared to give the DEWline operators the vitally important weather reports to guide the flight plans of the aircraft fleet 'working' the DEWline. Additional forecast offices and improved communications have resulted in a concentration of effort that has been invaluable to the entire programme in the North.

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202Ibid., p.4.
The requirements of the DEWline airlift had a considerable impact on aviation weather services in the North in general, and the accompanying sealift for the DEWline also gave rise to further services in support of maritime transportation in the Canadian Arctic. Here the problems associated with a short summer supply season were further complicated by ice and fog, limited hydrographic information, and vast distances to be covered according to a strict schedule. The very magnitude of the sea supply operation meant that huge convoys would be required to enter the arctic waters and penetrate as far as the Central Arctic and the Arctic Archipelago through little known passages and under varying ice conditions. In the case of the western sealift alone (through the Bering Straits to the Beaufort Sea and further east as far as Boothia Peninsula) a fleet of 57 ships and 15,000 men was involved, and it was estimated that during the 1955 shipping season alone all but four of the vessels engaged on the DEWline operation sustained some kind of damage, resulting in repair bills totalling more than $50,000,000.203

The sealift, although at its highest during the two years of DEWline construction (1955-1957) became a yearly event that also served the arctic settlements, and in support of the operation the Royal Canadian Air Force (in addition to flying surveillance over the Arctic Islands) carried out ice reconnaissance for the DEWline sealift during 1956, 1957, and 1958.204

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Since 1958 the ice reconnaissance has been stepped up yearly with specially equipped aircraft (presently operated by Nordair) performing this necessary service, while DEWline station personnel (in addition to their other duties) have for years also reported break-up, freeze-up and ice conditions at their respective locations.

The DEWline Contribution to Meteorology in the North

The construction of the DEWline generated special requirements for new weather services in the North, but by 1955 there was also a need to provide weather information concerning the arctic regions for trans-polar flights by commercial airliners. By 1956 the DEWline aviation requirements alone, in the words of J.R.Lotz: "resulted in a very heavy demand for weather services including forecast offices at Frobisher and Yellowknife and a temporary office at Coral Harbour." Earlier, in 1955 the impending upswing in aviation activities in the North and its effects on the weather service produced the following observation by R.W.Rae concerning requirements in the Canadian Arctic:

Extensive air operations over the Arctic will entail the use of many arctic stations as staging points or alternate landing fields, and will thereby create a demand for terminal forecasts for these stations. Arctic weather forecasting during the summer months does not present insuperable problems to a meteorologist trained in temperate latitudes. In winter, however, when frontal activity in the Arctic is very slight, and the weather is greatly influenced by local factors, an intimate knowledge of the topography and the local wind regime is essential in order to determine the frequency of ice fog and blowing snow, which are the two main causes of reduced visibility.

By 1957 the increased meteorological activities in the North had resulted in the following on a permanent basis:

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205 Ibid., p.86.
1. Routine Aviation Forecasts for the North

2. Weather support for various projects such as photo-survey operations, and air and sea supply

3. Weather services for commercial transpolar aviation.\(^{207}\)

The DEWline, in addition to being a prime user of the improved arctic weather services, was also a direct contributor to the arctic weather observation programme. Almost from the time that the DEWline became fully operational in 1957 the DEWline (at selected stations) had participated in the observing programme - a sound use of the installations given the high costs associated with the manning of weather stations in the Far North.

The DEWline with its line-wide system of communications and manned stations strategically placed across the top of the continent lent itself admirably to such an application, and under the auspices of the Canadian Meteorological Service of the Department of Transport, both aviation and synoptic weather observations were carried out along the system. The DEWline observing programme was continued and improved in 1958,\(^{208}\) and in 1959 this service was enhanced by the establishment of Department of Transport Meteorological Service technicians at the four DEWline main stations at Hall Beach, Cambridge Bay, Cape Parry, and Cape Dyer.\(^{209}\)

DEWline personnel were specifically trained to participate in the weather observing programme by the Canadian Meteorological Service, and each station was equipped with a standard set of weather instruments. By 1960, the DEWline weather observing programme involved the taking of

\(\text{\(^{207}\)Lotz, \(\text{ibid.}\), p.85.}\)
\(\text{\(^{208}\)Lotz, \(\text{ibid.}\), p.86.}\)
\(\text{\(^{209}\)Lotz, \(\text{ibid.}\), p.87.}\)
both aviation and surface synoptic weather observations at 16 of the 22 DEWline stations in Canada. More recent developments from 1975 onward have resulted in an increase in DEWline observation frequency, with all stations participating in the program and with synoptic weather reports being made at least every six hours, and hourly in certain locations.

Since its inception, the DEWline has thus been able to make a valuable contribution to the Canadian meteorological service, and in addition has been able to provide aviation weather reports and similar information on a line-wide basis to any and all aircraft that might need them.

Additional benefits have also accompanied the continued weather observing program along the DEWline in so much as the DEWline observations have provided records for almost twenty years, and a minimum of between ten and fifteen years is generally considered necessary for the compilation and determination of representative climatic means for a specific location.\textsuperscript{210} In the DEWline's case the locations have been widespread and in remote areas of the North. The contribution of the DEWline to meteorology has thus been of the immediate and of the long term variety, serving both aviation needs in the North and in assisting the growth of meteorological knowledge in the region in general.\textsuperscript{211}

\textsuperscript{210}R.W.Rae, "Meteorological Activities in the Canadian Arctic," \textit{Arctic}, Vol. 7, No. 3, 1955, p. 122.

\textsuperscript{211}An example of the DEWline contribution is seen in the Meteorological Service's Climatic Data Sheet No. 5-66 (Temperature and Precipitation Data from DEWline Stations, Ottawa: Canadian Meteorological Branch, 1966)
The uneasy peace that followed the close of World War II was a peace overshadowed by the spectre of nuclear conflict and further threatened by the ensuing Cold War between the Western Powers and the Soviet Bloc. This climate of distrust and fear, coupled with the threat of the nuclear bomber, saw Canada and the United States draw closer to strengthen their mutual security and to extend the activities of the Permanent Joint Board on Defence into the post-war era. Thus on February 12 1947 a joint declaration was issued by both countries re-affirming the continuance of the Permanent Joint Board and the need for further defence co-operation. In Canada the declaration was made in the House of Commons by Prime Minister W.L. Mackenzie King at which time the major operating principles of the declaration were also stated. These concerned the interchange of observers and information between the two countries; a move towards standardization in equipment and training; and a reciprocity in the use of military facilities. Significantly, the last point in the declaration dealt with such matters as control and jurisdiction, and stated: "As an underlying principle all co-operative arrangements will be without impairment of the control of either country over all activities in its territory." 


\(^{213}\)Ibid., p.346.
The declaration also noted that there was to be a large measure of freedom for both parties in this post-war era of co-operation, since: "No treaty, executive agreement or contractual obligation has been entered into," while the operating principles of the declaration were likewise flexible, for it was also stated that: "Either country may at any time discontinue collaboration on any and all of them."  

Nevertheless, there were ominous indications in Mackenzie King's speech pointing towards increasing military activity in the Canadian North, and increasing co-operation with the United States in this particular region. While Mackenzie King was to deny the likelihood of any large-scale military ventures in the North, he nevertheless repeatedly tied the civilian benefits accruing from northern research to military aspects of continental defence. Thus he was to state:

> When we think of the defence of Canada, we must, in addition to looking east and west as in the past, take the North into consideration as well. Our defence forces must, of course, have experience of conditions of these regions, but it is clear that most of the things that should be done are required apart altogether from considerations of defence .... The general economic development of the north will be greatly aided by tests and projects carried out by both civilian and defence services.  

Citing the activities of the Canadian Army and the Royal Canadian Air Force in the North, Mackenzie King further claimed that: "Canada's northern programme is thus primarily a civilian one to which contributions are made by the armed forces." Towards the end of his speech, however, while still linking the civilian and military sectors, Mackenzie King made mention of U.S. military participation in a winter experimental establishment at Churchill, and then gave a thinly veiled scenario of things to  

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214 Ibid., p.346.
215 Ibid.
216 Ibid., p.347.
Since the United States, as well as Canada, recognizes the need for greater familiarity with northern conditions, we have arranged for its government to participate in the work of this establishment. It may be that other tests and projects will require to be undertaken on a joint basis, in order to extend with a maximum economy and effectiveness, our basic knowledge of the north. Through such extensions we will acquire the basic data that are needed to make more accessible the economic resources of this region and which will be more valuable for defence purposes as well.\(^{218}\)

While Mackenzie King's pronouncement was received with scarcely a comment in the House of Commons, the Soviets were quick to focus on such joint activities in the Canadian North. In fact, less than a week after the February 12 Declaration of Defence Co-operation between the United States and Canada there was a criticism voiced in the February 18 issue of Izvestia.\(^{219}\) Although the Soviet attack was perhaps out of all proportion to the scale of military activities undertaken at the base at Churchill, it was not completely wide of the mark, for as Jame Eayrs was to note, U.S. intentions as early as the previous year had clearly been focussed on the Canadian North, and as Eayrs stated:

Of the score or more specific requests made of the Canadian government by the United States for access to facilities in the Far North for continental defence purposes during 1946, two were especially vexatious. One was its request to reinforce the base at Goose Bay, Labrador. The other was its request to maintain a garrison at Fort Churchill.\(^{220}\)

Canadian reaction to U.S. military activities in the North, although not evident at the time of Mackenzie King's February 12 speech took on a more

\(^{217}\)Ibid., p.348.

\(^{218}\)Ibid., pp. 347-348.

\(^{219}\)For details of this incident, see James Eayrs' comments in his In Defence of Canada: Peacemaking and Deterrence (Toronto: University of Toronto Press, 1972), pp. 352-356.

\(^{220}\)Ibid., p. 352.
critical focus as the activities themselves became apparent. Thus Mr. G.K. Fraser (Member for Peterborough West) questioned the Minister of National Defence (Brooke Claxton) in the following year (1948) about a statement released in the press concerning the expenditure by the United States of $611,570 for various facilities at Frobisher Bay and Fort Chimo.²²¹ In particular, Mr. Fraser wished to know under whose authority such work was being carried out and whether the Department of National Defence had any supervisory status in the matter. Brooke Claxton’s reply was to re-iterate the conditions of the Declaration of Defence Co-operation, and to further emphasize that: "If any work is being done in Canada, it is in accordance with that arrangement," and also, that: "it would be done only after arrangements had been completely worked out between representatives of Canada and the United States." ²²²

At its face value, Brooke Claxton’s reply seemed satisfactory enough, yet there was still a disturbing element present, for U.S. military activities in the Canadian North could in effect be planned and implemented almost entirely without parliamentary debate or input. Moreover, while the example mentioned here may have been innocuous in itself, the precedent set - in effect a fait accompli should perhaps have alerted the Members of the House (or at least the Members of the Opposition) to the dangers of blind acquiescence.

In a less troublesome time, a different approach may well have been adopted, and from a purely financial viewpoint, such activities were to

²²¹Canada, House of Commons Debates, April 29 1948, Vol.2, p.3437; even here the northern element appears to have been obscured, for the question dealt with: "enlargement of quarters and facilities at Frobisher Bay, Saskatchewan, and Fort Chimo, Quebec." (italics added)

²²²Ibid., p.3438.
funded entirely by the United States in any case. More to the point, both the United States and Canada realised that their northern regions were fast becoming critical areas as far as national defence was concerned. Indeed, Brooke Claxton, in a speech to the House on this topic gave the following list of factors considered particularly important: "(a) the geographical position of Canada; (b) the capacity of any possible aggressor to make an attack; (c) the disposition of friendly nations; (d) what may be called 'the international climate.'"\(^{223}\) Significantly, Brooke Claxton also noted that:

Distance and space still combine to give us a great natural advantage for which we cannot be too grateful, but distance and space have been drastically reduced and are still shrinking; and the shaping of world events and the changing centres of power have put Canada in a more important strategical position than she has ever been before.\(^{224}\)

Some years later, R.J.Sutherland assessed the strategic importance of Canada's geographical situation somewhat more bluntly, stating: "the United States is bound to defend Canada from external aggression almost regardless of whether or not Canadians wish to be defended. We may call this the involuntary American guarantee."\(^{225}\) Sutherland also gave a summary of a subject that has perhaps been nagging at Canadian sensitivities for many years, the matter of dependence and mutual defence. He noted in this respect that:

In the final analysis, a Great Power will take whatever action it finds necessary to the maintenance of its security. It must do this or cease to be a Great Power, and the United States is no exception. However, at least for the past half century, relations between Canada and the United States have never approached this brutal basis. It is difficult to believe that they ever will.


\(^{224}\)Ibid., p. 5270.

This is owing to the fundamental community of interests between the two nations. If the United States is bound to defend Canada, it is also true that Canada can never, consistent with her own interests, ignore the requirements of American security; because, in the final analysis, the security of the United States is the security of Canada.226

During the late 1940's, however, Canada was far from accepting the totality of the above argument, and instead was proceeding along partly independent paths. In June of 1948, the Opposition defence critic, Mr. G. R. Pearkes decried the government's defence policies, and further charged that the government of the day: "has consistently refused to recognise our changed position in the general make-up of the world organization for defence and the changed geographical position of Canada in view of the new inventions which have appeared on the defence scene in the last few years."227

After citing the lessons to be learnt from the attacks on Pearl Harbour, Czechoslovakia, and Poland, Mr. Pearkes asked for greater emphasis to be placed on air power in a defensive role, stating:

We must find a means of stopping the enemy bomber from reaching its target. That is the first requirement as far as the defence of Canada is concerned. To do that we must not only have an interceptor force readily available; we must also have the means of obtaining early warning.228

On a more detailed note, Mr L.W. Skey asked the Minister of Defence whether any joint agreement with the United States had been arrived at concerning Canadian assistance in the overall defence of North America, and chided the

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226 Sutherland's assessment of Canada's position did not go unchallenged. In particular, W.H.F. Caloren ("Political Considerations," International Journal, Vol.18, No.1, Winter 1963, p.84.) attacked Canadian military alignments with the United States with the comment: "Although it is nowhere made clear, the reasoning seems to be that since 'Canada will still be at the high end of the international batting order,' she ought to be batting for the Yankees."


228 Ibid., p. 5790.
minister for his answer, stating: "The minister replied that it would be almost inconceivable for the United States to request any action by us or to suggest that we should co-operate with them. To me that is a foolish reply. We do not need to fear our friends, and surely we can work with them." 229

Within a year, the needs for closer co-operation in matters of national defence had become more apparent, for the Soviet detonation of a nuclear device in August of 1949, and the Korean War in the following year further increased tensions between East and West. By 1951, Brooke Claxton was to tell the House that the number one objective of defence policy was now to be: "The immediate defence of Canada and North America from direct attack," 230 and while he noted that: "There is no way of making a continent of seven million square miles impregnable or impenetrable with a kind of aerial Maginot Line," 231 he nevertheless proceeded to announce the joint venture that was to be the Pinetree System situated along the U.S. and Canadian border:

To meet the possibility of air attack, our services are working in close co-operation with the United States. A screen of stations with the latest and most powerful radar apparatus is being built, connected with a network of communications and backed up by squadrons of fighters. The American and Canadian chains will be linked together to form a single system, of which about one-quarter will be in Canada. 232

229 Ibid., p. 5791.
231 Ibid.
232 Ibid.
The following year (1952) saw an increasing co-operation in matters of national defence, and again Brooke Claxton was to announce to Parliament on April 3, 1952:

> Obviously we cannot deal with the defence of our half of the North American continent, three and a half million square miles, by our own unaided efforts. We must do it in association with the United States. Also the United States alone cannot do it efficiently. We must work together. So we have worked out with the United States very full and detailed arrangements for our joint defence.\(^{233}\)

As before, while pronouncements were being made concerning joint co-operative ventures by the United States and Canada, few details were forthcoming, no doubt largely for security reasons. But if the situation with respect to North American air defence was critical in 1952, the events of the following year – particularly the explosion of a thermo-nuclear device by the Soviets on August 12, 1953 – gave even greater impetus for the need and establishment of early warning systems in the Far North. This was not to say, however, that these systems had not been under serious consideration in any case, for as noted earlier, Project Charles in 1951; the Lincoln Summer Study Group of 1952, and the trial DEWline system in Alaska and the Yukon of 1952-1953 (Projects 572 and Corrode/Counterchange) were specifically geared to the overall problems of North American air defence.

Significantly, once the thermo nuclear capability of the Soviets had been demonstrated, both the United States and Canada acted swiftly, and within weeks the National Security Council on October 6, 1953 adopted the Lincoln Summer Study Group's recommendations for the northern defence lines. Approximately one week later, Canada for her part began to undertake a Mid-Canada-Line feasibility study, and in the following month (November 1953)

\(^{233}\)Canada, House of Commons Debates, April 3 1952, Vol.1, p. 1086.
President Eisenhower delivered an important speech to the Canadian House of Commons reinforcing the need for co-operation in defence, and in all likelihood preparing the way for the coming of the DEWline proper. Thus Eisenhower stated to the House: "You of Canada and we of the United States can and will devise ways to protect our North America from any surprise attack by air," and then followed this with a somewhat more direct and ominous conclusion, namely that: "Defence of our soil presents a challenge to both our peoples. It is a common task. Defensively, as well as geographically, we are joined beyond any possibility of separation."

Somewhat cautiously, President Eisenhower then proceeded to map out the joint position for both countries, noting that: "....every arrangement rest squarely on the sovereign nature of each of our two peoples," and more to the point, that:

Canada and the United States are equal partners and neither dares to waste time. There is a time to be alert and a time to rest. These days demand ceaseless vigilance. We must be ready and prepared. The threat is present. The measures of defence have been thoroughly studied by official bodies of both countries. The permanent joint board on defence has worked assiduously and effectively on mutual problems. Now is the time for action on all agreed measures.

Eisenhower's speech, initially at least, was not cause for much comment in the House, but on November 30, the Opposition defence critic, Mr George R. Pearkes zeroed in on both the speech and the minister of defence, who had subsequently given what Mr Pearkes considered to be a confusing description of the current situation regarding national defence. As Mr Pearkes was it:

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235Ibid.
236Ibid.
237Ibid.
In his remarks last Thursday the minister dispelled the myth, which had been created, of an Arctic radar chain, claiming that the project had never reached the stage of discussion between governments. It is well that the minister did make this declaration because, through press releases and other sources, the impression has been created in the public mind that a radar chain did exist across the far north. A radar screen has been referred to at times. The minister referred to a radar system on more than one occasion.... The minister referred to a system working upwards and outwards from the most likely targets. I must say that "upwards and outwards" rather reminds me of a certain revivalist hymn, but it may give an impression of the present radar screen.

Now, this system, together with its attendant communications system, is partly in operation, according to the minister's statement; but it is now clear that no national screen exists.238

In view of the fact that it was not until April 8, 1954 that a joint statement was issued by Canada and the United States concerning plans for the establishment of the DEWline in the Far North and the Mid-Canada-Line at lower latitudes, Mr Pearkes' lack of accurate information was perhaps understandable. Mr Pearkes, however, was disturbed by both the lack of data on the subject and the implications of President Eisenhower's speech to the House, noting that: "The warning sounded in the throne speech and echoed by President Eisenhower here a few days later indicates that heavy expenditures will continue."239

Continuing in this vein, Mr Pearkes then suggested that: "the House is entitled to a further statement as to the precise meaning of General Eisenhower's exhortation. I am sure that that must have been discussed before at government levels."240

In spite of such questioning, no great elucidation followed, and in retrospect it is strange to note how readily the massive early warning

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239Ibid., p.455.
240Ibid., p.456.
networks came into being without parliamentary debate or discussion. Even though the DEWline was financed entirely by the United States, the Mid-Canada-Line was paid for by Canada, and both systems concerned Canadian territory over a large area. Although concerned primarily with the latter system, John William Warnock\(^1\) made the following comments concerning the manner in which the Mid-Canada-Line came into being, and in effect a similar situation prevailed in the case of the DEWline:

> It is interesting to see how this momentous policy decision was developed and carried out. It was mainly the result of private discussions between U.S. and Canadian military personnel, with the sanction of the PJBD. The recommendation was accepted by the St. Laurent Government and, in effect, implemented by executive action. The piecemeal agreements with the United States were in the form of executive agreements, not treaties, and they were announced to parliament in a casual manner over a long period of time, with no details provided. In spite of the far reaching significance of the decision, and the fact that it involved a considerable sum of the taxpayer's money, there was no meaningful discussion of the program in Parliament. The opposition asked a few questions, but there was never a single debate on the policy itself: it was just assumed to be correct. Even if Parliament had doubts, they were presented with a fait accompli.\(^2\)

**Defence and/or Deterrence**

Undoubtedly, a major factor influencing the manner in which the early warning systems were implemented with minimum parliamentary procedures was the international climate of distrust and fear. The threat of the nuclear conflict and the use of thermo-nuclear weapons in particular was of concern to Canada owing to her geographical position. Thus John Diefenbaker noted in a speech to the House on March 25, 1954 that:

> If there is one country just now which has a stake in peaceful negotiation and peaceful settlement of differences between these

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\(^2\)Ibid., pp. 173-174.
giants, if you like, the United States and the Soviet Union - the two sides in this Cold War- certainly it is Canada. 243

Another cause for concern was the hazy picture regarding Canadian national defence during this worrisome period and the lack of details available on the subject. Diefenbaker continued his speech with the following remarks on the latter topic:

This is not the place for me to question what means of defence we have. I do not know. This House of Commons does not know. We do know we are spending great sums of money on defence, but we do not know what these defences are. I am one who believes that under certain circumstances either the House of Commons or a committee of the House of Commons should sit in camera and be informed. I do not know whether we have an effective radar screen; I do not know whether we have effective interceptor aircraft. 244

Once again, little information resulted from such queries, and official government policy towards the release of details regarding Canada's radar defences became clearer one month later when the minister of national defence, Brooke Claxton replied to an Opposition question on the matter. 245

The linking of radar screens and interceptor aircraft in the above context itself raised an interesting point, for it had generally been agreed that there could be no complete defence in the event of a nuclear war. Hence even against an effective detection system and an efficient fighter force a small percentage of nuclear attackers could be expected to reach their targets. The escalation to include thermo-nuclear weapons placed further emphasis on the perils of the situation, and thus even during this early period the concept of "Massive Retaliation" had become one of the main

244Ibid., p.3344.
245Brooke Claxton had stated: "What is important is that we should not officially give a list of radar stations that indicates their existence, our progress in building up, or their operational qualities, thereby enabling the only potential enemy to check the efficiency and effectiveness of its own sources of intelligence." (Canada, House of Commons Debates, April 12, 1954, Vol.4, p.3980.)
instruments of defence.

Although little advertised at the time, it was this aspect of the early warning systems that began to emerge rather than the need for fighter defences per se. Thus Brooke Claxton on May 20, 1954, after noting the increased power of the latest generation of nuclear weapons, stated to the House:

the possession by the United States of both the new weapons and the power to deliver them is a powerful deterrent to aggression. .... Unless the United States can deliver the bombs they might just as well not exist. Hence the ability of the United States to deliver the bombs becomes a matter of the most urgent and primary importance in the preservation of peace. This consideration brings into focus and gives new emphasis to the whole question of continental defence.246

Having thus harked on the threat of the nuclear bomber and the value of the U.S. deterrent force, Brooke Claxton returned to the problem of defence against this same threat, and after pointing out the difficulties inherent in defending the whole of the North American continent against air attack, he announced the establishment of the Mid-Canada-Line.247 Somewhat more vaguely the establishment of the DEWline was touched on in the same speech with the following remarks:

We have also had under consideration by scientists and military experts in the United States and Canada additional means of having early warning, and no doubt additional steps will be taken from time to time. This is an exceedingly costly operation.248

Further statements concerning the establishment of the early warning systems in the North in the months to follow were made in the form of


247Ibid., p.4905.

248Ibid.
joint announcements with an agreement in principle finally given on September 27 1954.\textsuperscript{249} A further joint statement on November 19 of the same year\textsuperscript{250} announced the full go-ahead of the DEWline as a co-operative venture between Canada and the United States with the responsibility for the construction of the system accorded to the United States alone.

Somewhat surprisingly, it was not until the following year that any marked reaction took place over the DEWline decision, and even then the central issue appears to have been, as James Eayrs put it: \"preoccupation with sovereignty rather than survival.\"\textsuperscript{251} Even the enormous costs did not appear to be a major cause for concern\textsuperscript{252} for in a widely quoted article entitled: \"Will the DEWline Cost Canada it's Northland,\" the Editor of Maclean's Magazine, Ralph Allen, used the following byline as an introduction: \"To save less than half a billion dollars we handed the expense and operation of this radar network - perhaps obsolete already - to the United States. The Editor of Maclean's says we also handed over part of our national independence.\"\textsuperscript{253}

The question of sovereignty over the North had been raised in the House of Commons by John Diefenbaker on February 22, 1955, at which time both the cost factor and the terms of the agreements entered into with the United

\textsuperscript{249}Canadian Weekly Bulletin, Vol.9, No.48, October 1, 1954.
\textsuperscript{251}Canada, Special Studies prepared for the Special Committee of the House of Commons on Matters Relating to Defence, Supplement 1964-65, p.18.
\textsuperscript{252}Although Major-General W.H.S.Macklin (Maclean's Magazine, Vol.69, No.4, February 18, 1956, pp.20-21; p.51) termed it a joint wall-building exercise and claimed that (p.20) \"Our military experts are repeating the classic tragedy of the Chinese Wall by spending astronomical sums on DEW Line and other continental radar screens that can never really protect us.\"
\textsuperscript{253}Maclean's Magazine, Vol.69, No.11, May 26, 1956, p.16.
States concerning the DEWline were also requested. The Prime Minister, Louis St. Laurent replied for the government with the following assurance, stating: "With respect to the invasion of Canadian sovereignty, nothing has been done that does not flow quite naturally and appropriately from the commitments we have made under the North Atlantic treaty for the common defence of the area envisaged in that treaty." Continuing further, Louis St. Laurent alluded somewhat obliquely to the Declaration of Defence Co-operation of February 12, 1947 and concluded with a justification for joint operations in the Canadian North, since:

the general policy that underlines, according to a declaration that was made a long time ago, that anything done in the territory of the other country by Canada or the United States would remain under the control of the authorities of the country where the operation was being carried out. It is no longer possible to be isolated from each other. This is something which is regarded as necessary for the protection of the North American continent and requires this to be done as far from vulnerable points as possible, and on the North American continent, from the north, the farthest points are Canadian territory.

What Louis St. Laurent did not state, however, was that even then the "vulnerable points," in military circles at least, were not necessarily seen to be North American cities or industrial centers, but the bomber bases of the U.S.A.F. Strategic Air Command. Lieutenant-General Guy Simonds (ex-Chief of Staff, Canadian Army) had no illusions on this point, for in 1956 he had stated: "Distant early warning to secure Strategic Air Command against a surprise attack is militarily sound; the effort to build an effective defense based on the radar-controlled, winged, manned fighter is not." 

The question of obsolescence in the DEWline scenario was to surface quite

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255Ibid., p.1376.
early in its history, and strangely, the question is still with us, primarily because the manned bomber still exists as a potential threat. If the DEWline's main value, if not its stated purpose, was to allow the bombers of Strategic Air Command to preserve the concept and function of massive retaliation\textsuperscript{257} then it may well have more than served yeoman service. If preservation of peace, and freedom from a global nuclear conflict resulted from the DEWline's contribution, then the additional facets, such as costs, sovereignty, and northern intrusions should perhaps be weighed with this factor in mind. As far as the "costs" were concerned, Canada was not required to foot the bill for either the construction or the operation of the DEWline, and far from threatening Canadian sovereignty in the North, the DEWline actually reinforced and consolidated Canadian claims over the mineral rich Arctic Archipelago and the Far North.

The sovereignty issue was to become something of a political football during the early years of the DEWline. Nevertheless, the DEWline's role in the matter was critical, and it cannot be said, given the text of the DEWline Agreement, that the subject was not well covered or provided for in great detail.

While the gradual release of information about the DEWline (especially during the initial stages) lagged well behind events, there was no doubt

\textsuperscript{256} "We're Wasting Millions on an obsolete Air Force," \textit{Maclean's Magazine} Vol.69, No.16, August 4, 1956, p.39.

\textsuperscript{257} Massive retaliation itself concealed the other side of the coin, namely that civil defence was useless. Jame Eayrs noted sardonically in his summary: "Canadian Defence Policies since 1868," (Special Studies on Matters relating to Defence, Supplement 1964-65, p.19) that while the Canadian government had prepared a secret bunker during this period, "the average citizen was left to fend for himself, armed (if he so desired) with a government loan and a pamphlet from the Queen's Printer, 'Your Basement Fallout Shelter.'"
better liaison between the United States and Canadian military departments and the responsible bodies of their respective governments. Perhaps predominantly for reasons of security, and spurred by the urgency of the Cold War, the lack of adequate information was understandable. Nevertheless, the precedent set and the ease in which such massive systems came into being, along with the mechanism used (recommendations by the Permanent Joint Board on Defence as opposed to parliamentary debate) serves as a warning to those concerned with Canadian interests, national security notwithstanding.
CHAPTER XII

Northern Defence and Northern Affairs

Preparations for the DEWline Era

While military preparations for the DEWline preceded the actual implementation of the system by a number of years, and the planning phase was to be most thorough, the general impression gained regarding the carrying out of the project appears to one of casual indifference to the needs of the North itself, the terms of the DEWline Agreement notwithstanding. On the face of it, the dictates of military situation and the urgency of the time had meant that the system would have to be constructed, regardless of the cost and the difficulties involved. On the other hand, and on further examination, there does appear to have been concrete attempts to make the most of the situation, at least from the Canadian point of view.

Canada's northland, particularly the Far North, had generally been badly neglected until the turn of the present century when, as Diamond Jenness put it: "Only a threat to her sovereignty over the islands fringing her far-northern mainland could rouse her from lethargy. It was that threat and not, as in Greenland, any concern for Eskimos, which in 1903 provoked her to set up an arctic administration." 258 As far as Canada's Eskimos were concerned, the new administration, while bringing law and order259 with a thinly strung line of police posts across the arctic, did little to prepare for the


259Albeit law from the South; Jenness (ibid., p.24) noted with bitterness: "Accordingly, from the beginning of the century the laws of Canada prevailed throughout the Canadian Arctic, and Eskimos who offended them could be - and were - arrested by white police, tried by white judges, and subjected to penalties not intelligible to them, all with that perfect legality which salves the most tender conscience."
future, and as Jenness commented:

So the Arctic stagnated. And the fault lay in Ottawa, where government, though overly jealous of its sovereignty in the region, could not decide what it should do with it, or with the Eskimos who inhabited it. Its northern administration drifted without a goal, and the police it stationed throughout the north could do no more than try to maintain the status quo. Inactivity brings its own nemesis. While the government idly drifted, the fur trade collapsed, dragging in its fall the only pillars that were holding up the Eskimo's economy. Destitution and hunger stalked the Arctic, and Ottawa could see no remedy except unending relief.260

This sorry situation was to be both aided and exacerbated by the Second World War and the Cold War that was to follow, but even the advantages that resulted from wage employment during this period were somewhat transitory, and according to Jenness, this phase: " bared to the world the ineptitude of her (Canada's) administration and the degradation of her Eskimos, many of whom it dragged out of their isolation and caught up in its turmoil." 261 This assessment, however, is perhaps too harsh a condemnation of government activities (during the DEWline period at least) although Eskimos problems262 no doubt saw little real solution from military construction projects, but then nor could they be expected to either.

260 Ibid., p.25.
261 Ibid.
262 Not " the Eskimo Problem " itself, for as Jacques Rousseau has observed from a wider perspective: " there is no Eskimo problem, nor any Native problem in Canada; but there is an acute White man problem in his behaviour towards Natives." ( " The Northern Quebec Eskimo Problem And the Ottawa-Quebec Struggle," Anthropological Journal of Canada, Vol.7, No.2, 1969, p.2.)
The DEWline and the Establishment of the Department of Northern
and National Resources

Although Canada might have been accused of neglecting her far northern regions during the first half of the present century, there were obvious difficulties which contributed to the neglect. The very vastness of the region, the terrain, climate, and above all the enormous problems posed by minimal transportation routes and communications all must be taken into account. What little access there was into the North during this early period was largely confined to the short summer shipping season and the activities of the Eastern Arctic Patrol inaugurated in the 1920's, which in turn was designed primarily to reinforce Canadian sovereignty and law with its yearly visits to arctic waters.

Meanwhile governmental administration of the North took something of a back seat, with the Arctic being tacked onto the responsibilities of such bodies as the Department of the Interior initially, and later (in 1936) under the control of the Department of Mines and Resources.263 After 1945, the situation became even more fragmented when the last named department was replaced by the Departments of Citizenship and Immigration, Mines and Technical Surveys, and Resources and Development respectively. In addition to its many other duties,264 the Department of Resources and Development

263In 1953, Prime Minister Louis St. Laurent was to note apologetically to the House: "Hon. members know that that department had the administration of immigration, of mapping and surveys, of Indian affairs, of national parks, of forest resources and so forth, and it was not possible that very much of the attention of the department could be given specifically to northern affairs." (Canada, House of Commons Debates, December 8, 1953, Vol.1, p.696.)

264All responsibilities, in fact listed by Louis St. Laurent other than mines, mapping and surveys, which came under the new department of that name.
also inherited the responsibilities for arctic administration, although the complete administration of the Eskimo population was still not under one central authority even as late as 1950.

The confusion, lack of awareness, and somewhat minimal funding for Canada's Eskimos was well illustrated in a minor debate which concerned the allocation of the princely sum of $300,935 for the Arctic Division under the title: Operation and Maintenance of Services, including Eskimo Affairs on June 1, 1950. On this occasion it was revealed, after questioning, that while the education and welfare of Eskimos came under the Department of Resources and Development (unlike Indian Affairs, which came under Citizenship and Immigration) medical care for Eskimos came under the auspices of another department, that of National Health and Welfare.

While the sum of $300,935 may not have appeared to be particularly large given the immense area under consideration, the tendered allocation was nonetheless subject to considerable scrutiny and questioning by various Members of the House. This scrutiny was perhaps brought about by the fact that the allocation was considerable larger than in previous years, but the nit-picking and general lack of knowledge brought forth by the questioning was revealing. Finally, after a series of interchanges the item was agreed to, but not before Mr Edward Applewhaite had risen and complained that:

Under the heading of northern administration this committee has passed without the slightest hesitation or criticism items totalling approximately $5 million, but now we have some petty little sum of $300,000 to be spent for the benefit of our Eskimo population and it is being picked to pieces. I trust sincerely that neither the minister nor the government will assume that this country begrudges the small amount we are now expending upon the Eskimo population and which in my opinion might well be increased without in any way over-pampering the Eskimos.265

Although government activities in the Arctic had improved by the early 1950's, there was still a limited amount being done, and it was not until the coming of the DEWline that any great change was to take place. Arctic administration, the question of sovereignty, and northern resources and development all became topics of increasing importance in government circles immediately prior to the construction stage of the DEWline, and this was far from incidental.

As a result of the activities of the Permanent Joint Board on Defence and the liaison established with the United States arising from the trial DEWline installations in Alaska and the Yukon (Projects 572/Corrode and Counterchange) Canada had (as early as January 1953 and possibly earlier) its own "early warning" as to the likelihood that a major military construction project would soon be needed across its far northern lands.

The event that was to turn the possibility of this into a reality (if not a necessity) was the demonstration of the Soviet thermo-nuclear capability on August 12, 1953, and it is significant that as early as September of that year that the Canadian Government moved to change the responsibilities for northern administration by transferring duties not directly related to the North to other departments. More significant was the introduction of a major bill to re-organise northern administration under a new department (the Department of Northern Affairs and National Resources) by Prime Minister Louis St. Laurent on November 16, 1953, barely three days after President Eisenhower's speech to the House on the need for increased co-operation in defence.

The title of the new department - Northern Affairs and National Resources - was itself significant, spelling out (as it was intended to)
the spheres of influence covered. The relationship between the DEWline, the sovereignty issue, and northern development became clear from the text of Louis St. Laurent's main speech given at the second reading of the bill on December 8, at which time he stated that the Canadian Government felt that it was highly desirable:

to create conditions in which it is clearly indicated that the government and parliament want further attention given to the development of our north country, and I may say that that was further impressed upon us by the fact that there have to be quite a number of non-canadians going into that territory. We felt that it was very important to have the situation such that whenever they went there they realised they were in Canadian territory and in territory that was administered by Canadian authorities. The present bill is designed to give more emphasis to the fact the people of Canada are greatly interested in this northern territory and regard it as an important part of the territory subject to the sovereignty of the Canadian nation. The purpose of this bill is to further that objective.266

(italics added)

The selection of the name for the new department was also carefully explained, and its purpose was to indicate: "that the centre of gravity of the department is being moved north." 267 The inclusion of the term national resources was also carefully thought out, for as Louis St. Laurent explained:

The Department of Resources and Development will become the Department of Northern Affairs and National Resources. It is proper that they should be together because the national resources subject to the jurisdiction of parliament and vested in Her Majesty in the right of Canada are the resources that are situated in the northern territories.268

In order that there would be no misunderstanding whatever, Louis St. Laurent went further, and concluded with the statement that: "The

267Ibid.
268Ibid.
natural resources of Canada are now the natural resources in the territories that are outside those of provincial administration. " 269

Thus both Canadian sovereignty and government control of the North was clearly spelt out, while the impending influx that had made this action was also referred to (albeit obliquely) in the same speech as follows:

There is another aspect which makes it necessary for us to give more attention to these northern territories and that is the fact that the Canadian northland lies between the two greatest powers in the world at the present time, namely, the United States of America and the U.S.S.R., and our own security is probably made more difficult to provide for by the fact that this northland of ours is between these two great world powers. There will, no doubt, have to be joint measures taken for the security of the North American continent. It is a continental problem that presents itself for solution by that mere fact of geography. I am not going to say any more about it than was said by the Minister of National Defence (Mr Claxton), but these joint undertakings are carried out under the principle which the President enunciated from the head of the table here only three or four weeks ago. They are implemented with full respect for the sovereignty of the country in which they are carried out. We must leave no doubt about our active occupation and exercise of our sovereignty in these northern lands right up to the pole. 270

(italics supplied)

The defence aspect, perhaps surprisingly, did not occasion any great comment in the House 271 and understandably, the members from the northern constituencies were among the first to express their appreciation for the new focus on the North. The Member for Cariboo, Mr B.R. Leboe pointed out that: "the greatest aid to development is the provision of communications, the railways, highways and telephone systems which (I think) are required more than anything else at this time in order to assist this projected

269 Ibid.
270 Ibid., p. 699.
271 Although Mr M.A. Hardie (Member for Mackenzie River) generously volunteered the services of the Eskimos for national defence, and expressed the opinion that: "the Eskimos would make an ideal ground defence force in the event of invasion from the north." (ibid., p. 728.)
development." 272 Mr J.A. Simmons (Yukon) adopted a similar stance while at the same time welcoming further federal participation in such matters, saying:

We all know that the improvement of communications in any part of Canada helps to bind our country together, to make us more united and to speed up the development of our great resources. There is no part of Canada where transportation and communications are more vital than in the Yukon and in the north country generally. The economic development of the north will be encouraged and accelerated by the provision of these facilities. The area of the north is so vast and the distances so great, that it would seem only wise for the federal government to assume a much greater share of the burden in providing these essential services and facilities. 273

In general, the reception of the bill appears to have been almost one of euphoria, although a few warning (and, as it was to turn out, prophetic) notes were sounded by Mr Solon E. Low (Peace River) regarding the future of the North and the problems inherent in northern development. In particular, Mr Low commented on the strategic importance of the northern territories, and observed that:

Whoever controls the great northland - and I refer to control of all the territory and all the strategic places therein - will to a great extent control the whole continent of North America, For that reason we should be very careful how we enter upon the development of the Northwest Territories. 274

A further concern to Mr Low was the impact of the coming changes in the North on the Eskimos, and to illustrate his point he cited the experience of Alaskan Eskimos, saying:

I am not forgetting some of the things that were done among the Eskimos of Alaska not so many years ago, when the United States government was prevailed upon to do some work there. They sent so-called experts into the Eskimo country. These experts were

272 Ibid., p.706.
273 Ibid., pp.707-708.
supposed to civilize the Eskimos, and I may say that there were some tragic results.\textsuperscript{275}

The problems inherent in the situation, namely the impact and the consequences of the impending surge in northern activity, were not merely given lip-service, but were given sufficient priority to ensure wherever possible Canada's claims over both sovereignty and natural resources across the entire arctic regions of Canada. Nor were Canada's Eskimos forgotten in these preparations, for special Northern Service Officers of the new Department of Northern Affairs and National Resources were appointed to the Arctic to aid (among other things) with the problems of wage employment and cultural contact that the coming of the DEWline was to bring to this critical region.

A major problem nevertheless still lay in the general lack of wage employment opportunities and an industrial base in the Far North, and neither the construction of the DEWline, nor its continued operation could be expected to provide a real solution to these problems. What it could do was to provide temporary relief at the price of further disruption and movement away from traditional subsistence methods, yet it is necessary to note that this change was already under way and had become irrevocable even before the DEWline came on the scene.

Whether by policy and design,\textsuperscript{276} or by an accident of geography, the Canadian Arctic and the Eskimos that inhabited it were to undergo incredibly rapid changes in the years immediately following the birth of the Department of Northern Affairs and National Resources. The coming of the DEWline may well have presented Canada with many problems, but given the urgency of the time, it seems that the Canadian government attempted to do the best it

\textsuperscript{275}Ibid., p.725.
could in a most difficult situation that has perhaps still to be resolved adequately.

A study on the effects of the DEWline employment opportunities for Eskimos near Barter Island, Alaska by anthropologist Norman A. Chance begun in 1958 may have influenced Canadian philosophies on the question of acculturation in the North. The study carried out by Dr Chance was revealing in a number of ways. Firstly, Eskimo employment appears to have occurred on the DEWline quite early in the proceedings - as early as 1953 in the case of Barter Island, and apparently it also involved the movement of Eskimos from Aklavik in the Northwest Territories over the period 1953-1954. Secondly, the effects of working on the DEWline near Barter Island and the study that followed led Dr Chance to suggest the following hypothesis: "that rapid acculturation may be more conducive to community integration than slow or moderate change if the newly desired goals are clearly perceived and capable of being integrated into existing social and cultural patterns." ( "Notes on Culture Change and Personality Adjustment among North Alaska Eskimos," *Arctic*, Vol.16, No.4, December 1963, p.265.)
CHAPTER XIII

The DEWline and Canadian Sovereignty in the North

The Sovereignty Issue

During the presentation of the bill to introduce the Department of Northern Affairs and National Resources, Prime Minister Louis St. Laurent had observed that:

It has been said that Great Britain acquired her empire in a state of absence of mind. Apparently we have administered these vast territories of the north in an almost continuing state of absence of mind. 277

This was an accurate assessment in its way, for Canada had managed to lay claim to the immense arctic regions with little dispute, effort, or real difficulty. Indeed, as Gordon W. Smith has remarked: "with a little more ineptitude or a little less luck on our part, or a more aggressive competition from some other state or states, they may not have become ours." 278

Historically, the northern regions were claimed originally by Great Britain following the early voyages of discovery, and in 1670 the Hudson Bay Trading Company acquired the entire drainage area into Hudson Bay known as Rupertsland. In 1867 the Hudson Bay Trading Company amalgamated with the North West Trading Company, and the enactment of the British North America Act of the same year, together with the Rupertsland Act of 1868 gave the control of the Northwest Territories (including the Arctic Archipelago) to Canada. Deeds of surrender followed in 1870, and after the delineation of the Provinces and the Yukon Territory in 1912 the Canadian North took on a formal existence. This was not without dispute, for Denmark in particular

attempted to lay its own claims to Ellesmere Island in the years immediately following World War I, and Norway also disputed Canadian sovereignty over the Sverdrup Islands. Canada during this period was to remain adamant about its sovereignty over these areas, and significantly after establishing the Eastern Arctic Patrols in 1922 Canada also commenced in the same year to man police posts on Ellesmere Island (at Craig Harbour) and Baffin Island (Pond Inlet) with a further scattering of posts throughout the North for good measure.

Norwegian claims over the Sverdrup Islands were dropped by 1930, and in 1933 a precedent was set when the sovereignty of Denmark was established in Greenland irrespective of Danish settlement per se in all areas. At this time Canadian claims to the Arctic Archipelago appear to have been generally accepted, or at least not actively disputed, but Gordon W. Smith pointed out that in spite of this situation:

Canada could still lose her rights, conceivably, either through dereliction on her own part or the application of force by a stronger power; but in the first case she would deserve to lose them and in the second the issue would obviously be decided by might rather than right.\textsuperscript{279}

The former of the two possibilities still appears to have lingered on in the minds of certain segments of the Canadian government after 1933, and in a revealing document published by the Arctic Institute of North America\textsuperscript{280} plans to use Eskimos to reinforce Canadian claims to the Arctic Islands were clearly spelt out in 1934, albeit coupled to a more philanthropic motivation. The relevant document concluded that Eskimo relocation to areas where game

\textsuperscript{279} Ibid., p.12.

resources were more plentiful was desirable, but in addition, such moves also possessed additional advantages, for the document concluded that:

In addition to placing of Eskimos in new regions where game is more abundant and work more regular, there is the angle of occupation of the country, now that aerial routes, mineral developments, and other reasons make possible the claims of other countries to part of Canada's Arctic, which now reaches to the North Pole. To forestall any such future claims, the Dominion is occupying the Arctic Islands to within nearly 700 miles of the North Pole.281 (italics added)

The actual move involved Eskimo families from Cape Dorset, Pangnirtung, and Pond Inlet (on Baffin Island) to a location on Devon Island at Dundas Harbour during the summer of 1934.282 After two years the experiment proved to be a failure, and although the Pangnirtung contingent returned home, the remainder were relocated at Arctic Bay on Baffin Island. In 1937 there was a further move, this time to Fort Ross on Somerset Island where they remained until 1947, at which time they were once more relocated to Spence Bay on Boothia Peninsula.

The reasons for the failure of the colonization experiment have been given in some detail by Diamond Jenness283 and apart from noting such major obstacles as difficult ice conditions, limited sea access, and the most important aspect of all, whether the Eskimos themselves really wished to embark on the venture in the first place, they will not be discussed further. This tragedy (as it must surely be considered) was regrettably to be repeated in later years, in fact during the period immediately prior to the coming of the DEWline. Here again, given the fact that the new Eskimo "relocation" took place in 1953, the very year that saw the establishment of the trial DEWline installations

281 Ibid.
282 For these locations see Map No.13.
283 See Jenness, ibid., pp.59-64 for details.
in the Yukon and the formation of the Department of Northern Affairs and National Resources before the year's end, the move may have been influenced in part by a further desire to strengthen Canadian occupation of the Arctic Islands before the coming onslaught from the South. As it was, the new movement of "colonists" this time involved the relocation of Eskimos (from as far away as Port Harrison on the east coast of Hudson Bay) to the far northern regions at Resolute Bay on Cornwallis Island, and to Grise Fiord on Ellesmere Island. Nor was this all, for further "occupation" took place the following year (1954) with the establishment of a Canadian Weather Station at Sachs Harbour on Banks Island and the formation of a permanent Eskimo settlement at the same location.

The DEWLine and the Sovereignty Issue

Canadian presence in the North had thus been reinforced once again on Ellesmere Island, on Cornwallis Island, and established on Banks Island by 1954, just as the DEWLine construction phase began. This situation, I would claim, was understandable and a necessary precaution given the crucial importance of the DEWLine to northern development. It is obvious that a necessary adjunct to the development of Canada's far north was the clear recognition that the vast territories comprising the Arctic Archipelago were indeed Canadian. The relocation of Canadians among the Arctic Islands was no doubt a precautionary measure as far a Canadian sovereignty was concerned, but against this there was the period of time between the initial stages of the DEWLine project early in 1953 and the disclosure of the

284Jenness was particularly critical of this move, especially in the case of Resolute Bay and the dependency on support from wage employment and items from the South that it occasioned; for details see his chapter entitled: "Steering Without a Compass" (ibid., pp.94-95)
DEWline Agreement in May 1955. The sovereignty issue was to all intents and purposes settled when the DEWline Agreement came into being in 1955, at which time, according to R.J. Sutherland in an often quoted reference, the DEWline Agreement was the document by which: "Canada secured what the United States had up to that time assiduously endeavoured to avoid, namely, an explicit recognition of Canada's claims to the exercise of sovereignty in the Far North." 285

In view of the fact that the DEWline was to run not only along the top of the North American continent through Canadian territory, but also across the Arctic Archipelago - Victoria Island, King William Island, and Baffin Island - and no differentiation was made in this regard, the Canadian claim to the entire Archipelago was thus uncontested. Furthermore, in the last of a series of documents relating to the DEWline Agreement, the U.S. Secretary of State informed Canada on May 5, 1955:

I have the honour to acknowledge your Note No.306 of May 5, 1955. You refer to the construction by the United States of the distant early warning element of a comprehensive warning and control system, being established jointly by the United States and Canada, and annex a statement of conditions to govern the establishment of this line in Canadian territory which were developed in discussion between representatives of the two governments.

The United States Government notes the intention of your government with regard to participation in the construction, operation and maintenance of the project and both concurs in the conditions annexed to your Note and confirms that your Note and this reply shall constitute an agreement of our two governments effective today.286 (italics added)


The annexed portion of the document contained the conditions of the DEWline Agreement, and thus Canadian sovereignty was ensured over the entire Arctic Archipelago. The DEWline Agreement and its conditions was itself so satisfactory a document that the main sections dealing with plans, sites, law, immigration and customs, and matters affecting Canadian Eskimos etc., were used verbatim in the detailed annex to another related military venture in the North, the: "Establishment, Maintenance and Operation of Communications Facilities in Canada as Part of the Ballistic Missile Early Warning System." 287

Significantly, in both the DEWline Agreement of May 5, 1955, and the BMEWS Agreement of July 13, 1959 mentioned above, there was full provision for the application of Canadian law, and in the field of labour relations this factor was to play a part in the establishment of a Canadian labour union on the DEWline, while the utilisation of the Canadian Labour Board and standard arbitration procedures were all carried out in the North uncontested in terms of Canadian sovereignty.

The provisions for Canadian manning and operation of the DEWline laid out in the DEWline Agreement were applied when the Royal Canadian Air Force took over the operation of the system in 1959, while the use of both the Eskimos and Canadians from the South to man the Line further entrenched 288 Canadian claims for effective "occupation" of the Arctic - a claim that was fully consolidated by the conditions of the DEWline Agreement. 289

287 Ibid., pp.47-52.
288 The Canadian section of the DEWline was manned 97 per cent by Canadians by 1963 (Canada, House of Commons Debates, July 31, Vol.3, p.2837)
289 Although problems still remain with offshore rights and passage through the Arctic Islands; for details see: The Arctic in Question, Ed. E.J. Dosman (Toronto: Oxford University Press, 1976)
The Reception of the DEWline in Canada

Although the DEWline had in effect established Canadian sovereignty in the Far North, both the heavy security associated with the project and the interval of time between the trial DEWline segment in 1953 and the disclosure of the conditions of the DEWline Agreement in 1955 tended to obscure this vital fact, particularly during the early stages. Thus it appears that the sovereignty issue developed somewhat slowly as news of the DEWline project filtered south on one hand, and Canadian journalists became more aware of the undertaking on the other. One of the first expressions of concern was given by Leslie Roberts in October of 1955, although in an earlier article on the DEWline published only a few months previously he had spoken in glowing terms of U.S./Canadian co-operation, in which he had stated:

Throughout the entire operation, Canadian and Americans - individuals and governments alike - have been working together with remarkably little friction. This is not to say that Canada did not drive a hard bargain. She did. She insisted that actual construction of the stations must be done by Canadian contractors, that materials should be purchased in Canada when practicable, that all possible flying should be done by Canadians, and that Canadians should have first call on all employment. The United States, moreover, is financing the entire project; but Canada will have the right to take it over at any time, presumably after reasonable notice and agreement on terms. 290

By the time Roberts' next writing on the subject appeared there had been a considerable change in attitude, and while Roberts was still unconcerned about the financial aspects in view of Canada's own relatively high expenditures on the Mid-Canada-Line and Pinetree system, the question of manning on the DEWline was another matter. Although advocating the participation of Canadian Forces overseas as part of Canada's commitment to NATO, Roberts nevertheless felt that it was also necessary that: "all continental

defence establishments on this soil (Canada) should be manned by Canadians to the limit of our ability because it is our job and the only way in which we can maintain equality of status with our neighbours. " 291 Focussing more closely on the DEWline itself, Roberts objected to the fact that news releases on the projected emanated from Washington instead of Ottawa, that the news releases themselves were not always accurate, and that the security aspect was also handled by the United States. In the latter case he felt strongly that security was not a subject that should be controlled entirely by the United States, but that: " Security on the soil of Canada is a matter for Canadian judgement and decision .... It is a purely Canadian responsibility and a matter of Canadian principle, which clearly involves our sovereign status. " 292

Leslie Roberts was not content to leave the matter there, and roundly accused the Canadian government of neglect in this area with the following criticism:

Ottawa is not purposefully " selling us over the border. " It simply isn't taking the trouble to safeguard what we have and are. We are not being dragged into subservience by the United States. We are moving into it under our own steam with our chosen leaders at the throttle. But can much more be expected of men in a country where there is clear proof that the people don't give a damn? 293

In one respect this attack was justified, for Roberts' concern over the manning of the DEWline in Canada was vindicated by the disclosure a few months later that the manning and operation of the system was to be carried out by a United States company. This information was released on March 20, 1956 and on March 22 Mr G.R. Pearkes raised the matter in the House of Commons, asking


292 Ibid.

293 Ibid.
whether Canadian firms had been allowed to tender bids for this work.\textsuperscript{294} The Minister of Defence, Mr C.D. Howe replied that two Canadian companies had indeed submitted bids, but that they had been unsuccessful. Mr Howe was reluctant to supply the names of the two Canadian companies in question, but he informed the House that the successful applicant was the Federal Electric Company, and to soften the blow he further stated:

\textit{We have reason to believe that at least 80 per cent of the personnel employed on the section of the DEW line within Canada will be of Canadian citizenship, and we also have every reason to believe a fair number of Eskimos and Indians in the area will be employed on the line.}\textsuperscript{295}

Further concerns, however, were voiced regarding the allocation of DEWline contracts and whether Canadian law remained in force in such circumstances, and such were the rumblings in the House that Prime Minister Louis St. Laurent was obliged to give a speech on April 11, 1956 assuring the Members that the principles of the February 12 1947 Joint Declaration of Defence Co-operation were in force, and further, that for the DEWline and eight other joint U.S./Canadian defence projects in Canada: "Canadian law is fully applicable, and it is expressly stated that Canadian law shall apply." \textsuperscript{296}

All this, it should be noted, was taking place during the actual construction stage of the DEWline, not the initial operation, which took place over a year later. Nevertheless, the DEWline began to attract attention and some concern during this early stage, and in particular, an inflammatory article by Ralph Allen in a May issue of \textit{Maclean's Magazine} in 1956 sparked off

\textsuperscript{295}Ibid., p.2486.
another round of questions in the House of Commons. Based on a flying visit early in 1956, Ralph Allen's assessment was both vivid and critical, and no punches were pulled as he wrote:

DEWline is one of the greatest feats of engineering and logistics in all of history, a monument to the ingenuity and hardihood of the North American human being. Unhappily, it may prove to be far more and far less than that. It is the charter under which a tenth of Canada may well become the world's most northerly banana republic. For a sum of money that has officially been estimated at four hundred million dollars we have at least temporarily traded off our whole northern frontier. In law we still own this northern frontier. In fact we do not. We have not merely allowed our military allies, the people of the United States, to possess it; we have insisted that they possess it. We have done nothing so passive as simply giving up our sovereignty in the Canadian north....

Allen continued further in this vein, stating that: "The suggestion that Canada is only the nominal ruler of this important part of Canada and the United States is the real ruler is not taken seriously anywhere except on the DEWline itself. There the truth is palpable and inescapable." Other aspects of the project that invoked Allen's concern were questions associated with U.S. manning; the flying of U.S. flags in the Canadian North; military control of joint U.S./Canadian bases, and the practice of obtaining security clearances from the United States authorities rather than Canadian.

On June 20, 1956 the question of manning on the DEWline was again raised by Mr G.R. Pearkes (Opposition Defence Critic) who although not quarrelling with the military necessity for the system in Canada nevertheless commented: "One does question the wisdom of having the United States contractors manning and operating the D.E.W. line for the next three years. Naturally, having some pride in our own Canadian sovereignty, we would have preferred to see Canadian personnel doing that work."

298 Ibid., p.68.
Two days later, Mr John Diefenbaker wanted to know: "What are we doing to maintain good relations between the United States and Canada along the DEW-line, while at the same time assuring Canada's sovereignty in those areas where facilities of the DEW-line are being constructed?" Diefenbaker further suggested that greater use be made of government officials along the DEW-line, to give: "these areas a realization that indeed they are under our sovereignty...." and the same cry was taken up with even more fervour on August 2 by Mr D.S. Harkness, who also made numerous references to Ralph Allen's May 26 article in *Maclean's Magazine*.

In the face of this growing barrage of questions concerning Canadian sovereignty and the DEW-line, Mr Jean Lesage rose on behalf of the Government and stressed that there were no difficulties as far as sovereignty and control were concerned, saying:

> Nothing exists which one could call United States control in the north. It is Canadian control. Our northern service officers are constantly touring the line. The R.C.M.P. are constantly touring the line looking after order, peace and good behaviour on the part of everyone concerned. It is clear that Canadian law is applied and enforced, and that the control is in the hands of Canadians.

The whole issue appears to have subsided somewhat following Jean Lesage's August 3 speech, and although Mr Harkness was to resurrect the issue in March of the following year it was not until 1958 that the matter came into prominence once again. During this interval the DEW-line had become operational (in July of 1957) and there had also been a change in the government of Canada with the Conservatives coming to power. Thus John Diefenbaker and

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301 Ibid.
Mr George Randolph Pearkes in October 1957 found themselves on the receiving end as Prime Minister and Minister of Defence for the new government.

The next round of discussions in the House over the DEWline and the sovereignty issue had in fact been precipitated by John Diefenbaker on August 16, 1958 when he had made the observation that prior to his taking office, as far as northern defences were concerned: "there were in existence situations that could conceivably derogate from Canada's sovereignty," and that the present government had moved to counter such situations. 305

This statement provoked Lester B. Pearson to suggest that the DEWline Agreement of May 5, 1955 be put on record in Hansard, since in his opinion:

It seems to me that there is complete and necessary protection of the Canadian sovereign rights which are concerned, namely the Arctic areas, where the D.E.W. line would be established. In the annex to the exchange of notes the arrangements are given which I think are pretty adequate for the protection of those rights of sovereignty. 306

This move was somewhat surprising, and in a sense should not have been necessary, for details of the DEWline Agreement had in fact been disclosed to the House much earlier by Mr Pearson in May of 1955. Here he took the occasion to point out the various clauses and safeguards concerning such topics as Canadian law, provision for Canadian manning and operation, the use of airstrips, and other pertinent terms 307 before asking the Prime Minister to stipulate the additional regulations that the new government had claimed to have made to "improve" matters in this area. 308

In retrospect, I would claim that the sovereignty issue had in reality been a dead horse ever since the terms of the DEWline Agreement had been

307 Ibid.
308 Ibid.
drawn up, for in it Canadian sovereignty, control, and rights in the Arctic Archipelago were clearly stated. This fact, along with the tacit understanding of Canadian sovereignty that brought the DEWline Agreement into being in the first place should perhaps have been clear from the start, or at least from the time of its release in May 1955. As it was, I would argue that the issue became something of a partisan dialogue, although early in 1959 Diefenbaker's Government made a positive step of sorts when they announced the take-over of military control of the DEWline by the Royal Canadian Air Force.  

Even here the proclamation was bracketed between the following statements: "Well, the D.E.W. line was built and little consideration was given to Canada, " and: "This is a step in the direction of ensuring that in the northern territories there shall be no misunderstanding as to whom those areas belong. "

Flying the Flag and Security Clearances: Irritants and Comments

While the sovereignty issue was to be bandied about the Canadian House of Commons from time to time, it is worth noting that very little, if anything at all was done by the United States government in the form of clear statements that might have been construed as threats to Canadian sovereignty in the North. Instead, it appears that Canadian reaction to this question was based on minor incidents that filtered down from the region; a number of inflammatory articles in the Press, and supposed attacks on the

308 It was not until March of the following year that the information was forthcoming, and even then it occasioned Mr Pearson to remark: "There has been no change in regard to the D.E.W. Line which would justify the Prime Minister's statement that things were unsatisfactory when the government took over but changes were made to fix them up. " (Canada, House of Commons Debates, March 2, 1959, Vol.2, p.1504.)


310 Ibid.
sovereignty of Canada through the application of United States administrative procedures and activities on the DEWline.

Two areas that appear to have irked Canadians to an unusual degree were the flying of the United States flag at U.S. military bases in Canada, and security clearance procedures associated with visits to the DEWline. In the latter instances, the fact that Canadian members of the Press had to obtain a security clearance from United States officials, coupled with the necessity of obtaining press releases from similar sources, may well have contributed to the stand adopted by Canadian journalists in much of their writings on the matter.³¹²

The Flag Flying incidents were perhaps overblown in their importance and their intent. As early as May 1956, Ralph Allen had published along with his article: "Will the DEWline Cost Canada its Northland?" a photograph of the base at Frobisher Bay with the accompanying caption: "U.S. Flag flies beside the RCAF standard at Frobisher Bay, a DEWline supply base. Although the RCAF claims that it controls 'policy' on the base, the U.S.A.F really runs it."³¹³ In actual fact, the base at Frobisher Bay had been under joint U.S./Canadian military control since 1951, and although it was able to play an important role in the construction phase of the DEWline in the Eastern Arctic, this was hardly its only function.

The flying of United States flags on Canadian soil had been brought up in the House of Commons from time to time³¹⁴ and following Prime Minister John

³¹¹ Even the pros and cons of the question itself were a center of dispute in the House at this time (Canada, House of Commons Debates, August 3, 1956, Vol.7, p.6968)

³¹² A resentment that perhaps gained an outlet in such articles as those by Leslie Roberts and Ralph Allen mentioned earlier.


³¹⁴ As early as 1956, when Mr Solon E. Low raised the question in the House. (Canada, House of Commons Debates, April 11, 1956, Vol.3, p.2819)
Diefenbaker's disclosure on January 19, 1959 concerning the take-over of control of the DEWline in Canada by the RCAF, Mr M.A. Hardie (Mackenzie River) enquired: "Whether or not the United States flag will continue to fly over these sites on Canadian soil?" The answer to this query was furnished by the Minister of National Defence, Mr G.R. Peake, who sidestepped the issue somewhat when he pointed out that no flags were in fact flying over the DEWline stations at that time owing to the severe arctic weather conditions experienced at that time of year (January).

The matter did not end there, however, and two days later Mr M.A. Hardie again rose to ask the Minister of National Defence another question, arising, as he put it: "out of a silly answer I got from him the other day..." Mr Hardie, noting that fine weather had been forecast for the whole of Canada that day, asked whether the Minister would allow the flying of the Canadian flag over defence installations in the country. The minister's reply was the same as before, namely that both weather and the long hours of darkness in the Arctic precluded the flying of any flags in the North. This answer, although technically correct, was still far from satisfactory as far as the Opposition was concerned, and it occasioned Mr Lester B. Pearson to ask slyly: "Is it a fact, then, that our flag can brave the battle but not the breeze?"

The best answer that the Minister of National Defence could provide concerning the flags was that: "If a United States flag or any other flag is flown over an Arctic station it would be done as a matter of courtesy."

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316 Ibid., p.144.
318 Ibid.
319 Ibid.
There in effect the Flag controversy, if it can be called that, ended. Apart from taking over a small number of DEWline airfields (no doubt with adequate provision for flying the Canadian flag) little more in the way of re-inforcing the sovereignty issue was to take place, although the problem associated with U.S. security clearances was to persist.

The matter of obtaining security clearances from a United States agency was to be linked to Diefenbaker's announcement concerning the RCAF takeover of the DEWline in January of 1959, when Mr Hazen Argue asked in the House why it had taken eight months for a government official of the Department of Northern Affairs and National Resources to be cleared for a DEWline visit. Lester B. Pearson during the same spate of questioning on this topic asked further:

In view of the statement of the Prime Minister in the house a few days ago that Canada has now taken over responsibility for the administration of the D.E.W. line, is there any necessity now for a Canadian to secure clearance from any United States authority in order to visit that line?

The answer to this query was supplied two days later by the Prime Minister, and it was most revealing. Diefenbaker was obliged to tell the House that while Canada had taken over responsibility for military control of the system, he wished to: "make it very clear that it is the operational control and not the administration of the D.E.W. line which was taken over

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320 In this respect John Diefenbaker stated defensively: "What have we done in connection with our sovereignty? As far as the DEW line is concerned, we have taken over, as we said the other day, its operational control. We are taking over the airfields in the north, and in the course of the next two or three years, these airfields will be operated by us. We are ensuring that our sovereignty over the northern area shall be maintained." (Canada, House of Commons Debates, February 23, 1959, Vol.2, p.1301.)


322 Ibid.
by the R.C.A.F. The DEWline is still maintained by the United States."

This answer did not enlighten the House concerning delays in granting security clearances, although it did lead Lester Pearson to request that the regulations governing visits by Canadians to the DEWline be tabled, and to the present day there still appear to be difficulties in this area.

The matter of security clearances was at least more relevant than the Flag issue, although here again Canadian sensitivities may have been acute at times, and the fact that Canada and the United States were adopting a joint defensive alignment appears to have been somewhat downplayed, if not well understood.

Blair Fraser noted (without favouring either of the main political parties in Canada) as early as 1958 that as far as the question of joint defence was concerned:

> the choice had been made years ago. The DEW Line agreement which placed American radar sentries on our Arctic coast, was concluded by a Liberal government of Canada. NORAD, which makes the defense of the whole continent one indivisible task, was set up by the Conservatives. By what amounts to unanimous consent of those acquainted with all the facts, secret as well as public, Canadian defense has been merged into American like and egg into an omelet.

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324Ibid.
325DEWline employees are unfortunately still processed for security clearance in a manner that is beyond their control since they depend on being informed of their clearance by the civilian contractor who hired them. In some instances the security clearance has taken months longer than expected, and whether by bureaucratic delay or at the dictates of the civilian contractor, this has sometimes been used to force the waiting employees (who have no union protection or other recourse) to accept either lower wages than originally contracted for, or to seek alternate employment elsewhere.
327Ibid., p.71.
Fraser also took a somewhat cooler line regarding the supposed attacks on Canadian sovereignty that had been pursued by the majority of Canadian journalists with respect to the DEWline, noting that the matter of obtaining security clearances was a standard procedure, and furthermore, that: "What incidents have taken place have been mistakes, usually by some individual exceeding his own authority or ignoring someone else's, according to federal officials." 328

Incidents involving such matters as delays in gaining security clearance for government officials, and refusals of landing facilities for unannounced flights to DEWline stations were cited by Fraser as generally being blown out of all proportion, and he further commented that:

Cases like these have been the occasion of most of the public outcry about sovereignty in the conduct of joint defense with the United States. This has tended, in Washington, to magnify Canada's reputation for being a hypochondriacal fuss-budget, a reputation not yet widespread, but growing enough to worry some Canadian officials who would rather see Canada hold her fire for things of more importance.329

While Blair Fraser's assessment might have put the sovereignty issue in its true perspective, the fact remains that it may well have been more than a purely political exercise on the part of the Canadian government to make continued references and claims over sovereignty in the North. Even though the DEWline Agreement itself was perhaps the real recognition of Canadian sovereignty over the far northern regions of the continent (particularly the Arctic Archipelago) the continued re-iteration of claims to this territory was both a popular and necessary adjunct to dispel all possible doubts on the matter.

328 Ibid.
329 Ibid., p.72.
The manning of the DEWline in Canada by Canadians was an additional factor in the sovereignty issue, while the inclusion of the Eskimos in this context has important ramifications. That Canadian sovereignty had been maintained and re-inforced by the "relocation" of the Eskimos of Canada's North at various times since the turn of the present century is perhaps one of the least savoury aspects of the sovereignty question. The privations of the early groups of Eskimos relocated in the 1930's and 1950's was to be almost eclipsed by the further impact of the DEWline itself. In the end, however, it may well be that as a result of these many disruptions that the Eskimos of Northern Canada may ultimately profit from their enforced conscription in the battle for Canadian sovereignty in the northern regions.

Canada's Eskimos have, after all never signed away their claims to the North, and nor have they signed treaties making themselves wards of the government, as it were. If they have been used, as Canadian citizens to establish Canadian sovereignty in the harsh and desolate regions that now constitute Canada's uncontested northlands, then it seems only fair and correct to acknowledge that this region is indeed their land, their resources, and their heritage, as well as Canada's. Here again, the part played by the coming of the DEWline assumes importance, for it was in a sense the DEWline impetus that in all likelihood contributed to the relocation that took place in the 1950's, while the employment of Canadian Eskimos on the system was an additional factor in establishing their residency in the North.
CHAPTER XIV

Employment, Labour Relations, and Unionization on the DEWline

Preparation for Eskimo Employment on the DEWline

Writing in November 1940, John Quincy Adams\textsuperscript{330} was both critical of the manner in which Canadian settlements in the Eastern Arctic (such as Craig Harbour, Arctic Bay, and Pangnirtung) had evolved, and the already apparent southern influences that were manifested in such locations.

Looking to the future, he observed:

Apparently the only new developments that might cause a great or rapid increase in the number and the size of the present settlements would be the rise of a demand for the creation of military outposts in the Arctic and the discovery of rich deposits of minerals which have a high value to weight index. The first factor, operating through the desire for protection against a possible invasion by air, might cause new posts to be established or old one expanded. Likewise, new mineral deposits capable of being worked and marketed at a profit would bring a rapid though probably temporary influx of private capital and of people. However, no important mineral strikes have been made, and the Second World War has not yet reached the North American Arctic.\textsuperscript{331}

Within months of this observation the events of the War were to result in both an increase in the Northwest (where for a time the threat of invasion was considered a possibility for Alaska) and in the Eastern Arctic with the hurried establishment of the Air Staging Routes and their attendant support stations. Some time later the era of mineral exploration in the High Arctic commenced in earnest following the discovery of oil at Prudhoe Bay in 1968, and sandwiched in between was the era of the early warning systems.

Even John Quincy Adams, however, would hardly have envisioned just how


\textsuperscript{331} Ibid., p.126.
chaotic things were to become in the Canadian Arctic during the 1950's when the DEWline and other changes brought about a virtual transformation of the region.

Although the imperatives of the Cold War were not perhaps any less urgent (at least to military planners) than the situations encountered during World War Two, there was at least the element of time as far as preparation for change was concerned. This is not to say that there was that much time available for planning, but in view of the early warning studies of 1951-52, the trial DEWline system of 1953, and the close liaison between U.S. and Canadian authorities, at least elements of the Canadian government were aware of the impending changes in the North months, if not years in advance.

A major problem, that of cultural contact with Canada's Eskimo population and its consequences, appears to have been seen initially from opposing viewpoints - namely, avoidance, or "non-fraternization," and the exact opposite, rapid and complete integration. The former view (advocated by missionaries and initially by government administrators) was unlikely to lead to any satisfactory conclusion, for as Graham Rowley noted:

A determined government could, of course, build a cultural dam to protect a people. This would hold back outside influences, good as well as bad, but it would burst sooner or later, and the final result on an unprepared and unsophisticated people, if not completely disastrous, would probably be more disruptive than if they had been left to the vicissitudes of continuous contact.332

By the time that the coming of the DEWline had become recognized, the Canadian government appears to have adopted the same viewpoint, for in an essay entitled: "Human Problems in the Canadian North" in the annual report of the Department of Northern Affairs for the fiscal year 1954-55

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it was stated:

In future years the Eskimo will be brought ever more under the influence of our civilisation. There is no purpose in arguing whether this is good or bad. It is inevitable. As our civilisation encroaches on the Eskimo culture these people must be helped to adjust their lives and thoughts to the changes involved. The need will become quickly apparent in those areas where defence establishments such as the Mid-Canada and Distant Early Warning Lines are being located..... The self-sufficient primitive Eskimo is passing. To leave the Eskimo alone would involve his segregation and isolation from the increasing activity in the north. It would involve denial of the humane services modern society can provide. At the same time, to fail to protect him, during this period of change, from contacts and influences which might be injurious to him would be to invite chaos. 333 (italics added)

The same essay noted further that: "Employment of Eskimos on a continuing basis on defence installations, on weather and radio stations, on airfields, at radar posts and with mining companies involves a complete break with their traditional ways of life and entails sharp changes in social organization and in standards of living." 334 To help will all the impending changes and problems, the Department of Northern Affairs and National Resources brought into being a new class of administrators (Northern Service Officers) who in addition, according to the same source: "are being instructed to encourage the Eskimos to take responsibility for local decisions to as great an extent as possible." 335

The Northern Service Officers

Initially, the Northern Service Officers took up posts at Aklavik in the West, Coppermine and Coral Harbour in the Central Arctic, at Port Harrison (Hudson Bay), and Fort Chimo and Frobisher Bay in the Eastern Arctic. Their

333Department of Northern Affairs Annual Reports, Fiscal Year 1954-55, p.12.
335Ibid., p.15.
various duties included the following:

to get to know the native peoples, to help them use their available resources, and to develop new resources to improve their economic, social, and cultural conditions. They may assist them with local industries such as boat-building, tanning, or handicrafts, and they will always be on the lookout for new outlets for native talents. Equally important, these officers will advise the Administration in Ottawa of measures which might be taken to help make them a bigger contribution to national life.\textsuperscript{336}

By 1957 a number of such projects had indeed been initiated in the North, including the collection of eiderdown and garment making, the tanning of sealskins, handicrafts (mainly carvings), continued activities with the northern reindeer herd, and even an experimental sheep rearing project at Fort Chimo.\textsuperscript{337} It might have been said that these activities in the long run would hardly cater to either the integration or needs of the ever growing Eskimo population in the North, yet the situation there during the late 1940's and early 1950's had become serious owing to dwindling game in many areas and poor prices in the Fur Trade. Thus the various projects mentioned above, along with the coming of the DEWline at least provided a form of temporary relief.

The DEWline was both a problem and an opportunity in this respect, and it cannot be said that attempts were not made to grapple with the various difficulties that northern employment was to bring. In addition to the clauses incorporated in the DEWline Agreement dealing with Eskimo contact

\textsuperscript{336}Canadian Weekly Bulletin, May 21, 1954, Vol.9, No.29, p.3; The Department of Northern Affairs and National Resources Annual Report, 1954-1955,(p.20) put this last sentiment somewhat more realistically when it noted: "The task of implementing a broad plan of Eskimo development will be long and probably expensive. A carefully developed plan - and substantial progress has been made on such a program - can, however, transform Canada's Eskimos from a financial liability to a national asset."

and the like, further steps were taken when the Department of Northern Affairs and National Resources increased the activities of the Northern Service Officers and specifically allocated a number of these officials to the early warning lines. Thus after the initial establishment of these administrators in 1954, an additional expansion of the program resulted in six further appointments in 1956, three of whom were located in the Keewatin, Frobisher Bay, and Ungava Bay, while the remaining three officers were in turn allocated to the Mid-Canada and DEWlines. By 1957, the Department of Northern Affairs and National Resources reported:

Field staff had to be increased. Northern Service Officers are now posted at communities across the Arctic - at Frobisher Bay, Cape Dorset, Fort Chimo, Great Whale River, Churchill, Baker Lake, Tuktoyaktuk, and Cambridge Bay. Their work is varied as the areas in which they are stationed. Some are assigned to the DEWline, where they provide guidance and assistance to Eskimos newly taking up wage employment. Others are helping the transition in different settings. Yet others are assigned to the remotest areas of the Arctic, where full impact of an industrial society has yet to leave its impression on the people. During the year, too, the Arctic gained its first social worker.

Although employment on the DEWline and other construction projects (such as the replacement of Aklavik in the Mackenzie Delta by the new town of Inuvik, and work in Frobisher Bay) were to have a beneficial effect in terms of increased wage-earning, it was recognized that this was a transitory situation for the most part, and the Commissioner of the Northwest Territories accordingly stated: "These and similar opportunities will occur for several years, but only a relatively small proportion can be counted upon to continue for longer than that. They therefore cannot be regarded as a cure

338 Department of Northern Affairs and National Resources Annual Reports, 1955-1956, p.25.
for the problem of economic distress in these communities but merely a short-term palliative. " 340 In the following year a similar conclusion was reached concerning the DEWline and future employment opportunities in the Northwest Territories when the Commissioner, Mr R.G. Robertson reported:

these projects offer no long term solution to the problem of employment for persons who formerly depended on hunting and trapping for a livelihood, except for the limited numbers who will find permanent employment in connection with the operation of the DEW Line. The Territories are still in need of additional basic industries. 341

The problem posed by a lack of industries in the Arctic was further complicated by both educational and vocational training in the North. In the former instance a momentous and highly disruptive change was brought about in an attempt to remedy the situation with the adoption of a policy of residential schooling in the Arctic in 1955. The official philosophy behind this move was that it was necessary because: " The nomadic character of Indians and Eskimos makes it impossible to provide any continuity in the education of these peoples except at centres where residential facilities are provided, and the plan therefore includes the construction of hostels. " 342

Even here the situation appears to have had a link with the establishment of the DEW Line in the Canadian North, for the Department of Northern Affairs and National Resources in 1954 stated in its annual report:

The developments which will have the most far reaching effects throughout the whole of the Arctic, will probably be the


construction of the defence lines already under way. Recognizing that the native peoples cannot remain unaffected by these activities, steps have been taken to assist them in taking up employment during the construction period and to prepare themselves, if they so desire, to continue their employment after the lines go into operation.

Provision is being made to educate the younger generation so that they may in turn be prepared to take their place in the further developments that are already taking shape in the Arctic.343

The consequences of residential schooling almost certainly added to the difficulties of Eskimos and Indians in the North, and indirectly, to those of the Northern Service Officers and Social Workers, although a slightly more satisfactory situation prevailed in the case of the vocational training program. In particular, a scheme involving the Department of Northern Affairs and National Resources and the major DEWline contractor, the Federal Electric Corporation (an ITT subsidiary) permitted the training of thirty Eskimos from the Western Arctic as Heavy Equipment Operators at a school in the South at Leduc, Alberta in 1957.344 The selection for this training scheme was made by the Northern Service Officers in conjunction with representatives from Federal Electric, and there were apparently further plans to train another 120 Operators the following year. Unfortunately, very few Eskimos actually obtained employment on the DEWline in this exact category of work during the early years of the system, although in recent years some Eskimos Heavy Equipment Operators now hold these positions at some DEWline stations.

Further attempts to train Eskimos during this early period also involved a mining venture at Rankin Inlet with 200 semi-permanent employees and a full-time labour force of 70 Eskimos during the first year in 1957.345


In 1960 and 1961 training as Power Plant and Diesel Operators respectively was carried out by a number of Eskimos at a school in Barriefield, Ontario, but this was not a DEWline related venture and no DEWline employment resulted as a consequence.

**Eskimo Employment on the DEWline in the Early Years**

The major part of the construction work on the DEWline in Canada took place during the years 1955-1957, and at its peak the DEWline was reported to have had a total labour force of 7281 workers, although the vast majority were from the South. What Eskimo employment there was took the form of unskilled labour, but although the wages paid were low in comparison to southern standards (in the region of $3,000 per annum) they were still considerably more than could be obtained in many areas of the Arctic by trapping and traditional methods. Moreover, there were a number of added benefits from DEWline employment, such as food and lodging, which in turn supplemented this new steady income. By the middle of 1957 (even before the DEWline became operational) it was reported that: "Construction of the Distant Early Warning and Mid-Canada radar defences alone enabled 235 Eskimos working at points throughout the North to save around $200,000. A few individuals have saved as much as $2,000, although most accounts range from $80 to $1,000." Against this the same source, however, also stressed that these figures should be seen in their true perspective, since the number of Eskimos employed was relatively insignificant compared to the overall total of 11,000 Eskimos in Canada.

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Although the numbers of Eskimos employed on the DEWline suffered a decline as the construction boom ended and the system became operational, the additional benefits available for the fortunate few that obtained employment on a permanent basis increased. In particular, the Eskimos employed permanently were to be provided with special housing facilities, food and oil. This arrangement was to have a twin benefit for Eskimos in so much as they were also employed in the construction of the new housing units. Starting in 1957, this activity extended through 1958, 1959, and 1960, at which time it was reported that a further 53 houses were constructed for Eskimo DEWline employees across the entire system, bringing the total number of houses built to 95 over the three year period.

By 1964, a partial closure of the Intermediate Sites (some 20 small stations situated between the Auxiliary Stations) reduced this total from 95 houses to 66. Details of the DEWline housing facilities were at that time requested in the House of Commons, and it was revealed that the average rental charges were somewhat higher than those for Government employees in the North. This, however, was not the fault of the DEWline contractor, but the result of the Treasury Board making adjustments to the rental rates initially established, while a true comparison between DEWline employees

354 Ibid., Initially the DEWline Eskimos were assessed a nominal rate of $20 per month in 1959. In 1960 this was increased by the Treasury Board to $45, then to $55 in the following year, to $65 in 1962, and in 1963 raised to $77 per month.
and the other workers in the Arctic was almost impossible owing to the fact that Eskimo employees on the DEWline received free oil, services, and rations.

The difficulties of comparison notwithstanding, the fact that the Treasury Board in 1960 increased the rental rates for DEWline employed Eskimos served to illustrate the relatively high wages and advantages gained from such employment. It also served to emphasize the even wider issue that was developing at that time, namely the discrepancy between DEWline wages and other forms of wage employment for Eskimos in the North. This discrepancy, along with the disruptive effects of the construction phase lead in turn to a major revision in labour rates throughout the entire Arctic, as Sheila MacBain relates:

During construction of the DEW Line, large numbers of Eskimos from all over the Canadian Arctic obtained training and wage employment and gained work experience. Those on the DEW Line received higher wage rates than they had been used to. By about 1960, it had become necessary for the Federal Government to re-examine the basis of its pay scales for Eskimos, primarily as a result of the training and experience gained by many of them through employment on the DEW Line. In order to accommodate the varying levels of skill to be found among Eskimo employees, government agencies gradually adopted a complex system of wage rates and job classifications designed for the Eskimo members of their establishments, based on rates prevailing for non-Eskimo employees and on guidelines laid down by the Department of Labour. In 1960, the decision was made to pay permanent Eskimo employees a cost of living allowance, i.e., isolated post allowance (I.P.A.) or northern allowance, long received by non-Eskimo employees working in the North. Adjustments were also made in the rates of pay of permanent Eskimo employees working in semi-skilled positions as tradesmen, or, as usually classified, tradesmen's helpers. 355

Here again the DEWline impetus is clearly evident, and while Eskimo wages and conditions benefitted, an even wider change took place in the early 1960's with the establishment of a labour union on the DEWline itself.

355Sheila MacBain, Frobisher Bay: An Area Economic Survey, A.E.S.R. 66/3 (Ottawa: Northern Administration Branch, Department of Northern Affairs and National Resources, 1966, p.75)
Unionization on the DEWline

Following two years of construction between 1955 and 1957, the DEWline finally became operational in July of 1957. The manning and operation of the system was carried out by a civilian contractor, a subsidiary of ITT, Federal Electric Corporation of Paramus, New Jersey. This contractor in turn was working for the United States Air Force and ultimately, the United States government, while the DEWline system as a whole was for the mutual defence of both the United States and Canada.

Initially, those employed on the DEWline did so on fixed salaries on 18-month contracts, with a two week vacation at the mid point of the tour. Salaries on the DEWline were reported to be $8,000 to around $10,000 with a work week of six nine-hour days plus one day off. After the initial tour of 18 months, a bonus of between $1,000 and $1,500 and a further vacation (one month duration) was provided for those who wished to take another tour of duty in the North. The completion of the second tour resulted in another bonus, but no third tour was encouraged without first taking a one year break from the DEWline.

The actual wages received for working on the DEWline, even for 1957, were not that much higher than could be obtained from industry in the South, but the real financial windfall lay in the provision of full room and board, plus winter clothing, entertainment, and transportation. Apart from the supervisory staff (earning up to $20,000 per annum) the class of employees known as "Radicians" were the highest paid, earning in the region of $10,000 per

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357 Ibid., p.113.
One of the main reasons that this group were paid higher wages than most of the DEWline personnel was the application of a "Jack of All Trades" philosophy in DEWline manning. Thus the radicians, in addition to carrying out electronic maintenance on the communications and detection equipment also dealt with such activities as message handling, weather observations, and operational watchkeeping. This use of manpower on the DEWline made sound economic sense given the enormous costs involved in any northern operation, and this indeed was an original part of DEWline planning, as Major General James E. Briggs, assistant USAF Deputy Chief of Staff in 1956 explained, noting: "As the numbers of people to be supported in the Arctic increase, the support effort itself rises in a much steeper ratio. For this reason the people who are to operate these installations must possess the greatest number of combinations of skills we can find." 359

During the early years of DEWline operation it appears that morale was high on the DEWline, with a good sense of what the U.S. military is wont to term "mission accomplishment." Unfortunately, this did not last beyond 1963, when it became apparent that DEWline contracts held by the employees were devoid of legislative protection and could be changed at will by the contractor. How this situation actually arose has never been fully revealed, but it does appear that in 1963, when the DEWline contract was up for tender, that the Canadian Marconi Company (already responsible for the same kind of work on the Mid-Canada-Line) made a successful initial bid on the DEWline contract. It seems that the bid by Canadian Marconi was considerably lower

than that tendered by Federal Electric, but the latter company, by some means or other nevertheless managed to retain the DEWline contract at the expense of Canadian Marconi, but to do this Federal Electric apparently had to match bids.

Whatever took place at the upper echelon, the results on the DEWline itself transformed relations between Federal Electric and its employees, and ultimately brought about unionization on the DEWline in Canada. The first hint of difficulties on the DEWline surfaced about June 1963, and were reported almost immediately to the House of Commons by Mr David Orlikow (Winnipeg North), who asked the Minister of National Defence whether: " the United States company operating the D.E.W. Line can dismiss Canadian personnel on 24 hours notice because they refuse to accept a unilateral cut in pay imposed by the company? " This was not the only difficulty either, for Mr Orlikow also wished to know on what authority this company had in flying DEWline personnel: " to a city like Winnipeg where they are deposited with little money although the company may owe them anything from $500 to $1000 in back wages? "

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360 At least this was the information given the writer in 1963 while employed on the Mid-Canada-Line at Great Whale River, Quebec. Subsequently it was learnt that Canadian Marconi had lost the bid after Federal Electric had apparently protested.

361 It may be coincidental, but the Mid-Canada-Line equivalent of the Radician earnt approximately $600 per month to the $800 per month of the Radician, and the pay cut imposed by Federal Electric was apparently 25 per cent.

362 Winnipeg was a major transportation point for the DEWline, hence Mr Orlikow's involvement.


364 Ibid., p.1247.
Replying to Mr Orlikow's question, Lucien Cardin, the Associate Minister of National Defence stated that he was aware of some difficulties on the DEW-line, but according to the terms of the DEWline Agreement, this was a matter for the Department of Labour. A further question by Mr Orlikow concerned the apparent reason for the dismissal of the DEWline employees, namely that this was reprisal by Federal Electric after their refusal to allow the DEWline employees to form a union. 365 At this stage in the proceedings the full situation regarding labour troubles on the DEWline had not been made clear, although a series of questions raised in the House during the following weeks gradually revealed the overall situation.

In July of the same year there was a further complication as far the DEW-line employment picture was concerned, for on July 15 the closure of twenty of the "Intermediate" stations was announced. This was not entirely unrelated to the current labour problem, and in a series of questions and answers on this topic it was learnt, among other things, that the Federal Electric Corporation had given termination notices to all DEWline employees on June 30 and then offered a new contract at reduced rates of pay which had been approved by the Canadian Labour Board on June 24. 366

At this juncture the DEWline employees had little recourse other than to either accept the reduced wage scales or leave. 367 For one reason or other many of the DEWline employees elected to remain, but the fact that the Labour Board had approved the change in salary did not lead to an end in matter, but

365Ibid., p.1247.
367The writer met some of the ex-DEWline employees later in 1963 while working on the Mid-Canada-Line; they were understandably very bitter.
in fact reinforced the need for adequate protection and a voice in such changes. Once again the question of whether the Federal Electric Corporation could prevent DEWline personnel from joining a union arose, and again it was the subject of further questions in the House of Commons on October 2, 1963.\(^{368}\)

On the following day, Mr Andrew Brewin asked a further question on the subject, wishing to know if:

> the attention of the Minister (of Labour) has been called to a press dispatch in *Le Devoir* of September 26 to the effect that a United States company is arguing before the Canada Labour Relations Board that its 600 employees on bases on the D.E.W. Line should be deprived of their rights to belong to a trade union and to bargain collectively by virtue of a Canada-United States treaty relating to these bases? What action does the minister propose to protect the rights of the Canadian workers concerned? \(^{369}\)

The Minister of Labour (Mr A.J. MacEachen) was able to tell the House that the situation was in fact being reviewed by the Labour Board at that time, and that the Board was to make a decision on the certification of DEWline employees for union representation by the International Brotherhood of Electrical Workers. The question of a possible treaty between the United States and Canada forbidding unionization was discussed some days later when Mr David Orlikow requested all documents and related agreements tabled in the House,\(^ {370}\) and there for the time being the matter rested.

In the following month the International Brotherhood of Electrical Workers was duly certified by the Canadian Labour Board, but the Federal Electric Company immediately attempted to invalidate the arrangement for this body to act on behalf of the DEWline employees. The matter then went

\(^{368}\)By Mr L.J. Pigeon, *House of Commons Debates*, October 2, 1963, Vol.4, p.3122


to arbitration, and on March 23, 1964 the certification was upheld in the Manitoba Court of Queen's Bench. The Federal Electric Corporation, this ruling notwithstanding, still refused to accept the union as a collective bargaining agent for the DEWline, and once more the matter went before the Canadian Labour Board, amid threats of a possible strike by the increasingly frustrated DEWline workers.\(^{371}\)

After a lengthy discussion and more arbitration another favourable ruling was made, and this time the union (Local 2085, International Brotherhood of Electrical Workers) was firmly established as the DEWline bargaining agent, and in this capacity it was able to obtain more equitable wage rates and working conditions after approximately one year of difficulties with the Federal Electric Corporation and its minions. The labour problem on the DEWline was thus brought to a satisfactory conclusion (as far as the DEWline employees were concerned) but from 1963 onward both the willingness and high morale on the system suffered an inevitable decline, and it has never actually recovered from the callous and indifferent handling of personnel that took place during the period 1963-1964.

Approximately mid-way between the DEWline labour difficulties and the final establishment of a labour union on the system an important speech was made in the House of Commons by Mr Gene Rhéaume, the member for the North-west Territories. This speech concerned labour regulations in the North, and obviously owed a large part of its origins to the DEWline problems then being brought before the House. Mr Rhéaume pointed out in his

\(^{371}\)The potential threat of a strike also raised another contentious issue in the House, for it appears that the USAF was preparing to staff the DEWline in Canada with its own military personnel in the event of such action. (Canada, House of Commons Debates, September 30, 1964, Vol.8, pp.8584-85)
speech that:

At present there is only one area in Canada where the working man has absolutely no labour legislation to protect him. That area, as the honourable gentlemen may guess, is the Northwest Territories. At the present time there is no minimum wage law, no legislation guaranteeing annual vacations, no legislation with regard to hours of work, overtime, and so on.... I feel there must be labour legislation introduced quickly, and for two reasons. First, we have to protect the men who are already there, even though they may number only some 2,000 employees. In the second place, if we are ever to develop this part of the country it is essential that employers who come to area and the employees who work for them know what their rights and responsibilities are, and that these rights are shored up by legislation.372

Following further comments concerning the lack of labour laws for mining in the Yukon and the Northwest Territories, Mr Rhéaume then proceeded to give a thorough and accurate account of the DEWline labour problems to July 1964. Although the contents of the speech deal with material previously discussed here, the relevant part of the speech is reproduced below since it is most informative and was obviously a major factor in bringing about improvements in labour legislation in the North:

As a result of the diminishing threat of the manned bomber attack from Russia, the D.E.W. Line, the distant early warning line, is being phased out. As a result of this, the employees who have served on the line are placed in an unfortunate position. This is not a pleasant kind of service for most of these men, to be thousands of miles away from their families, in complete isolation, not allowed to have their families on site with them; it is an artificial and unfortunate kind of living. None the less the pay is good and over the years the men have built up a tradition of service on the line.

As jobs became scarcer, the Federal Electric Corporation, which operates the D.E.W. line for the United States Air Force, decided that this would be a good time to cut wages and increase the workload of the men; that they had more applicants with D.E.W. line experience than they had positions, they could force men who had served for five, six, seven or eight years to take a 25 per cent cut in pay. What happened was that the international brotherhood of electrical workers went in and organized the men on the line, and in May of 1963 certification of local 2085 of the international brotherhood was granted by the Canadian government, this after many years of difficulty. Believe me, Mr Chairman, the Federal Electric Corporation did not make it easy for the international brotherhood

to go in there and organize these men; they put every possible
stumbling block in their way.

At any rate, in May of 1963 they were finally certified as the
bargaining agent. The Federal Electric Corporation immediately
appealed this decision and it took some months before a decision
was finally handed down. The minister will recall answering a
question on this matter in March of this year. His answer can be
found on page 1404 of Hansard. He there gives the facts of the
case and says that the way is now clear for men to bargain
effectively for their rights. This question involves some 500 or
600 employees. I posed a question to him on that same day and
asked whether he would look into a problem that had been suggested
to me, namely that Canadian citizens working on the distant early
warning line were being paid substantially less than United States
citizens, for doing the identical jobs, being employed in the
same category. I asked the minister to look into this matter,
and he promised he would do so.

I am hoping that maybe he will be able to give me an answer now;
because what is happening is that the United States corporation is
paying those persons who are American citizens substantially higher
than they are paying Canadians in the same location, doing the same
work, and at the same employment level. This situation has gone on
for some time. But recent difficulties, the recent retrenchments
in positions have exacerbated this problem; they have brought it to
the fore now, and the men are completely unhappy. I am sure the
minister can understand why Canadians and why members of parliament
who represent these men on the line should be pretty upset. Right
now there are conciliation board hearings going on in Winnipeg to
review some of these problems of the men on the distant early warning
line. What has happened is that as a result of earlier intervention
from the minister's office the Federal Electric Corporation were told
they could not just chop the pay of the men whom they did not want to
hire. Therefore the Federal Electric Corporation right now is employ-
ing a bunch of manoeuvres to, in effect, accomplish the same thing.
I want to tell the minister about that because it is something I feel
his departmental officials should look into. For example, when they
are told they must pay the same rate, let us say, for a radar tech-
nician, or radician, as they are called on line, what the company has
been doing has been to set up a new grade of radician at a much
lower rate, and to hire men at the lower category for the same job.
Or they are doing things like removing all cooks from the site, and
the chef, who is of course one step up from a cook and receives more
pay, is now having to do all the cooking, baking, and so on, as well
as clean up. That is another way of cutting their pay or making the
senior officers do more menial tasks.

Another thing they are doing, which I should like the minister or
his officials to note, is that they are bringing in a lot of temporary
employees for terms of less than four months. If the minister is
familiar with the distant early warning line he will realize that
under Federal Electric Regulations an employee who is in the employ-
of the company for less than four months is not eligible to join the
union. Therefore they are able to force that particular person to
work at a much lower wage than he otherwise would, and leave him without the protection of the international brotherhood of electrical workers to stand up for him. I hope the minister will bring this matter to the attention of his officials in his department because it is not a good situation.

The future of the distant early warning line, which employs many hundreds of Canadians, is a tenuous one, and there will be further retrenchments until finally the line will be no more use at all. Indeed there are those who argue that it is already obsolete. The problem is a recurring one, so perhaps the officials can do something now.373

Although labour problems on the DEWline came to a satisfactory conclusion before the end of 1964, the DEWline itself, despite the gloomy forecasts of impending closure carried on essentially unchanged. It was not until over ten years later that any real difficulties on the DEWline labour scene were to re-surface, and once again it was the Federal Electric Corporation, albeit in the guise of "Felec Services" that was the culprit. Federal Electric had in fact held onto the DEWline contract continuously from 1957 through 1972, at which time the contract was awarded to another American company, RCA Victor, who held the contract for the next three years. In 1975 the contract was once more awarded to Federal Electric who were allowed from April to September of that year to affect the change-over. At that time (as in other sectors of northern employment such as the Aeronautical Environmental Service) female employment was introduced on the DEWline, but against this there were also more problems and labour difficulties as Federal/Felec once more assumed command.

While the name may have changed (from Federal Electric to Felec) the same old tactics were nevertheless employed again, with the introduction of a new classification of workers at greatly reduced rates of pay and the simultaneous rendering of jobs in the higher classification obsolete.

373Ibid., pp.6032-6033.
Once more the union took up the issue, which also involved the low rates of pay being introduced, and matter became quite heated to the point of a near strike on the DEWline during August of 1976. Subsequently the dispute went to arbitration with the happy result that the rates of pay were revised upwards, but very little of the disruption in labour on the DEWline itself was mentioned in either the press or in the House of Commons.\footnote{For some reason the existence of the DEWline unions in the North appears to have been either obscured or kept from general knowledge. It may well be purely accidental, but also for reasons of national security perhaps, that, for example, the last troubles mentioned above was recorded in the Collective Bargaining Review (October, 1976, p.49) under the title of: "Community, Business and Personal Service Industries," and the general geographic area given as: "northern Canada," rather than either the Yukon or the Northwest Territories where the DEWline is actually situated.}

The above was not the only dubious activity carried out by Felec Services when they resumed control of the DEWline in 1975, for they also showed the same callousness and indifference in dealing with the DEWline supervisors, who up to that time had been salaried employees with no union or other form of representation. Felec, on taking over the contract from RCA Victor in 1975 at that time decided not to honor a pay increase awarded to the DEWline supervisory staff just prior to the take-over. The result was predictable; the DEWline supervisors objected to this in vain, and then with no other recourse left, promptly obtained union membership for themselves, at which time it was rumoured that Felec Administrators at the top were most unhappy with this show of "disloyalty." Displeased or not, there was now another union on the DEWline (another benefit for labour in the North) even though once again the manner in which it came into being was hardly laudable.
CHAPTER XV

Socio-economic Consequences of the DEWline in the Canadian North

The DEWline Impetus to Northern Research

The establishment of the DEWline in the Canadian North, as the present thesis has demonstrated, was neither as rapid or as carelessly implemented as most commentators on the subject have implied. As a result of the impending changes that the DEWline was bound to bring to the Canadian Arctic the government of Canada was obliged as early as 1953 to focus more attention on its arctic regions, its resources, its policies, its territorial claims, and the potential difficulties that the coming of the DEWline might bring. One of the results of this new interest in the North was the establishment of the Department of Northern Affairs and Northern Resources, as noted earlier.

The DEWline was not the new department's only concern, of course, but the increased activity accompanying the DEWline's construction provided both an impetus and an opportunity that was not missed. The Department of Northern Affairs and National Resources, in addition to its responsibilities for the administration of the region began a series of programs and studies concerning resources and employment possibilities, and from 1954 onward there was a tremendous increase in northern research. Thus it was reported in 1954 that:

"Plans are being made for extensive long-range research programs to evaluate the wildlife resources of the Arctic territories and the extent to which they can be safely utilized for the benefit of the steadily increasing population that now must be looked for." 375

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375 Department of Northern Affairs and National Resources, Annual Report 1953-1954, p.27.
The plans in question were realised in 1958 with a series of studies carried out across the Canadian North entitled: Area Economic Survey Reports (A.E.S.R.) while another body concerned with research in the North, The Northern Co-ordination and Research Centre (N.C.R.C.) was established as early as 1954. The latter organization was required to report through the Secretary of the Advisory Committee on Northern Development; its main functions were: (1) Collect and disseminate scientific and technical data, (2) Co-ordinate scientific research, and (3) Sponsor and conduct scientific research.

The relationship between the DEWline and increased research in the Canadian North was twofold. It appears that the Canadian government had recognized quite early that the coming of the DEWline was both a problem and a major opportunity, and had acted accordingly. Since the DEWline itself required comprehensive data about the Canadian North before it could even be considered, there was an immediate need to carry out extensive air surveys, mapping projects, and field trips into the Arctic, all of which proved to be beneficial to Canadian operators and the government. As a necessary adjunct, the arctic coastline and waterways between the Islands was charted, and again Canadian vessels and industry were involved. Some idea of the extent of the increase in northern research and its scope (in diverse fields ranging from medical and social research to arctic building methods) can be seen in the data gathered by J.R. Lotz for the period 1956-1961.  

376 For a description, critique, and assessment of the Area Economic Survey Reports, see the comments on this topic by J.R. Lotz in Milton Freeman's Inuit Land Use and Occupancy Report, Vol.2,(Ottawa: Minister of Supply and Services, 1976), pp.23-29.

377 J.R. Lotz, Government Research and Surveys in the Canadian North 1956-1961 (Ottawa: Northern Co-ordination and Research Centre, Department of Northern Affairs and National Resources, 1963)
This period of intense activity in the North was partly for the DEWline, and partly because of it in so much as both the means of access and the need came from this vast project. Thus in 1956, for example, there was an upswing in mapping and hydrographic charting of the Arctic waters, including the participation of Canadian Department of Transport vessels C.D. Howe and D'Iberville on surveys of the Labrador, Ungava Bay, and Hudson Bay coastlines during this period.\(^{378}\) In addition, there was also a corresponding increase in land surveys and studies across the North, which by 1961 resulted in the production of 14 new maps, 11 new charts, and the revision of 1500 approved names for mapping and general use across Canada's arctic regions.\(^{379}\)

The value of the DEWline, as far as actual northern research was concerned, did not go unnoticed in government circles, and Mr Frank A. Enfield make the following comments on this aspect of the DEWline to the House of Commons:

> When private companies go up there (into the Arctic) for the purpose of constructing such installations as the D.E.W. Line, all the material collected through careful research by the federal government is available free of charge, I was told, to these private companies in order that they may carry out their work to the best advantage. Therefore the research undertaken provides information for private civilian organizations, and we reap a double reward from the money spent. I think that is an extremely important point. It is a chance to more or less have our cake and eat it too, something we do not encounter too often.\(^{380}\)

This speech was made only days after the DEWline Agreement was released, and as it was to turn out, Canada never did have to make a contribution.

\(^{378}\)Lotz., ibid., p.33.

\(^{379}\)To mention only a small part of the work carried out in the Canadian North during the period in question; for further details, see Lotz, ibid., pp.26-40.

towards the cost of the DEWline itself. In view of this fact, Enfield's comments were all the more pertinent, while the total expenditure on the DEWline in Canada, even at a conservative estimate must have reached about one billion dollars between the years 1955-1980. Nor were the economic benefits of the DEWline confined entirely to the North alone, although its effects were obviously predominant in the Arctic itself.

The DEWline and the Northern Economy

The economic value of the DEWline to the Canadian North has perhaps been downplayed somewhat in most treatments on the topic, although a government publication pointed out in 1965 that:

The DEW Line is, in many respects, the biggest single development in the Northwest Territories and its effects have been profound. After the Canadian government it provides the largest single payroll of any northern activity. In its build-up it has had a direct economic influence on auxiliary industries and services such as construction, food catering, communications, and transportation. However, the DEWline's economic impact on the overall economy of the North has been and still is far less than its important position as an employer.

The same source also noted that there was unfortunately little "multiplier" effect from the DEWline's payroll on the economy of the Northwest Territories, but concluded nevertheless, that:

The trend in DEW Line activity over the last four years has been downward and in the near future (five years) this downward trend

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381 Based on construction costs of 310 million dollars and an estimated yearly cost of $30 million from 1957-1980. This is a low estimate since it was revealed in the House of Commons (Debates, March 2, 1959, Vol.2, p.1517) that the annual costs ran between $30 million and $40 million.

382 For example, in 1959 the Canadian Department of Transport took over the responsibility for the DEWline sea-lift into the Eastern Arctic and was funded to the tune of $2,878,600, an amount that was reimbursed by the United States at the end of the year (Canada, House of Commons Debates, June 12, 1959, Vol.4, p.4656.)

will likely continue barring its complete obsolescence by a technological breakthrough. It is not likely that its payroll will exceed $3,000,000 by 1970. As noted above, however, the slowing down of DEWline activity will not really have as adverse an effect on northern economic development as might be expected from the size of the operation.  

Like most of the observations concerning the imminent demise of the DEWline, the above prognostication proved to be in error, and the DEWline has remained in continuous operation up to and including the present day, a factor that must be taken into consideration when weighing the overall assessment of the DEWline's economic effects on the North.

The problem of assessing the DEWline's contribution to the Northern Economy has been mentioned by R.J. Rea, who has also compiled the following table concerning DEWline employment data from 1953 to 1962:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MONTHLY NUMBER OF EMPLOYEES</th>
<th>TOTAL PAYROLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>13</td>
<td>$42,519</td>
</tr>
<tr>
<td>1954</td>
<td>288</td>
<td>$796,146</td>
</tr>
<tr>
<td>1955</td>
<td>1,751</td>
<td>$11,216,611</td>
</tr>
<tr>
<td>1956</td>
<td>4,140</td>
<td>$32,935,579</td>
</tr>
<tr>
<td>1957</td>
<td>1,245</td>
<td>$5,855,670</td>
</tr>
<tr>
<td>1958</td>
<td>1,011</td>
<td>$8,167,614</td>
</tr>
<tr>
<td>1959</td>
<td>1,197</td>
<td>$9,746,168</td>
</tr>
<tr>
<td>1960</td>
<td>1,807</td>
<td>$13,904,976</td>
</tr>
<tr>
<td>1961</td>
<td>1,429</td>
<td>$11,857,424</td>
</tr>
</tbody>
</table>

In a comparison between the above data and the mining industry in the Northwest Territories over the same period, Rea noted: "that the DEW line provided twice as much labour income and almost double the amount of employment that the mining industry did." Nevertheless (and in spite of the amount earnt on the DEWline) little of it had any great effect

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384 Ibid., p.47.
386 Ibid., p.310.
387 Ibid.
on the local economies of the North, as noted earlier. This was largely a result of the self-contained nature of the DEWline installations, but it was also influenced by the fact that the vast majority of the DEWline workers were from the South in any case, and it was to the South that both their allegiances and their earnings were directed.

Although the proportion of Eskimos employed on the DEWline in a permanent capacity between the years 1957 to 1963 was itself low in comparison to the total Eskimo population, i.e., approximately one hundred heads of families and their dependants,\(^{388}\) the effects of the DEWline, along with the new modes of transportation, communications, and the new lifestyle was to bring about significant changes in their culture.

The DEWline and Demographic Change in the Canadian North

Even though Edgar Dosman observed that by the end of the 1960's that: "The isolation of Canada North of 60 is over,"\(^ {389}\) it was only two decades earlier that the Canadian North was still considered a remote and neglected area that commanded little attention or interest in the South. There was, however, a growing increase in northern activities following the close of World War II with the introduction of Family Allowances and improved medical services to the arctic regions. At the same time it also became apparent that growing trends towards a rapidly increasing population coupled with diminishing game resources were likely to precipitate a dire situation in the North, although there seems to have been no clear-cut policy formulated to combat the problem.

On one hand the retention of traditional subsistence methods and the

\(^{388}\) This number was reduced in 1963 following the closure of "Intermediate" Station to around sixty employees (The Northwest Territories Today, Ottawa: Queen's Printer, 1965, p.47.)

continued reliance on trapping were subject to problems associated with the poor availability of game and low fur prices respectively, while encouraging the Eskimos to congregate in settlements was not considered to be a desirable solution, even though it at least permitted the better provision of relief and medical services. This latter attitude extended into the early 1960's, as L.A. Fainberg noted in the following:

It is interesting that only 11 years ago, in 1952, a conference on Eskimo affairs, participated by government agencies concerned with the North, found that the tendency among the Eskimos to concentrate in the settlements was undesirable, as this led to rapid exhaustion of the hunting grounds around the settlements. During those years, Canadian official circles still believed that priority ought to be given to encouraging the Eskimos to live on local natural resources and follow their traditional way of life. In fulfillment of these decisions, about 100 persons were resettled, starting in 1953, from poverty-stricken areas on the shore of Hudson Bay to the Canadian Arctic Islands.  

Fainberg noted further (with a masterful understatement) that the relocation of the Eskimos in 1953 was: "not crowned with success," and apart from the fact that such movements may have been influenced by the sovereignty question as previously discussed, the failure of the relocation experiment further emphasized the dire need for more viable methods to cope with the increasing subsistence problems in the North.

In the western regions, the coming of the DEWline not only provided much needed employment, it also resulted in the formation of Tuktoyaktuk as a permanent settlement, not only because of the establishment of a DEWline station at that location, but also because it was (and still is) a terminus and transfer point for the sea supply routes into the Western Arctic.

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391 Ibid.
Peter Usher assessed the effects of the DEWline on the Western Arctic as follows:

Relief came to the region's stricken economy in 1955. The construction of the DEW line and of the new town of Inuvik brought jobs and a major shift to a wage economy. The jobs were often temporary but the change irrevocable. The assumption of a wage position was frequently a more binding committment than the Eskimos at first perceived; both their capital equipment and their inclination to trap were dissipated, so that a return to that activity became difficult or impossible. During the last decade there has been a very significant decline in hunting and trapping activity and in camp life, as more and more individuals have moved into major settlements. The great majority of the population is now urbanized.\textsuperscript{392}

In the case of Tuktoyaktuk, the initial effects of the DEWline in the area have been documented by J.D. Ferguson,\textsuperscript{393} who also reported by the summer of 1957 (when the DEWline became operational) there were two Eskimo families employed at each of the Auxiliary and Intermediate DEWline stations between the Alaska border and Cape Parry (at Komakuk Beach, Kay Point, Shingle Point, Tununuk, Tuktoyaktuk, Atkinson Point, and Cape Dalhousie).\textsuperscript{394} Ferguson also provided data concerning the relative incomes obtained from DEWline employment and traditional methods (mainly trapping), and he recorded that while trapping could provide an income of between $300 and $500 per annum,\textsuperscript{395} the DEWline employees at Tuktoyaktuk and elsewhere earnt in the region of $3,500 per annum, and in addition received free food oil.\textsuperscript{396} These wages in fact placed the DEWline Eskimos among the highest income bracket for the entire settlement, while the average family income there ( higher than in many areas


\textsuperscript{393}J.D. Ferguson, The Human Ecology and Social Economic Change in the Community of Tuktoyaktuk, N.W.T.(Ottawa: Department of Northern Affairs and Northern Resources, Northern Co-ordination and Research Centre,1961)

\textsuperscript{394}Ibid., p.4.

\textsuperscript{395}Ibid., p.29.
of the Arctic in any case) was only $1850 per annum. Thus the DEWline Eskimos found themselves near the top of the pecking order on one hand, and a considerable distance (in terms of security and earning power) above their less fortunate brethren on the other. Nor was this all, for the DEWline Eskimos were also provided with housing, and while Tuktoyaktuk had previously been utilised as a site for hunting camps prior to the coming of the DEWline, it was once again the consolidating factor in the establishment of the location as a permanent settlement, as Ferguson relates below:

Few permanent house were built until the D.E.W. Line was started and permanent employment was available. Between 1954 and now (1957) more than twenty log or frame houses have been built and permanent residence taken up by the majority of the fifty seven nuclear families now living there.

While Tuktoyaktuk was to become firmly established as a settlement, other areas experienced a rise and decline, such as the DEWline related settlement at Cape Parry that grew up there as a consequence of initial wage employment during the years 1955-1957. Although Cape Parry settlement was still in existence in 1962, by 1967 the site was abandoned, even though the DEWline station there remained. In describing the Cape Parry settlement in 1962, G. Abrahamson reported that the DEWline was again the major factor in the movement of Eskimos to the location, and in this instance this was not a particularly good choice. Abrahamson commented that: "Without the DEWline site, the Eskimo village of Cape Parry would probably not exist. The locality is poor in food and fuel, neither good fish nor caribou are found within a day's journey by dog team."

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396 Ibid., p.21.
397 Ibid., p.27.
398 Ibid., p.51.
Another factor in the DEWline employment picture that has not received a great deal of attention, namely that in some cases there was much more to the movement of Eskimos to DEWline stations and settlements than simply wage earning per se was also noted by Abrahamson; as he explains:

During the 1940's official concern was expressed at the danger of inbreeding among Eskimos of the area who were all closely related. There was little communication with other settlements, and opportunities for marriage outside the group were limited. Single young men began travelling along the DEW Line chain on construction work and they picked wives from Aklavik and Tuktoyaktuk, and men from other locations collected brides from Cape Parry.400

Under the heading "Health" Abrahamson also described the value of the DEWline station at Cape Parry and the medical facilities available there,401 and it should be noted that these same facilities were also available across the entire DEWline. Abrahamson stated:

It is obvious that a most profound change has come about as a result of the establishment of the DEW Line. The Cape Parry community used to be almost 300 miles from a doctor; transportation and communications were infrequent and irregular.

Since 1957, the local population has, for emergencies, availed itself of the services of a first aid station, and often a doctor, based at Cape Parry. Thus quick diagnosis became possible, and immediate evacuation of serious cases to Inuvik could be arranged through communications networks of the DEW Line. Beyond this, health services are non-existent, no preventive medicine or health education is carried out, though this would seem one of the prime needs of the community.402

Although Abrahamson was of the opinion that the settlement at Cape Parry would continue to exist as long as the DEWline station remained in operation, the settlement suffered a decline and was abandoned by the mid-1960's. The Eskimos that remained were those that obtained permanent employment at the

400 Ibid., p.27.
401 An entertaining account of the medical duties carried out along the DEW-line during the early years is given by Dr. Gareth Howard in his: DEW Line Doctor (London: Robert Hale, 1960)
402 Ibid., p.27.
DEWline station, where they also made good use of the facilities, as they did everywhere along the Line. Abrahamson, impressed by this fact and the DEWline communications in particular observed that: "The DEW Line communications system at Cape Parry may be used by authorized persons to telephone anywhere in the world! Eskimos employed on the DEW Line use the system to exchange news with friends based at other sites." This was in fact an understatement, for the Eskimos were to make extensive use of the line-wide and free facilities to remain in contact with each other and their dependants over vast distances, and in effect established an Eskimo "hotline" to this end.

The need for this Eskimo "hotline" was perhaps a result of the new changes induced by the construction and later employment opportunities associated with the DEWline, for in addition to drawing Eskimos from all over the Arctic to new locations, it also had its effects on their points of departure. In some instances, such as at Cambridge Bay or Tuktoyaktuk, the use of DEWline communications helped to permit the maintenance of ties between the settlements and the outlying DEWline stations. Other areas located some distance from the DEWline were not so fortunate, as in the case of Bathurst Inlet some 170 miles south-west of Cambridge Bay in the Central Arctic. David Damas described the problems arising out of the uneven distribution of relief to Eskimos in this area and further complications associated with DEWline employment. He also suggested that:

Another factor that affected native autonomy at Bathurst was the emigration of a number of young men from the area after 1955. The men were drawn away by the prospect of finding wives. Few of

403 Ibid., p.32.
these men returned to Bathurst, and their emigration removed active members from the community, thereby weakening the efficiency of the local co-operative networks. 405

This may well have been so, but since the area itself was proving to be incapable of sustaining its population the out-migration must have had its positive side too, even though the settlement obviously suffered.

In certain areas a different situation prevailed, for the two major DEW-line staging posts at Cambridge Bay and Hall Beach saw considerable growth during the same period and long after. Initially, a series of shacks sprang up in Cambridge Bay, 406 but while the fortunate few employed on the DEWline station at this location were allotted housing that was described as being "excellent," it was also stated that: "similar units would be too expensive to construct and heat for unemployed Eskimos." 407 Here again was yet another indication of the mounting disparity to be found among the Eskimos in the rapidly expanding arctic settlements, and it must be admitted, a source for alienation and frustration.

Further east in the Hall Beach area the DEWline also had a significant effect, particularly on Igloolik and the adjacent regions. Although the Eskimos in this area were initially advised by government officials and missionaries to avoid the DEWline sites, Bisset 408 reported in 1964 there were seven Eskimos from the region employed on the DEWline as semi-skilled Equipment Operators who each averaged $6,600 per annum. This last figure was the combined wages earnt plus food and fuel costs supplied free to the

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405 Ibid.
406 Settlements of the Northwest Territories (Ottawa: Department of Indian Affairs and Northern Development, 1966), p.93.
407 Ibid., p.92.
Eskimos employed on the DEWline; 46% of the total was estimated to be the equivalent value, while a further 14% was expended on rent. 409

Bisset also mentioned that in addition to the loss of food caused by walrus and seal hunting with rifles from boats, which caused as much as 50% losses by sinking carcasses: "Trade in ivory with DEWline personnel has also resulted in tusk hunting which has inevitably led to a degree of wastage of this valuable resource." 410 This may well be a valid criticism, but it also points to the difficulties inherent in utilizing local resources to supplement incomes in the North. On the other hand, G. Anders411 in his study of same region's economic potential pointed to the DEWline station at Hall Beach as a profitable outlet for Eskimo carvings in general, and he also concluded that this was an area where further expansion was possible. 412

Anders further reported in 1965 that there were 12 heads of families employed on the DEWline in the region, with seven located at Hall Beach, one at Garry Bay, two on Rowley Island (FOX-1), and the remainder at Longstaff Bluff (FOX-2). Significantly, Anders' assessment of their future wage earning potential was that: "There seems to be little doubt that these people will be able to find other wage employment when the DEW Line installations are closed down." 413

This observation appears to have been supported by specific studies on Eskimo employment potential, such as the work carried out in 1972 by Charles

409 Ibid.
410 Ibid., p.13.
412 Ibid., p.70.
413 Ibid., p.75.
Hobart and George Kupfer at Coppermine assessing Eskimo adjustment to wage labour in the oil industry. The study found that Eskimos hired as heavy equipment operators were typically in their middle age and had learnt their skills on the DEWline, and that this group obtained the highest rating. The study also reported that: "The best adjusted group, which included virtually all the heavy duty operators, not only had the most experience with the routine and demands of wage employment, but they were also employed in the highest status, best paying and (to the Inuit) most enjoyable kind of work." The DEWline experience was thus a twofold benefit, although it must also be conceded that the corresponding poor showing of the younger generation and the problems of disaffected youth are another side of the coin that the DEWline must also answer for.

Earlier attempts at introducing wage labour (other than through DEWline employment) were not so successful, such as the movement of Eskimos in 1957 and 1958 to Rankin Inlet to work at the nickel mine at that location, while even further disruptions in the same area resulted from the movement of 12 Eskimo families from Coral Harbour on Southampton Island to work at various locations along the DEWline.

In the eastern areas of the Canadian Arctic, settlements such as Frobisher Bay benefitted from both local building projects and the fact that Frobisher Bay was used during the construction stages of the DEWline as a major transportation point. Further east on Baffin Island the DEWline was responsible for the establishment of the new settlement of Broughton

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15 Ibid., p. 85

Island (FOX-5), and by 1966 there were nine Eskimos from this region also employed on nearby DEWline stations; three each at Cape Dyer (DYE-MAIN), at Cape Hooper (FOX-4), and at Broughton Island itself.  

The Social Consequences of the DEWline Era: Problems and Complications

It can safely be said the DEWline was primarily responsible for the establishment of the new settlements of Tuktoyaktuk and Broughton Island, and was a major factor in the increased growth of both Hall Beach and Cambridge Bay. The DEWline in addition played a part in the growth and decline of the settlement at Cape Parry, had some influence on settlements at Bathurst Inlet, Coral Harbour, Pelly Bay, and Iglulik, and was in a very real sense responsible for major demographic changes across a wide region of the Canadian Arctic.

The effects of the DEWline were thus felt from the Western Arctic to the east coast of Baffin Island, and the rapid changes brought about by this massive project - the introduction of new modes of transportation, communications, social services, increased dependency on wage earning, and a new urban lifestyle - could not fail to have a profound effect in turn on the native peoples of the North. In discussing the consequences of the changes brought about in northern settlement patterns, Charles C. Hughes observed that: "The most obvious thing we can say about recent community change in the North is that we now speak of 'communities' in terms that have much more of a ring of stability and permanence about them than was the case 20 years ago." 

Hughes also pointed out that this change was

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"17 Settlements of the Northwest Territories (Ottawa: Department of Indian Affairs and Northern Development, 1966), p.73.
"18 See Map Number 14 for the locations of the main areas mentioned here.
particularly dramatic in the case of the Canadian North and he further emphasized that the trend towards wage earning through labour rather than material products had a wider implication than might at first be supposed. He noted:

What has occurred in the north is a fundamental change in the behavioural environment in which people act - both the environment as it is (as in the depletion of the caribou herds or other game animals) and the environment as it is conceived to be (as in new orientations and sentiments relating to the world). To a large extent, the people of the north, in coming into the population centres for jobs that will yield money, have taken steps to acquire what appears to be the most efficient tool for adapting themselves to some of the more salient features of the new environment that has been thrust upon them.420

Hughes has commented elsewhere421 on the impact of the massed assault on the North by some 9,000 workers during the DEWline construction phase, and after noting that this figure actually equalled the entire Eskimo population in the Canadian North at that time he suggested that: "For the Eskimo the effects of this vast array of workers in underscoring outside reference images and standards will be irreversible." 422

Another important feature of the DEWline operation (caused by both haste and a "cost-plus" philosophy) was the vision of plenty it provided, and in this vein Hughes stated:

Perhaps the biggest effect of the D.E.W. line activity, however, was not so much in the actual jobs it provided as in the illustration it gave of the scope and the capabilities of the technological culture of the outside world, and the measure of its control over the environment demonstrated by weather-indifferent housing, military facilities, and defense activities. In addition, the inevitable detritus and waste of such a large-scale operation as this provided much material useful to the Eskimo - wood, for example, which until now had been exceedingly scarce and valuable for groups living along the northern shores of Keewatin.423

420 Ibid., p.73.
422 Ibid.
For their own part, the Eskimos have a short, sharp assessment of the activities of the white southerners who frequent their land - "Kabloona Krazy" - delivered in a mixture of their own language and English (lest the meaning be lost), and while this description no doubt owes its origins as much to the past as to the present, the DEWline may well have reinforced the notion from time to time, especially one might suppose, if the actual purpose of the system was explained in detail to the locals.

Nor was this the only aspect of the DEWline operation that was tinged with an element of madness, for however well intentioned, there was still the incongruity of providing the Eskimos employed on the DEWline with food, oil, housing and wages almost ten times higher than could be obtained by traditional methods - and all this for the most menial kinds of labour. There were of course advantages to be had from wage labour, but the fact remains that the opportunities were relatively few, and there were still problems of adjustment to be considered. As Robert G. Williams has observed, as a result of wage employment provided in the North by the DEW-line, the Eskimos were:

Increasingly involved, for the first time in their lives, in high wage-earning. This involved them in firmly structured patterns of time usage, in new modes of dwelling and consumption, continuous application to the same kind of work, and to the values of our more atomized and competitive society. Very significant in all these situations of shifts to wage earning, was the diminuation of the technical significance of the women as busy and vital elements in family economic team.

The disruption caused by such changes in traditional roles has not been aided by the new urban setting, and A.A. Mackinnon and A.H. Neufeldt found

423Ibid.
425Ibid.
that females in general were more dissatisfied than males with living in the North, and further, that: "The Eskimo of the far northern and eastern settlements were most unhappy with their current status and were more pessimistic about the possibility of future improvements than either Indians or whites." MacKinnon and Neufeldt also gave the following depressing statistic, namely that: "Eighteen per cent of the Eskimo sample actually anticipated life would be worse in the future."

There are, therefore, still serious problems in the North that wage employment has not solved, and indeed may have exacerbated. The population in the North is growing at an alarming rate, it is generally accepted that: "virtually no arctic community can now (1974) be considered self-sustaining," and in many areas of the North drinking is a serious problem for Eskimos and whites alike. To this situation can be added the ever-increasing costs for fuel and oil, both of which are particularly critical in the Arctic and contribute to the high cost of living in the

427 Ibid.
428 Ibid.
430 MacKinnon and Neufeldt, ibid., p.6.
431 This is a complex problem hardly confined to the North alone, but in the Arctic context there are additional considerations, such as the suggestion of John and Irma Honigmann (Arctic Townsmen, Ottawa: Canadian Research Centre for Anthropology, Saint Paul University, 1970) that drinking is also representative of "Frontier Culture" exhibited in the North. John S. Matthiasson ("You Scratch My Back and I'll Scratch Yours: Continuities in Inuit Social Relationships," Arctic Anthropology, Vol.12, No.1, 1975, pp. 31-36) has also commented on the use of alcohol in the North as a medium of social exchange.
Alcoholism and its related problems are hardly new to the North, but the increasing population, limited employment opportunities, and the introduction of a new urban lifestyle can hardly be expected to ease the situation. Nor can the increasing legion of social and administrative workers aid the northern economy, given the high support costs that accompany this new influx of people from the South.\footnote{32} The presentation of a new way of living in the form of what amounts to a fait accompli is also a source of friction, if not further alienation, and as J.D. Atcheson points out:

The motivation of the invader has rarely been based on a sympathetic understanding and respect of the native culture. We have attempted to impose a political and public health system, a mystical religion with a questionable morality and a concept of laws not entirely based on reality. This has been enforced by police, representing a Society which identifies with the sanctity of private ownership\footnote{33} where the native culture conceived the world as their land to be shared, but never owned.\footnote{34}

While a number of Eskimos employed on the DEWline during construction and afterwards may have been able to adjust to the changes taking place in the North, the disruptive effects of the DEWline on what might be termed the DEWline Generation" appear far less encouraging. For this group the consequences of rapid changes brought on by the DEWline, residential schooling, and further intrusions such as increased mining exploration

\footnote{32}{Resulting in what Kenneth J. Rea (The Political Economy of Northern Development, Ottawa: Maracle Press, 1976, p.186) has termed: "the service economy of the north."}

\footnote{33}{John. S. Matthiasson (op. cit.,) has also described the traditional response to stress and avoidance behaviour exhibited by the Inuit in relation to violence (both alcohol induced and otherwise) and most significantly, in the examples cited, which deal with the earlier hunting economy and the later urban setting, the emphasis remained predominantly on personal relationships rather than the acquisition of material possessions.}

\footnote{34}{J.D. Atcheson, "Problems of Mental Health in the Canadian Arctic," Canada's Mental Health, Vol.20, No.1, January-Februaury 1972, p.11,}
have contributed to the rise of a population of young people who have been presented with southern oriented goals without any adequate means of achieving them. The situation in the Canadian North is becoming critical, according to Atcheson, who states:

The problem of alienated youth, although demonstrating somewhat different behaviour and containing different content, are becoming increasingly significant in the Arctic communities. It would be my opinion that eventually these will become angry, violent youth. Major Etiological Factors in Emotional Breakdown. 435

The italics in the above are Atcheson's own, as are the capitals, and although he is primarily concerned with medical and mental aspects of health in the North, he nevertheless does not see the problem of provision of medical services per se as the central issue. Instead, he considers that the main problem lies in the overall economic climate of the North, and his final assessment contains a sombre warning:

It would be my opinion that unless a rational economy can be developed in the northern communities and a reasonable application of our knowledge of the dynamics of cultural erosion and racial discrimination can be made effective, the major problem of northern communities will be ever-increasing violence. Frobisher Bay and Inuvik will become the Watts and the Newark of the Canadian North. 436

Once again, the italics are Atcheson's, and while not all would necessarily agree with the above assessment, few would dispute that there do exist many serious problems in need of solution. Nor are the problems of the North likely to diminish, for while distance has been conquered, time and population increases are both exerting an inexorable pressure. The state of the Canadian North at present is perhaps best summed up by the following remarks made by A.W.R. Carrothers in 1971:

435 Ibid., p.15.
437 Ibid., p.17.
In 1965 Mary River was a dream where a Torontonian dreamed. Today it is an iron lode of international promise. In 1965 Prudhoe Bay was a spot on an atlas. Today it is a dramatic oil reserve and we talk of "S.S. Manhattan," ice breakers, pipelines and policies. In 1965 no-one mentioned tiny King Christian Island, Dome and the Canada Development Corporation. Give the wrong toss of the dice in the Middle East, or Venezuela, give a few days of austerity on the east coast of North America, and we'll be into the North. The industrial juggernaut of this continent will crave satisfaction from a land where rape will be a cliché. In the North we face a grinding trade-off of rights, responsibilities and interests. "It is all very well," reads our report, "that peoples should be free to work out their own destiny; but freedom without opportunity will produce a destiny predetermined by those who, having the means, withhold the opportunity."

Since the above was written, the dice have indeed fallen, and oil prices have soared, placing further pressure on the resources of the North. This region is now open to development, and if development itself is dependent on transportation and communications, then it can be said that the DEWline, above all else, provided the essential facilities for this process to take place.

The final ending of the DEWline era has yet to occur, but its overall place in northern development is perhaps best summed up by Trevor Lloyd, who has stated:

Much though one may regret the reasons for its being there, and deplore the enormous cost to the community, it remains true that without the DEW Line and associated developments the hope of effective occupation of the Far North would be even more remote today than it is. Such far-ranging enterprises have made possible elaborate programmes of research and development which have speeded the solution to many problems in logistics, housing, and communication. When the military men eventually evacuate their settlements, as is beginning to happen at some arctic sites, they will leave behind them an invaluable group of well-endowed oases in the northern wilderness.

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CONCLUSION

At the present time (1980) the DEWline is still operating in the Canadian North, in spite of the many predictions voiced over the past two decades concerning its ultimate demise. The DEWline has in a real sense become a multi-faceted fixture in the Arctic, and the benefits afforded by this massive system have helped to allay the enormous costs expended on its construction and continued operation.

While the need to retain such a costly system in the North was perhaps based on a wider strategy involving issues outside the immediate realm of North American defence, the end result was a surprisingly long-lived network of permanent settlements established in largely uninhabited regions of the Far North. Although the imperatives that brought such installations into being were complex, so also were the practical difficulties inherent in their construction. This was particularly so in the Canadian Arctic, for in the early 1950's access into this region was most limited. To this problem was also added the almost total lack of major transportation routes (either by sea or air), ports, airfields, communications, navigation facilities and even electrical power. Further complications also resulted from the extremely short and hazardous shipping season, the extreme distances to be travelled (again either by sea or air) and a most uncompromising and unforgiving climate. Moreover, almost all support facilities - habitation, food, transportation, heavy equipment, power supplies, and fuel - had to be brought into the Arctic en bloc, resulting in a completely self-contained system that depended entirely on external supply from the distant South.

This was the difference between the old and the new presented by the DEWline on one hand, and the remnants of the northern hunters on the other. The incredibly swift movement of masses of machinery, supplies and personnel
for the construction of the DEWline represented a wholesale intrusion across a wide area of the North that previously had seen only limited contact with southern technology and lifestyles. This massive onslaught by the DEWline was in addition to the ongoing changes brought about by the coming of the Whalers, Traders, Missionaries, and Government Agencies, but the DEWline was an intrusion of an entirely different order, both in its scope and its purpose.

What was significant about the DEWline was its unique nature arising from its primary purpose, its geographical extent, the rapidity of its construction, its longevity, and its overwhelming representation of new lifestyles, new modes of transportation, and new means of communication.

In addition to giving a tremendous impetus to Arctic sea and air transportation, both during and after the construction phase, the DEWline also opened up the Canadian North to air transportation in general; gave further impetus to the Mackenzie River transportation system, and had a significant effect on the Canadian Air Industry as a whole. Nor were these the only benefits to transportation that resulted from the continued operation of the DEWline in the North, for the safety margin for northern air operations was increased dramatically by the DEWline's continent-wide system of manned airfields situated less than 100 miles apart along the entire Arctic Circle of North America.

Transportation was not the only area that underwent changes with the coming of the DEWline, for part of the communications facilities of the DEWline were in time to be allocated to commercial needs in the Canadian North. As a result, a number of previously isolated settlements were released from the vagaries and limited channel capacity of High Frequency (HF) radio communications. The DEWline thus served to link up much of the Arctic well
before the coming of satellite communications to the North, while the very location of the DEWline stations also served as unofficial stop-over or navigational points for travel by sled in winter, or by canoe or small boat during the short Arctic summer.

The DEWline, in addition to providing such services, also brought about financial benefits in the form of employment opportunities for Northerners and Southerners alike, particularly during the construction stages. In addition, the continued operation of the DEWline has also meant permanent employment for some and seasonal employment for others, although this assessment of DEWline employment can hardly be limited to the financial aspect alone, for the consequences of wage labour and the lifestyle it represented must also be considered in the final analysis.

Whatever the DEWline's faults and shortcomings, it can at least be said that the DEWline did not come to the North to exploit natural resources, or to colonise the incumbent peoples there, and neither was its purpose to teach or to preach. Against this, on the other hand, it must also be said that by its very presence (and, as it has turned out, its longevity) it could not fail to have a profound effect on the indigenous peoples of the many regions it encompassed. Regarding this last point we have already noted the clash between the old and the new, and while it is generally recognized that what we call the hunting lifestyle has predominated among humankind for approximately 99 per cent of our tenancy on Earth, our current nuclear stand-off and growing population pressures have raised serious doubts concerning the products of our technology, if not our very future.

The accelerated trend towards urban living in the Canadian North has potentially serious consequences, for while the carrying capacity of the land has already been exceeded in many areas of the Arctic, the population in
the region has undergone a significant increase that has placed even more stringent requirements on supply from the South. Nor have recent exploration activities in the Far North aided this situation, although the DEWline, particularly during the initial stages of this new activity, was at least able to render valuable assistance by providing a safety factor by its very presence and the many facilities afforded by its airfields, navigational aids, networks.

The DEWline in Canada was to play a far more important role with respect to northern resources by establishing Canadian sovereignty throughout the entire Arctic Archipelago, another vast northern region now known to possess a huge store of oil, gas, and mineral resources. The political overtones of the decision to build the DEWline still linger on, yet there is little doubt that the decisive factor in favour of Canadian sovereignty now appears to have been the acceptance of Canadian jurisdiction over the area as a result of the DEWline Agreement reached by the United States and Canada in 1955. Thus the DEWline from this viewpoint alone has had a significant effect on the North and Canada in general by establishing Canadian territoriality and mineral rights over what now has turned out to be a highly productive area.

The establishment of Canadian territoriality over the Arctic Archipelago on one hand, and the fact that the entire cost of the construction and the continued operation of the DEWline in Canada was borne by the United States on the other were both due to the details of the DEWline Agreement reached between the two countries during 1954-1955. The benefits of this agreement to Canada were enormous, while the safeguards written into the agreement also permitted the participation of Canada's Eskimos in the project, and the resulting interest in the Canadian North, I would suggest, was in turn a major factor in the creation of the Department of Northern Affairs and
Finally, there is one further aspect of the DEWline operation that bears examination. Historically, the use of terms such as "progress" and "development" have implied the existence of care and judicious planning, even though the increasing annexation of new territories has unfortunately all too often been the result of hurried responses to crises of one sort or another. Development as such has largely been the residual effect of some initial impetus occasioned by a response to change, be it of a political, economic, or technological nature. Nor have these factors been necessarily separate, for the combination of circumstances that often have precipitated changes in one of these areas have also tended to produce changes in others.

It is at this point that we return once more to the clash between the old and the new in the Canadian Arctic, for although the northern hunters employed a technology of their own, they nevertheless obtained a stability in their existence by living within (and in a sense being part of) their own ecological niche, rather than attempting to bring about drastic changes in their environment. They were essentially self-sufficient, with stable populations and able to provide for themselves (until recent times) with little or no dependency on manufactured goods or supplies from the South. Significantly, while the hunting lifestyle involved relatively stable and limited populations, the onset of urbanization has resulted in a tremendous expansion in numbers where ever and when ever the process has taken hold.

Subsequently, in response to a complex impetus generated by political, economic, and population pressures, the adherents of this new lifestyle have moved from fixed bases to fill and modify what in effect has constituted "available" space. Almost uniformly, "available" space has in turn resulted in the replacement or subjugation of the old way of life where ever
it was encountered. Because the bases for such expansion were essentially fixed, the growth of transportation routes and communications networks were an accompanying necessity for the utilisation of the newly annexed resources and territories.

In the context of the Canadian Arctic the process was somewhat slower than in the more temperate zones, and in addition, it took place generally prior to the discovery of oil and mineral deposits in the region. While the coming of the DEWline was undoubtedly an accelerating factor in the urbanization process, the fact that this took place before the discovery of the extent of the mineral resources was of vital importance. The establishment of transportation routes and communications networks in the North in support of this project thus aided northern development, but did not precipitate it. Instead there was an interim period during which Northern peoples became aware of both the advantages and dangers of southern intrusion to the point where a stand could be taken. This is not to imply that the Northerners were not already aware of the difficulties and dangers by the time that the DEWline came into being, but to suggest that the rapid changes brought about by the project came at a highly fortuitous time.

Whether the DEWline was therefore harmful or beneficial to the Canadian North thus requires a wider view: in some respects its effects were no doubt harmful; in others a more positive view can be taken, yet the overall assessment remains difficult, given the complexities of northern development. What can be said, however, is that the process of urbanization in North America is almost complete, and the hunting lifestyle throughout the world is now rapidly coming to an end. It remains to be seen whether our modern oil-based technological age will be as durable, and whether the Arctic's present problems of transportation, population, and supply are not in themselves an early warning from the North.
APPENDIX A

THE DEWLINE AND THE COLD WAR: A CHRONOLOGY

February 12 1947: Declaration of Joint Defence Co-operation between the United States and Canada; rejection of the "Maginot" line concept for North American Air Defence

April 1949: Canada joins NATO, North Atlantic Treaty Organization

September 1949: The Soviets detonate a nuclear weapon


1952: LINCOLN SUMMER STUDY GROUP: Lincoln Laboratory continuation of 1951 defence study

Late 1952: Construction of a secret trial Distant Early Warning (DEW) section in Alaska near Barter Island (PROJECT 572)

January 1953: PROJECTS CORRODE/COUNTERCHANGE: The United States requests permission to construct two trial DEWline station in the Yukon near Herschel Island. Permission is granted with the proviso that liaison be established with Canadian specialists on such matters thereafter.

August 1953: The Soviets detonate a thermonuclear weapon

October 6 1953: The National Security Council meets in the United States to discuss the urgent need for an early warning system in the North

November 13 1953: President Eisenhower speaks to the Canadian House of Commons emphasizing the need for a common defence

November 16 1953: Introduction of a bill in the Canadian House of Commons concerning the formation of the Department of Northern Affairs and National Resources

April 8 1954: Joint U.S./Canadian announcements concerning the building of two early warning systems in the North

June 23 1954: Canada proceeds with the construction of the Mid-Canada-Line (MCL)

September 27 and November 19 1954: Further joint announcements concerning the DEWline and MCL

May 5 1955: The DEWline Agreement formalised

July 1957: The DEWline becomes operational

1960: A Ballistic Missile Early Warning System (BMEWS) established in the North

1966: DEWline communications upgraded for BMEWS traffic

1980: Canada purchases F-18A fighter aircraft, some for the North; the DEWline still in operation as a tactical system
APPENDIX B

Agreement between Canada and the United States on the Establishment of a Distant Early Warning System in Canadian Territory

On 16 September 1955 the Canadian government concurred in a proposal that the construction of a Distant Early Warning Line (DEW Line) in the far north to aid in the air defence should be the responsibility of the United States government. The DEW line would be one element of the over-all joint Canada/United States warning system. The conditions governing the establishment of the DEW system were agreed between the two governments in an exchange of notes dated 5 May 1955. At this time the Canadian government stated its intention to participate in the operation and maintenance phase of the project. The conditions are given below:

1. Sites

The location and size of all airstrips and the location of all sites, roads, wharves and jetties required for the DEW System in Canada shall be a matter of mutual agreement by the appropriate agencies of the two Governments. Canada will acquire and retain title to all lands required for the system. Canada grants and assures the United States, without charge, such rights as access, use, and occupancy as may be required for the construction, equipment and operation of the system.

2. Liaison Arrangements

It is anticipated that the United States will carry out the construction of the DEW System through a management contractor appointed by the United States. It is understood that the United States and the management contractor will establish a DEW Project Office, and that the participation of interested Canadian Government agencies in the Project Office is desired to the extent necessary for consultation on matters covered in this statement of conditions. In addition, the Canadian Government may decide to appoint a Special Commissioner for the Project, and to assign liaison officers to the construction operations in Northern Canada.

3. Plans

Plans of the buildings, airstrips, roads (including access roads) and similar facilities, information concerning use of local materials, such as rock fill, sand and gravel, and information concerning other arrangements related to construction and major items of equipment, shall, if requested, be supplied to the appropriate Canadian authorities in sufficient detail to give an adequate idea of the scope of the proposed construction. Canadian officials shall have the right of inspection during construction. Proposals for subsequent construction, or major alterations, shall be discussed with the appropriate Canadian authorities.

4. Provision of Electronic Equipment

The Canadian Government reaffirms the principle that electronic equipment at installations on Canadian territory should, as far as practicable, be manufactured in Canada. The question of practicability must, in each case, be a matter for consultation between the appropriate Canadian and United States agencies to determine the application of the principle. The factors to be taken into account shall include availability at the time period required, cost and performance. For the purposes of applying these principles to the DEW Line, the DEW Project Office shall be used as far as possible as the instrument for effective consultation between the Canadian and United States agencies concerned.

5. Construction and Procurement (other than Electronic Equipment)

(a) Canadian contractors will be extended equal consideration with United States contractors in the awarding of construction contracts, and Canadian and United States contractors shall have equal consideration in the procurement of materials, equipment and supplies in either Canada or the United States;

(b) Contractors awarded a contract for construction in Canada will be required to give preference to qualified Canadian Labour for such construction. The rates of pay and working conditions for this labour will be set after consultation with the Canadian Department of Labour in accordance with Canadian Fair Wages and Hours of Labour Act.

6. Canadian Law

Nothing in this Agreement shall derogate from the application of Canadian law in Canada, provided that, if in unusual circumstances its application may lead to unreasonable delay or difficulty in construction or operation, the United States authorities concerned may request the assistance of Canadian authorities in seeking appropriate alleviation. In order to facilitate the rapid and efficient construction of the DEW System, Canadian authorities will give sympathetic consideration to any such request submitted by United States Government authorities.
6. **Canadian Law** (continued)

Particular attention is directed to the ordinance of the Northwest Territories and Yukon Territory, including those relating to the following:

(a) No game or wildlife shall be taken or molested in the Northwest Territories. Licences to hunt in Yukon Territory may be purchased from representatives of the Yukon Territorial Government.

(b) No objects of archaeological interest or historic significance in the Northwest Territories or Yukon Territory will be disturbed or removed therefrom without first obtaining approval of the Canadian Department of Northern Affairs and National Resources.

7. **Operation and Manning**

(a) The extent of Canadian participation in the initial operation and manning of the DEW System shall be a matter for later decision by Canada after full consultation with the United States. It is understood that, in any event, Canada reserves the right, on reasonable notice, to take over the operation and manning of any or all of the installations. Canada will ensure the effective operation, in association with the United States, of any installations it takes over.

(b) Subject to the foregoing, the United States is authorized to station personnel at the sites, and to operate the DEW System, in accordance with the principles of command in effect from time to time between the military authorities of the two countries. The overall manning policy as between the employment of military and civilian personnel shall be the subject of consultation and agreement between the two Governments.

8. **Financing**

Unless otherwise provided by Canada, the costs of construction and operation of the DEW System shall be the responsibility of the United States, with the exception of Canadian military personnel costs if Canada should man any of the installations.

9. **Period of Operation of the System**

Canada and the United States agree that, subject to the availability of funds, the DEW System shall be maintained in operation for a period of ten years or such shorter period as shall be agreed by both countries in the light of their mutual defence interests. Thereafter, in the event that either Government concludes that any or all of the installations are no longer required, and the other Government does not agree, the question of continuing need will be referred to the Permanent Joint Board on Defence.
9. Period of Operation of the System (continued)

In considering the question of need, the Permanent Joint Board on Defence will take into account the relationship of the DEW System to other radar installations established in the mutual interest of the two countries. Following consideration by the Permanent Joint Board on Defence, as provided above, either Government may decide that the installations in question shall be closed, in which case the arrangement shown in paragraph 10 below regarding ownership and disposition of the installations shall apply.

10. Ownership of Removable Property

Ownership of all removable property brought into Canada or purchased in Canada and placed on the sites, including readily demountable structures, shall remain in the United States. The United States shall have the unrestricted right of removing or disposing of all such property, PROVIDED that the removal or disposition shall not impair the operation of any installation whose discontinuance had not been determined in accordance with the provisions of paragraph 9 above, and PROVIDED further that removal or disposition takes place within a reasonable time after the date on which the operation of the installation has been discontinued. The disposal of United States excess property in Canada shall be carried out in accordance with the provisions of the Exchange of Notes of April 11 and 18, 1951, between the Secretary of State for External Affairs and the United States Ambassador in Ottawa, concerning the disposal of excess property.

11. Telecommunications

The United States military authorities shall obtain the approval of the Canadian Department of Transport, through the Royal Canadian Air Force, for the establishment and operation (including the assignment of frequencies) of radio stations in Canadian territory. The provision of telecommunication circuits (both radio and land-line) required during the construction period and thereafter will be the subject of consultation between the appropriate authorities of the two Governments, having regard to the desirability of using existing military circuits and existing Canadian public carries where this may be feasible.

12. Scientific Information

Any geological, topographical, hydrographical, geophysical, or other scientific data obtained in the course of the construction or operation of the DEW system shall be transmitted to the Canadian Government.

13. Matters Affecting Canadian Eskimos

The Eskimos of Canada are in a primitive state of social development. It is important that these people be not subjected unduly to disruption of their hunting economy, exposure to diseases against which their immunity is often low, or other effects of the presence of white men which might be injurious to them.
13. **Matters Affecting Canadian Eskimos** (continued)

It is therefore necessary to have certain regulations to govern contact with and matters affecting Canadian Eskimos. The following conditions are set forth for this purpose:

(a) Any matters affecting the Eskimos, including the possibility of their employment in any area and the terms and arrangements for their employment, if approved, will be subject to the concurrence of the Department of Northern Affairs and National Resources.

(b) All contact with Eskimos, other than those whose employment on any aspect of the project is approved, is to be avoided except in cases of emergency. If, in the opinion of the Department of Northern Affairs and National Resources, more specific provision in this connection is necessary in any particular area, the Department may, after consultation with the United States, prescribe geographical limits surrounding a station beyond which personnel associated with the project other than those locally engaged, may not go or may prohibit the entry of such personnel into any defined area.

(c) Persons other than those locally engaged shall not be given leave or facilities for travel in the Canadian Arctic (other than in the course of their duties in operation of the project) without the approval of the Department of Northern Affairs and National Resources, or the Royal Canadian Mounted Police acting on its behalf.

(d) There shall be no local disposal in the North of supplies or materials of any kind except with the concurrence of the Department of Northern Affairs and National Resources, or the Royal Canadian Mounted Police acting on its behalf.

(e) Local disposal of waste shall be carried out in a manner acceptable to the Department of Northern Affairs and National Resources, or the Royal Canadian Mounted Police acting on its behalf.

(f) In the event that any facilities required for the system have to encroach on or disturb past or present Eskimo settlements, burial places, hunting grounds, etc., the United States shall be responsible for the removal of the settlement, burial ground, etc., to a location acceptable to the Department of Northern Affairs and National Resources.

14. **Canadian Immigration and Customs Regulations**

(a) Except as otherwise agreed, the direct entry of the United States personnel into the Northwest Territories or Yukon Territory from outside Canada shall be in accordance with Canadian customs and immigration procedures which will be administered by local Canadian officials designated by Canada.

(b) Canada will take the necessary steps to facilitate the admission into the territory of Canada of such United States citizens as may be employed on the construction of the DEW System, it being understood that the United States will undertake to repatriate at its expense any such persons in the contractors fail to do so.
15. **Use of Airstrips**

Airstrips at installations in the DEW System shall be used by the United States solely for the support of the System. If it should be desired at any time by the United States to use an airstrip for other purposes, requests should be forwarded through appropriate channels. The airstrip shall be available for use by the RCAF as required. The airstrip shall also be available for use by Canadian civil air carriers operating into or through the area, whenever such use would not conflict with military requirements, and SUBJECT to the understanding that the United States Air Force will not be responsible for the provision of accommodation, fuel, or servicing facilities of any kind. Proposals and arrangements for such use of USAF-operated airstrips by Canadian air carriers shall be submitted to the RCAF, which shall consult the USAF before granting any such permission.

16. **Landing Facilities**

Landing facilities at any of the stations on the tidewater will be available for use by Canadian Government ships and ships employed on Canadian Government business.

17. **Transportation**

Canadian commercial carriers will to the fullest extent practicable be afforded the opportunity to participate in movements of project materials, equipment and personnel within Canada. The United States will select the means of transportation and specific carriers for the movement of material, equipment, and personnel from points of Canada to DEW System sites, provided that in the case of air carriers applicable civil air transport agreements and procedures shall be observed.

18. **Re-supply Arrangements**

Because of the special conditions in the Canadian Arctic, the Canadian Government has a particular interest in the arrangements for the re-supply of the DEW System. These arrangements shall therefore be a matter of later consultation and agreement between the two governments.

19. **Taxes**

The Canadian Government will grant remission of customs duties and excise taxes on goods purchased in Canada which are or are to become the property of the United States Government and are to be used in the construction and/or operation of the DEW System, as well as refunds by way of drawback of the customs duty paid on goods imported by Canadian manufacturers and used in the manufacture or production of goods purchased by or on behalf of the United States Government and to become the property of the United States Government for the construction of the system.
20. **Status of Forces**

The "Agreement between the Parties to the North Atlantic Treaty regarding the status of their Forces," signed in London on June 19, 1951, shall apply.

21. **Supplementary Arrangements and Administrative Agreements**

Supplementary arrangements or administrative agreements between authorized agencies of the two Governments may be made from time to time for the purpose of carrying out the intent of this agreement.
The 3,000 mile DEW Line consists of approximately 30 search radar installations located at roughly 100-mile intervals along the line. Approximately midway between each search radar station is a gap-filler radar installation. The types of stations are as follows:

MAIN STATION, of which there are six, serves as command, communications, maintenance and supply headquarters for a group of nine or ten stations which make up each of six DEW Line sectors. Each Main Station has two search radars manufactured by Raytheon, one providing high altitude coverage, the other providing low-altitude coverage. The Main Stations also have receivers and automatic alarms operated by two adjoining gap-filler radars made by Motorola. Each Main Station also has at least one ionospheric or tropospheric scatter communications installation to provide rearward radio teletype links to air defence centers in the U.S. and in Canada. The Main Stations are commanded by six military personnel and operated by approximately 30 civilians. In addition, the Main Stations also house 30-40 roving technicians who serve other stations in their sectors.

AUXILIARY STATION, of which there are approximately 25, also equipped with two search radars and receivers. Each Auxiliary Station is operated by approximately 20 civilians, but has no military personnel.

INTERMEDIATE STATION, of which there are approximately 30, each equipped with two gap-filler doppler radar transmitters and antennas which are beamed to the adjoining Auxiliary or Main station. The Intermediate stations are manned by approximately five civilians.

As given by Philip Klass, "DEW Line Demonstrates Effectiveness," Aviation Week, August 31, 1959. Since that time there have been a number of changes on the DEW1ine, namely the closure of all the Intermediate Stations in 1963, and the upgrading of DEW1ine Communications carried out during Project SURE-STOP by 1966, and the installation of a number of VHF links from certain DEW1ine stations (such as Lady Franklin Point and Shepherd Bay) to provide commercial telephone facilities to settlements near the DEW1ine.
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**RED ROUTE 31**

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2Mean Enroute Altitude; Distances in Nautical Miles.
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