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**Under the Radar:
Defence Construction (1951) Limited
and Military Infrastructure in Canada, 1950-1965**

By
Jeffrey David Noakes, B.A., M.A.

A thesis submitted to
the Faculty of Graduate Studies
in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

Department of History
Carleton University
Ottawa, Ontario
30 June 2005

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**Under the Radar:
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Military Infrastructure in Canada, 1950-1965**

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Jeffrey David Noakes, B.A., M.A.

in partial fulfilment of the requirements
for the degree of Doctor of Philosophy

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Abstract

Established in 1950 as an element of Canada's Cold War rearmament, Defence Construction (1951) Limited, or DCL, was created as an agency to tender and supervise construction contracts for the Department of National Defence, a function it fulfills to this day. Such use of a Crown corporation was characteristic of Minister of Defence Production C.D. Howe and his often expedient and pragmatic approach to meeting policy objectives. In its first fifteen years, DCL helped make possible the construction of \$1.5 billion in defence infrastructure, including three major radar lines, two in northern Canada. The corporation also played a role in helping the Canadian government implement civilian projects at home and abroad. Using an extensive collection of corporate and related government records at the agency itself, at Library and Archives Canada, and at the Department of National Defence's Directorate of History and Heritage, this dissertation examines the corporation's history as an effective and flexible instrument of government policy. Adjunct to this function, DCL helped represent the interests of the Canadian construction industry in the provision of Cold War infrastructure. By the end of the 1950s, the corporation, working in conjunction with other government agencies, had managed to ensure that American and joint Canadian-American defence projects built in Canada would use Canadian construction firms drawing on Canadian suppliers. This dissertation also encompasses and examines themes related to Canada's northern Cold War from 1950-65. National defence, sovereignty, economic development, the expansion of Ottawa's influence and control over northern Canada, and relations with the United States all played a role in shaping the environment in which DCL operated, and were in turn influenced by events and projects that DCL had

a role in shaping. An examination of the history of DCL between 1950 and 1965, therefore, also provides a useful prism for examining these issues. Aside from these issues, the corporation's history is also an revealing case study of a Crown corporation and its utility as an instrument of government policy; in many respects DCL served as Ottawa's "Cold War handyman."

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This dissertation would not have been possible without the support and encouragement of many people. My thanks go to all of them for their time and assistance. First and foremost, to Dr. Duncan McDowall, my advisor, who patiently waded through the initial drafts of this document and provided very helpful advice. This dissertation is immeasurably better thanks to his efforts. I would also like to extend my thanks to a number of people within the Department of History, including Dr. Bruce Elliott, Dr. Norman Hillmer, and especially to Joan White. My thanks also to the staff at the Carleton University Library, particularly to those in Inter-Library Loans, who managed to track down some important materials based on the most cursory of references. Thanks also to Marianne Keyes and Raymond Boilard from Computing and Communications Services. To Carleton University and the Peter Browne Bursary, I extend my appreciation for the financial support provided for this research.

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always been a pleasure to make use of the tremendous resources it makes available to the public. At Defence Construction Canada, I would like to thank Sue Greenfield, Shawn Bindon, Bruce Aird, and Stephanie Ryan. All of these people, and many others, have helped me with my research, but any errors or omissions are solely my responsibility.

It has become something of a joke that graduate students evaluate a coffee shop by the availability of outlets for laptop computers. In this respect, I would like to thank the Bridgehead coffee shop on Third Avenue, which has consistently been able to provide both coffee and outlets. My thanks also to friends and to fellow graduate students including Emily Arrowsmith, Jillian Brant, Andrew Burtch, Janice Cavell, Grant Dawson, Richard Goette, Rachel Lea Heide, Omar Khan, Tim Krywulak, Vadim Kukushkin, Tony Michel, and Stacey Zembrzycki for their friendship, advice, and support through this project. Finally, I would like to thank my parents, without whose patient and continued support this dissertation would not have been possible. I am certain that they are as glad as I am to see it finished.

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Introduction:
**Defence Construction (1951) Limited and Military Infrastructure in Canada,
1941-1965**

In the 1950s, Canada asserted itself as it never had before in peacetime. After its post-war doldrums, the Canadian military was sparked into an unprecedented peacetime buildup of personnel, equipment, and installations. Cold War tensions that had been building since the end of the Second World War were brought to a head by the outbreak of war in Korea. In this explicitly ideological conflict, the perceived menace was the Soviet Union and the People's Republic of China. Canada had responded to the emerging Cold War by embracing collective security – through the United Nations and the North Atlantic Treaty Organization – and to the Korean War by building up its military forces. The war moved the Canadian government from a policy of restrained military expenditure and carefully-prescribed commitments to levels of peacetime expenditures that have remained unmatched to this day.¹ Personnel strengths and equipment allocations were substantially expanded. On the ground, Canada's military landscape was changed dramatically. The country became dotted with a myriad of facilities designed to sustain warfare in a technological age, ranging from the more traditional army bases, naval dockyards, and airfields, to the newer structures of modern warfare, including the familiar Cold War icon of the radar station with its large white radomes looming over the surrounding landscape. One company, a Crown corporation – Defence Construction (1951) Limited – above all others was the prime instrument in facilitating the building of

¹ David J. Bercuson, "Canada, NATO, and Rearmament, 1950-1954: Why Canada Made a Difference (But not for Very Long)," in *Making a Difference? Canada's Foreign Policy in a Changing World Order*, John English and Norman Hillmer, eds., (Toronto: Lester Publishing, 1992), 103-105.

new military infrastructure in Canada.² DCL was hardly the first iteration of the Crown corporation as a manifestation of public purpose in fields often associated with private enterprise. Indeed, the Crown had made its entrepreneurial purpose known as early as the canal era of the mid 19th century and as recently as the birth of radio broadcasting in Canada. But DCL was the first Cold War incarnation of this distinctive Canadian means of achieving a public end through a mechanism that in key ways resembled a private enterprise. This dissertation, which is derived and considerably expanded from earlier work on an anniversary history of DCL,³ will seek to explain the role of Defence Construction (1951) Limited in the provision of defence infrastructure for Canada's Cold War between 1950 and 1965 and how, by helping to provide this infrastructure as well as providing related services to Ottawa politicians and policy-makers, the corporation became an effective instrument of government policy.⁴

The creation of Defence Construction Limited and its immediate successor, Defence Construction (1951) Limited (DCL) was, as noted above, a direct result of postwar events and the Canadian government's reaction to them. The conflict in Korea created a sense of urgency that placed a premium on the *means* by which Canada would arm itself in the Cold War. These requirements were extensive, and a separate federal department was created to oversee the boom. Headquartered in Ottawa, with personnel

² Infrastructure, a 1951 memorandum to the Cabinet Defence Committee explained, was a term "used to define the static items of capital expenditure which are required to provide the material backing for operational plans necessary to enable the higher command to function and the various forces to operate with efficiency." "Military Definition of the term 'Infrastructure,'" Appendix "A" to Cabinet Document D-287, Memorandum to Cabinet Defence Committee, "Financing of Airfield Infrastructure," 12 June 1951, Library and Archives Canada (hereafter "LAC"), RG2, vol. 2751, file "Cabinet Defence Committee Documents, vol. X".

³ The earlier, 160-page, work has the tentative title of *Fifty Years and More: Defence Construction (1951) Limited, 1951-2003*, and has not yet been published.

distributed across Canada and abroad, the Department of Defence Production (DDP), assumed many of the powers of the wartime Department of Munitions and Supply, although as events unfolded its freedom of action was far more restricted than its predecessor's.⁵ Not surprisingly, the department was made the responsibility of long-time cabinet minister Clarence Decatur Howe, who had been Minister of Munitions and Supply, and subsequently Minister of Reconstruction and Trade and Commerce.⁶ "C.D." was a prototypical "multi-tasker" and his instincts were pragmatic in the ideological sense. The end justified the means whether the instrument wore the glove of the state or private enterprise. Howe thus turned to one of his favourite solutions for such situations – the Crown corporation – to meet the Cold War challenge of girding the Shield of Achilles. While the new department assumed responsibility for a number of existing Crown corporations to help fulfill its objectives, the task of providing new infrastructure on a crash basis as part of Canada's rearmament programme led him to create yet another – Defence Construction Limited.⁷

Experience in creating a coast-to-coast airline and in arming the nation to fight the Second World War had given Howe a keen sense of industrial, organizational, and financial expediency. Due to the pressure of work and the limited time available he reactivated the dormant Wartime Housing Limited, renamed it "Defence Construction Limited" (DCL), and put it to work in conjunction with the Central Mortgage and

⁴ For a number of reasons, DCL's activities as part of Canada's military commitments to NATO in Europe will not be examined to any significant extent in this dissertation; foremost among these is the destruction of all relevant DCL files on work in France.

⁵ Bothwell and Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland and Stewart, 1979), 255-258.

⁶ As the war drew to a close, Howe also became Minister of Reconstruction, later Minister of Reconstruction and Supply. Since 1948, he had also served as Minister of Trade and Commerce. *Ibid.*, 184-186; Public Archives of Canada, *Guide to Canadian Ministries Since Confederation, July 1, 1967 – April 1, 1973*, (Ottawa: Information Canada, 1974), 209.

Housing Corporation as the tendering and supervisory authority for the Department of National Defence's burgeoning construction requirements.⁸ By May of 1951, DCL had been recast as Defence Construction (1951) Limited, and embarked on what would prove to be the busiest years of its corporate existence.⁹

The defence infrastructure requirements to be met through DCL were substantial. Between the 1951 and 1955 fiscal years, for instance, the corporation handled some forty per cent of the federal government's construction expenditures other than those for housing.¹⁰ At the end of its first fifteen operational years on 31 March 1965, DCL had administered contracts worth some \$1.5 billion and had also been involved in significant civilian undertakings, including major foreign aid projects, the Northern Ontario Pipeline, and Expo 67. In what was perhaps its most substantial and visible achievement, however,

⁷ The Department of Defence Production assumed responsibility for a number of existing Crown corporations, including the Canadian Commercial Corporation and Canadian Arsenals Limited.

⁸ In the first few years after the war, defence construction was carried out by the Canadian Commercial Corporation (CCC), but it was felt that it would take too long to build up the organization. After 1950, defence construction had to be carried out by the CCC or a limited number of other organizations because the Defence Production Act limited the Minister to selecting a company covered by the Government Companies Operation Act. This description fit Wartime Housing Limited and the corporation's charter, which would also apply to Defence Construction Limited, permitted it to employ a corporation to manage part or all of its affairs, thus allowing CMHC to act as an operating and financial agent for DCL during the latter's early years. C.A. Ashley and R.G.H. Smails, *Canadian Crown Corporations: Some Aspects of their Administration and Control*, (Toronto: Macmillan, 1965), 116-119; K.J. Holmes, *The History of the Canadian Military Engineers, Vol. III*, (Toronto, ON: Military Engineering Institute of Canada, 1997), 42-43; Canada, House of Commons, *Debates*, 8 February 1951, 180; Memo, H.C. Linkletter to D.B. Mansur, "Re: The Defence Supplies Act," 3 November 1950; Memo, H.C. Linkletter to D.B. Mansur, "Re: Construction Defence Projects," 4 November 1950, DCC in-house file 011-2, "Historical Information". On the history of Wartime Housing Limited, see, amongst others, J. de N. Kennedy, *History of the Department of Munitions and Supply: Canada in the Second World War Volume 1*, (Ottawa: King's Printer, 1950), 480-489; Jill Wade, "Wartime Housing Limited, 1941-1947: Canadian Housing Policy at the Crossroads," *Urban History Review*, 15:1 (June 1986): 41-59.

⁹ The addition of "(1951)" was required because two charters could not be issued for the same company name. Memo, H.C. Linkletter, General Counsel, CMHC, to R.G. Johnson, "Re-Incorporation of DCL," 21 April 1951, Defence Construction Canada (hereafter referred to as DCC) in-house file 011-2, "Historical Information". For a summary of these functions, see the corporation's annual reports through the years; for instance, Defence Construction (1951) Limited, *Annual Report*, 1958-59, 5.

¹⁰ Royal Bank of Canada, *The Canadian Construction Industry*, (Ottawa: Royal Commission on Canada's Economic Prospects, 1956), 7.

DCL had been involved in the construction of vital infrastructure for continental defence, including three major radar lines that stretched across Canada.¹¹

Graph 1
Expenditures on DCL Contracts, 1950-1965, in \$ Millions

The years from 1950 to 1965 paradoxically encompassed some of the busiest and quietest in DCL's history. Following a peak in the 1957-58 fiscal year, the volume of work put in place through the corporation would sharply decline due to changes in the perception of the military threat to North America and to the resultant retrenchment in military expenditures on continental defence.¹² Furthermore, with the initial spurt of Cold War building over, the mid-1960s brought a number of challenges and changes for the bureaucratic environment in which Defence Construction operated, including the 1959 Heeney Report on Civil Service reform and the examinations and the 1962-63

¹¹ DCL, *Annual Report*, 1964-65, I.

¹² Bercuson; "Canada, NATO, and Rearmament," 119-120; B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defenses from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 101-104; 134-141. American expenditures on continental defence, for instance, would peak in the 1958 fiscal year. *Ibid.*, 137.

conclusions of the Glassco Commission.¹³ By 1965 ministerial responsibility for DCL had been transferred from the Minister of Defence Production to the Minister of National Defence. DCL's major client, the Department of National Defence, also experienced significant change in the mid-1960s as it underwent integration and unification. This led in turn to a Memorandum of Understanding, which redefined the relationship between the two organizations and formed a basis for DCL's next two decades of operation. Throughout the peaks and valleys of the entire period, DCL none the less remained a versatile tool in Ottawa's hands.

Defence Construction's relationships, however, extended beyond the bureaucratic milieu of the federal government. From its outset, although it acted on behalf of the newly-created Department of Defence Production and its domineering minister, C.D. Howe, DCL also had a close relationship with the nation's construction industry, one of the key primers of the post-war construction industry. R.G. Johnson, the General Manager of the Canadian Construction Association, was placed on loan to DCL in 1950, while many of DCL's other senior personnel had come from the construction industry and related organizations.¹⁴ This relationship with the construction industry extended to actions which suggest that the state in the guise of DCL was often acting on behalf of the private sector. In the 1950s and 1960s, for instance, DCL and other government organizations were directly involved in negotiations that guaranteed equal or preferential treatment for Canadian contractors bidding on American and joint Canadian-American

¹³ Canada, Civil Service Commission, *Personnel Administration in the Public Service: A Review of Civil Service Legislation*, (Ottawa: Queen's Printer, 1959); Canada, Royal Commission on Government Organization, *Report*, 5 vols., (Ottawa: Queen's Printer, 1962-63).

¹⁴ Sources included the Foundation Company of Canada, the Ontario Hydro-Electric Commission, Abitibi Pulp and Paper, Dominion Bridge Ltd., Dominion Structural Steel Ltd., Warnock-Hersey Ltd., Angus Robertson Ltd., Fraser-Brace Ltd., and the Canadian Construction Association. Ben Dworkin, "Ottawa Today: DCL's important roles," *Daily Commercial News and Building Record*, 16 March 1965.

defence projects. Viewed from this perspective, the history of DCL in the 1950s and early 1960s seems to furnish a striking example of the use of military expenditures as a form of Keynesian pump-priming by the state and points to the emergence of a growing understanding and cooperation between the Canadian government, its agencies, and the Canadian construction industry in the provision of military infrastructure in Canada. The symbiotic existence of DCL – hatched by Ottawa and accepted by Bay Street – thus suggest an ideological pliability in Canada's national security bureaucracy through what have been called "the Howe Years."

Despite the significance of these events outlined above and the corporation that helped make them possible, historians have largely shunned the empirical study of Canada's Crown corporations, with the exception of a handful of prima donna organizations like Eldorado Nuclear. The recent publication of Matthew Bellamy's *Profiting the Crown* has, however, helped redress the lacuna in this field.¹⁵ Depressingly little has been written about Defence Construction Limited itself, possibly because of the corporation's low visibility in comparison with the other actors involved in its major projects. A number of books and articles discuss DCL's corporate ancestor, Wartime Housing Limited, but all of their discussions of WHL's history seem to end around 1947 without discussing the ultimate fate of the company.¹⁶ Strikingly, DCL does not feature in the standard biography of its primary creator, C.D. Howe.¹⁷ A detailed history of

¹⁵ Robert Bothwell, *Eldorado: Canada's National Uranium Company*, (Toronto: University of Toronto Press, 1984); Matthew J. Bellamy, *Profiting the Crown: Canada's Polymer Corporation, 1942-1990*, (Montreal: McGill-Queen's University Press, 2005).

¹⁶ Jill Wade, "Wartime Housing Limited, 1941-1947: Canadian Housing Policy at the Crossroads," (M.A. thesis, University of British Columbia, 1984); Wade, "Wartime Housing Limited, 1941-1947" (article), 41-59; John Bacher, "Too Good to Last: The Social Service Innovations of Wartime Housing," *Women and Environments* 10:2 (1988): 10-13; Annmarie Adams and Pieter Sijpkes, "Wartime Housing and Architectural Change, 1942-1992," *Canadian Folklore Canadien* 17:2 (1995): 13-30.

¹⁷ Bothwell and Kilbourn, *C.D. Howe*.

Defence Construction (1951) Limited therefore remains to be written. Such a study should address issues related to Crown corporations, the Canadian construction industry, Canadian defence policy, and also touch on issues of Canadian development and sovereignty. A strategically important Crown corporation such as DCL ought therefore to act as a prism for a number of crucial themes of Canadian policy-making. On the level of high policy, it should cast light on the often-debated issue of whether Canada has developed a special knack for managing a "mixed" economy. More closely, DCL's history will enhance understanding of Canada's greatest spurt of peacetime military activity.

This dissertation will therefore focus on DCL and major defence projects of the 1950s and early 1960s in Canada for a number of reasons. The first is that these activities are generally more completely documented than its overseas operations.¹⁸ The second is that these were prominent Cold War projects, subject to crucial and ongoing negotiations with and intervention by C.D. Howe, DCL management, Canadian and American politicians and bureaucrats, and the construction industry. The third compelling reason is that such a study can be projected onto the broader screen of Cold War historiography, benefiting from works examining how these projects came to be, particularly since there is ongoing historiographical debate in this area.¹⁹ Recent work on the history of the Cold

¹⁸ DCL's civilian overseas operations (in the period under consideration, primarily the Colombo Plan) have also been difficult to reconstruct; while some documentation of these activities survives, and a considerable amount of material related to the Colombo Plan exists, it appears that no general history of the Plan has ever been written. One of the few works on Canadian involvement is Jacqueline T. Shaw, "Grudging Gifts": Canada, the Colombo Plan and the Formation of an Aid Policy," (M.A. thesis, Carleton University, 1992), which examines the decision-making process that led to Canada's involvement with the Plan. See also Keith Spicer, "External Aid in Canada's Foreign Policy," (Ph.D. dissertation, University of Toronto, 1962); David R. Morrison, *Aid and Ebb Tide: A History of CIDA and Canadian Development Assistance*, (Waterloo, ON: Wilfrid Laurier University Press, 1998), 27-56.

¹⁹ Over the past two decades there has been a spate of works in this field. Among the earliest is Joseph Jockel's *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air*

War can also provide useful background and insights, especially since former Soviet records are now more readily available and Russian and other historians are now better able to examine and discuss the Soviet experience and actions in postwar years.²⁰ As a result, this dissertation must necessarily place itself within a number of well-established historiographic fields. The history of Crown corporations and business in Canada is an obvious starting point. Historians and contemporary observers have long debated, often hotly, the efficacy of involving the Crown in matters usually reserved or private sector initiative. Are “Crowns” invariably “investments in failure” or do they equip Canada with a nimble means of offsetting its intrinsic weakness of capital and geography? Similarly, the history of construction in Canada, and of postwar defence policy and the Cold War are also relevant. Finally, some related historiographical issues involving economic development, particularly of high-technology industries involved with military work, Canadian sovereignty, and the northern expansion of the Canadian government’s policies and activities can be tested against DCL’s evolution in the 1950s.

While locating itself in these historiographical fields, this dissertation will cover the formation and early years of a Canadian Crown corporation, Defence Construction (1951) Limited, which played an important role in the construction of military infrastructure in Canada between 1950 and 1965. Three themes will feature prominently

Defence, 1945-1958, (Vancouver: University of British Columbia Press, 1987). More recently, there are sections of Ann Denholm Crosby’s *Dilemmas in Defence Decision-Making: Constructing Canada’s Role in NORAD, 1958-96*, (New York: St. Martin’s Press, 1998), and Andrew Richter’s *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950-63*, (Vancouver: UBC Press, 2002) that discuss these issues. The contentious issue of nuclear weapons in Canadian air defence is discussed in Richter, *op. cit.*, and in sections of John Clearwater, *Canadian Nuclear Weapons: The Untold Story of Canada’s Cold War Arsenal*, (Toronto: Dundurn, 1997). For an American-oriented discussion of the development of air defence policy and its implementation, see Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Washington: Air Force History Support Office, 1991).

in this work: the rationale for DCL's creation and continued existence; DCL's role in Canada's relations with the United States and the defence projects that resulted from them; and relationships between the government and the private sector, particularly the role played by DCL in facilitating these relationships and furthering the interests of the Canadian construction industry. The dissertation will examine how the federal government used a Crown corporation to implement public policy over time, and how that same corporation related to the Canadian construction industry. This study therefore aims to bridge an historiographical gap, or actually several such gaps. It seeks to delineate the relationship between Crown corporations and Canadian business at large and the construction industry more narrowly, as well as the making of defence policy, and the issues of economic development, sovereignty, and the northern expansion of Canadian government policies and activities. All too often, the role of DCL has slipped "under the radar." This dissertation seeks to give this crucial Crown corporation its just historiographical due.

The 1950-65 time frame was chosen in part because of limitations on the size of the dissertation and the availability of research materials and in part because it parallels the high noon of Cold War preparation in Canada. It thus covers a period when a tremendous amount of work was carried out through DCL. By 1965, although over \$1.5 billion in work had been put in place, the volume of work handled by the corporation had fallen dramatically from its last peak in 1956-57, as had its employee strength.²¹ This decline was attributable to a number of factors. The emergence of the intercontinental

²⁰ See, for example, Steve Zaloga, *Target America: The Soviet Union and the Strategic Arms Race, 1945-1964*, (Novato, CA: Presidio Press, 1993); Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002).

²¹ DCL, *Annual Report*, 1964-65, 1.

ballistic missile as a new threat supplanting the long-range bomber brought an end to the construction of major air defence systems in North America. The ambitious schemes for other military installations in Canada prompted by the Korean War, which had produced such massive projects as the construction of Camp Gagetown in New Brunswick, had been completed by the end of the 1950s. With these military requirements met, and the threat of the Cold War shifting in new directions, no comparable new projects were foreseeable. The Canadian defence budget, which had spiked after the outbreak of the Korean War, had also been steadily declining since 1954. The interaction of these and other factors meant that expenditures on new defence infrastructure had by the early 1960s reached a low point and would not rise again until the mid-1970s.²² DCL none the less survived and found new applications favoured by its Ottawa masters.

The 1965 cutoff date also coincides with a number of significant changes both to the bureaucratic environment in which DCL operated and to the corporation itself. Beginning in the late 1950s, a series of re-evaluations of government organization and operations culminated in a transfer of ministerial responsibility for DCL from the Minister of Defence Production to the Minister of National Defence, to the integration and ultimately to the unification of the Canadian military, and to the 1965 establishment of a Memorandum of Understanding between DCL and DND. The provisions that had governed Defence Construction's first fifteen years were replaced by arrangements that would endure for the next two decades. At the same time, the corporation experienced a substantial turnover in personnel; in addition to those who had been let go as the volume of work decreased, a number of senior managers, including DCL's first president, R.G.

²² Bercuson, "Canada, NATO, and Rearmament," 199-120.

Johnson, had left the organization by the middle of the 1960s. 1965, therefore, marked a significant turning point in the corporation's history.

As with any historical study, the examination of these fifteen years must be carried out through the imposition of artificial constructs. The first involves filtering and selective presentation: a great number of smaller projects undertaken through DCL have been omitted in the interests of both clarity and length, especially when points and issues that might be raised in examining them have already been discussed. Other small undertakings, and even elements of larger programmes, have been accorded only limited attention due both to continuing secrecy and to ongoing delays in the Access to Information process at Library and Archives Canada.²³ The most significant exclusion, however, is the corporation's role in the provision of defence infrastructure for the Canadian military stationed in Europe as part of the country's NATO commitments, which for a number of reasons, including the destruction of DCL records, will not be discussed in this dissertation.²⁴ The second construct used in this dissertation is the method of its division into chapters. While many of the projects discussed in this dissertation co-existed, any effort to reproduce this simultaneity would likely prove confusing. In discussing these years, the dissertation is broken down by major projects

²³ There is a difference between these two points; some documents, such as the records of PJBD discussions from after 1950, are currently closed and will in all likelihood remain closed for the foreseeable future due to the need to obtain permission from both Canada and the United States to declassify these records. Other documents might well be opened to the public, but must first undergo review under LAC's ATIP policy.

²⁴ First, and perhaps most importantly, the relevant DCL records held by the corporation's European branch were destroyed in the 1970s following the relocation of bases from France to Germany. Second, the political and bureaucratic environment in which these installations were built was substantially different. While worthwhile observations and conclusions can be drawn from Canadian experience in this field – it is particularly interesting, for instance, to see how Canadian authorities handled being the military that wanted to build bases in another country, rather than being on the receiving end – the experience was substantially different and heavily constrained by NATO infrastructure policies and negotiations. Finally, any examination of NATO projects relying on archival documentation must also encounter significant

presented in roughly chronological order in order to provide a more straightforward organization and discussion. This is not to imply that the chapters will stand in isolation; the examination of the late 1950s downturn in the corporation's volume of work discussed in chapters seven and eight, for instance, is directly linked to the wrapping up of projects discussed in chapters two and four. When required, such simultaneity will be acknowledged and invoked.

The antecedents and origins of Defence Construction Limited, as well as its early organizational history, are discussed in Chapter One, while the corporation's role in providing defence infrastructure for the Canadian military as part of the Korean War rearmament is examined in Chapter Two. The Mid-Canada Line is discussed in Chapter Three, and the Distant Early Warning Line in Chapter Four. Defence Construction's role in the building of refuelling bases for the United States Air Force's Strategic Air Command is evaluated in Chapter Five, along with the changing perceptions of the Soviet threat to North America that would have such profound effects on DCL's role in continental defence and the consequences of Diefenbaker's "Northern Vision" for the town of Frobisher Bay. Chapter Six examines DCL's participation in the last of the major air defence programmes built in Canada during the early Cold War, as well as its involvement in the joint Canadian-American reactions to the advent of the ballistic missile and the building of emergency government headquarters, including the highly publicized "Diefenbunker". The civilian government projects that drew on DCL's services between 1952 and 1965 are discussed in Chapter Seven, along with the substantial changes to the corporation and its bureaucratic environment that occurred in

obstacles to access due to its multinational nature, presenting yet further complications to the researcher. These NATO projects are interesting in a number of respects, however, and would merit further study.

the late 1950s and early to mid-1960s. Thus, the chapters convey the impression of DCL as a “jack of many trades” during fifteen years fraught with Cold War tension.

While addressing broad historiographical fields that include Crown corporations and Canadian business at large, the Canadian construction industry, Canadian defence policy, issues of economic development, sovereignty, and the northern expansion of the Canadian government policies and activities, this dissertation will focus on a number of more narrowly-defined major themes: the rationale for DCL’s creation and continued existence, DCL’s role in Canada’s relations with the United States and the two countries’ defence projects, and relationships between the government and the private sector. Special attention will be paid to the part played by DCL in facilitating these relationships and furthering the interests of the Canadian construction industry. The case study that should emerge from this is that of a very dexterous Crown corporation, one that moved with the ideological and national agenda. Originally created as a temporary entity to meet Ottawa’s limited initial needs for Cold War defence infrastructure, DCL soon assumed many more responsibilities. Military projects including extensive radar lines, command and control installations, and communications links required the corporation’s involvement, while its capabilities and the skills of its personnel also found a useful niche in civilian commitments ranging from foreign aid projects to a World’s Fair. While DCL was originally to have operated for only a few years after its inception in 1950, fifteen years later the corporation still existed. Not only was this a testimony to the organization’s ability to adapt, but it was also evidence the government had a need for an agency that could help provide military and, on occasion, civilian infrastructure. Defence Construction (1951) Limited, this dissertation will argue, had not only demonstrated its

utility in these fields, but also, more broadly, shown its worth as an instrument of government policy. Historiographically, it should no longer have to fly “under the radar.”

Chapter 1

Building the Foundations: The Origins and Early Administration of DCL

Defence and public works are two of the oldest functions of – and two of the oldest justifications for – government. Canada's experience has arguably held to this pattern. Historians have held that one of the primary driving forces for Confederation was the British belief that they could no longer protect their North American colonies, which should therefore provide for their own defence, while others have noted that the Act of Union of 1840 and Confederation in 1867 were intertwined with public works requirements and promises.¹ The exigencies of wartime, or even the threat of war, have often been used to justify greater efforts in these areas; Canadian territory is dotted with works put in place by governments seeking to defend their interests. Some of these remnants, like fortresses, are obviously military, but others, like the Rideau Canal, now seem quaint anachronisms or examples of bygone technology, even though the fundamental purpose driving their construction was the same.

The emergence of total war in the twentieth century helped further redefine the works necessary for a nation's defence. Now, in addition to physical defences, the modern factory and its supporting infrastructure, including railways, mines, and power plants, became essential elements of a nation's military effort. By the outbreak of the Second World War in 1939, a country's ability to mobilize economically – to provide weapons, equipment, and foodstuffs – became as important as its ability to mobilize

¹ J.L. Granatstein and Norman Hillmer, *For Better or for Worse: Canada and the United States to the 1990s*, (Toronto: Copp Clark Pitman, 1991), 2-4; P.B. Waite, *The Life and Times of Confederation, 1864-1867: Politics, Newspapers and the union of British North America*, (Toronto: Robin Brass Studio, 2001); Michael J. Piva, *The Borrowing Process: Public Finance in the Province of Canada, 1840-1867*, (Ottawa: University of Ottawa Press, 1992); Norman R. Ball, "Introduction," in *Building Canada: A History of Public Works*, Norman R. Ball, ed., (Toronto: University of Toronto Press, 1988), 3.

troops to fight battles. Production on the “home front” had become essential to a successful war effort. In Canada, the demand for war materiel was substantially different than it had been during the First World War; the complex, technologically-involved products that were required, including aircraft, motor vehicles, and electronics, stood in sharp contrast with the previous war’s foodstuffs, raw materials, shells, and wooden ships. Seeking a means to expedite and co-ordinate Canadian wartime production, in April 1940 the federal government created a Department of Munitions and Supply to oversee, organize, and facilitate the provision of munitions for the war effort.² By the end of the war, the department’s influence and wide-ranging powers had reached into many areas of Canada’s war effort and daily life on the home front. Among these areas was the provision of housing for workers in war industries and subsequently for veterans returning from the war. The organization that was created to meet these needs not only helped provide housing, but would later be used in the creation of another instrument of policy to help meet the Cold War defence requirements and broader socio-economic policy goals of the federal government in the postwar world.

Wartime Housing and the Origins of Defence Construction Limited, 1941-1950

The organizational history of Defence Construction (1951) Limited can be traced back to Wartime Housing Limited (WHL), one of twenty-eight Crown corporations

² J.J. Deutsch, “War Finance and the Canadian Economy, 1914-1920,” *The Canadian Journal of Economics and Political Science* 6:4 (November 1940): 537; Duncan McDowall, *Steel at the Sault: Francis H. Clergue, Sir James Dunn, and the Algoma Steel Corporation, 1901-1956*, (Toronto: University of Toronto Press, 1984), 59-68; Robert Bothwell and William Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland and Stewart, 1979), 132-179; J. de N. Kennedy, *History of the Department of Munitions and Supply: Canada in the Second World War, Volume 1*, (Ottawa: King’s Printer, 1950), 3-9.

created by the Department of Munitions and Supply during the Second World War.³

Under the authority of the department and its minister, Clarence Decatur Howe, WHL was given responsibility for the design and construction of housing for wartime munitions workers, and later, once the prospect of victory seemed plausible, for returning veterans and their families. While the provision of housing filled a social need, the primary motivation for the creation of WHL was economic and political – without housing for workers, Canada's war industries would not be able to meet production goals. Housing was also a significant area for government concern and control for broader reasons of social policy. The political, social and economic upheavals of 1919 had been largely the result of the effects of the First World War and its generally unplanned economy.⁴ In 1939, the Liberals were eager to avoid the inflation, poor urban conditions, and divisive conscription debate that had characterized the home front during the previous war. Better control of the economy, Ottawa policy makers and their advisors believed, would help avoid such conditions and prevent another round of postwar dislocation.⁵ Even before the outbreak of the war, Ottawa had already turned to housing as a "leverage point" in the Depression economy. The 1938 National Housing Act that attempted to promote employment and stimulate economic growth through a programme of loans for home improvements or the construction of new housing; although the results

³ Sandford F. Borins, "World War II Crown Corporations: Their Functions and Their Fate," in *Crown Corporations in Canada: The Calculus of Instrument Choice*, J. Robert S. Prichard, ed., (Toronto: Butterworths, 1983), 447.

⁴ See, for instance, Deutsch, "War Finance and the Canadian Economy, 1914-1920," 525-542, for one of the contemporary arguments that detailed planning and centralized direction was necessary to avoid the repetition of the economic problems caused by the First World War.

⁵ Principal Cyril F. James of McGill University, for instance, who chaired the Committee on Reconstruction established in 1941, feared a repetition of the postwar inflation and recession of 1919-1921. J.L. Granatstein, *Canada's War: The Politics of the Mackenzie King Government, 1939-1945*, (Toronto: Oxford University Press, 1975), 254-256. See also A.F.W. Plumptre, "Organizing the Canadian Economy for War," in *Canadian War Economics*, J.F. Parkinson, ed., (Toronto: University of Toronto Press, 1941), 1-16. For broader discussions of Canadian wartime policies, see Granatstein, *Canada's War*, Jeff Keshen, *Saints, Sinners, and Soldiers: Canada's Second World War*, (Vancouver, BC: UBC Press, 2004).

proved disappointing. The pressures and necessities of the national war effort, however, would be used to justify far more extensive government involvement in the field. Until the end of the war, they would also provide advocates of direct government intervention in the field with enough ammunition to overcome the opposition of senior bureaucrats who preferred a more *laissez faire* approach to the field.⁶

Housing for war workers was a vital requirement for the Canadian war effort, particularly given the consequences of the slump in housing construction and maintenance caused by straitened financial circumstances during the Depression which was followed by wartime overcrowding as Canadians seeking wartime employment and the families of servicemen moved to new locations.⁷ The locations of many of the new wartime factories contributed to housing shortages; the availability of land and access to transportation facilities for raw materials and finished products was often of greater importance than the supply of housing or public transportation for workers. Wartime rationing of gasoline and rubber, as well as the lingering consequences of the Depression made commuting by private motor vehicle impractical. Furthermore, government controls on materials and labour contributed to housing shortages by curtailing new construction.⁸

Despite the importance of housing for the war industries and the effects of overcrowding, WHL faced significant opposition. Municipal governments where the projects were built – or planned to be built – were worried about the long-term

⁶ John C. Bacher, *Keeping to the Marketplace: The Evolution of Canadian Housing Policy*, (Montreal & Kingston: McGill-Queen's University Press, 1993), 94-180.

⁷ Greig Stewart, *Shutting Down the National Dream: A.V. Roe and the Tragedy of the Avro Arrow*, (Toronto: McGraw-Hill Ryerson, 1997), 16; Jill Wade, "Wartime Housing Limited, 1941-1947: Canadian Housing Policy at the Crossroads," *Urban History Review* 15:1 (June 1986): 44; Bacher, *Keeping to the Marketplace*, 125-129; Keshen, *Saints, Sinners, and Soldiers*, 76-79.

⁸ Annmarie Adams, Jennifer Beardsley, and Pieter Sijpkes, *Ville St-Laurent Revisited: Wartime Housing and Architectural Change, 1942-1992*, 14; Wade, "Wartime Housing Limited," 44.

consequences of the housing turning into slums, while private sector builders saw the corporation as unwarranted interference by the government and a potential threat to their postwar livelihood. These and other factors shaped WHL's projects and the housing they provided, most notably through the requirement that they be removed following the war. Derived from this requirement was the use of "demountable" construction, intended both to speed the building of the houses and to facilitate their postwar dismantling. Although many of the resulting houses were therefore supposed to be "temporary," postwar housing demand made them available to former tenants and to others. Based on a limited range of plans, and designed to make efficient use of construction materials, the easily identifiable "wartime houses" and their postwar successors have consequently remained a feature of many Canadian towns and cities to this day. Wartime Housing Limited therefore came to serve changing goals in its role as an instrument of government policy. Originally created to help house wartime workers, it was later used to provide housing for returning veterans and their families. In both instances, however, these goals served broader government policies – the successful conduct of a national war effort, followed by the conversion to a prosperous and stable postwar economy – in addition to addressing immediate housing shortages.

Canada entered the war in a housing crisis caused in large part by the Depression; the war simply exacerbated a marginal situation. To further complicate matters, the existing stock of rental housing was also deteriorating, in part because of deferred maintenance during the Depression and also because of widespread overcrowding. This deterioration would contribute to both wartime and postwar housing shortages.⁹

⁹ Wade, "Wartime Housing Limited," 42-44. In the 1930s the federal government had begun to address this situation with legislation culminating in the 1938 National Housing Act, but, later critics have argued, the

Following the outbreak of war, the situation soon became critical. At the beginning of 1941, a survey revealed that over thirty-five percent of all major urban centres had no vacant accommodation at all, and that fewer than one in ten such centres had vacancy rates of over three percent, which was considered normal at that time. There was little private interest in meeting this demand because it was felt that the shortage would not outlast the war, while rent controls imposed by the federal government's Wartime Prices and Trade Board (WPTB) further discouraged investors. Canadians' inclination to embrace the state, usually in the form of Crown corporations, often increases at such times when private initiative is stifled by macroeconomic roadblocks. As a result, government intervention was seen as necessary, and, as the official history of the Department of Munitions and Supply notes, "as the shortage was due mainly to the expanding munitions programme, it was decided that the problem should be dealt with by the Department of Munitions and Supply, and any losses incurred should be chargeable as a war expenditure."¹⁰

The result was the creation on 28 February 1941 of Wartime Housing Limited. At the suggestion of the Economic Advisory Committee, a group of senior civil servants who oversaw and advised Cabinet on economic and financial issues, it was formed as a Crown corporation.¹¹ WHL joined what would ultimately be almost thirty other wartime

relatively few people who benefited from these programmes – which included loans for home improvements or the construction of new dwellings – were not those most in need of such assistance. Bacher, *Keeping to the Marketplace*, 94-119.

¹⁰ Kennedy, *History of the Department of Munitions and Supply, Volume 1*, 480.

¹¹ The Advisory Committee on Economic Policy, to give the EAC's proper name, was an acknowledgement of the close relationship between financial and economic measures taken by the government. The committee was composed of senior civil servants, and was intended "to facilitate the work of Cabinet committees responsible for supervising policy in supply and war finance, ...to help avoid duplication of effort by departments and agencies, and ...to ensure effective co-ordination of economic and financial policy." J.L. Granatstein, *The Ottawa Men: The Civil Service Mandarins, 1935-1957*, (Toronto: Oxford University Press, 1982), 159.

companies that were the responsibility of DMS. Created under the authority of the War Measures Act and the Department of Munitions and Supply Act, WHL's duty was to advise DMS of housing needs, to construct housing to fill such needs, and to set up the necessary local administration for such housing when it was constructed.¹² The structure of a Crown corporation offered advantages over the regular departmental structure; not only did it simplify cooperation with municipalities, where the business and regulation of home building was focused, but it also produced an organization more closely linked to DMS and its imperative requirements for worker housing.¹³ Although WHL projects had implications for social policy, and some historians and commentators have discussed it in this light, the government's motivation was economic – the expedient provision of housing for war workers would contribute to the expansion of Canada's war effort. It was also not the only means by which the federal government directly intervened in the housing market during the war; rent controls, along with regulation of building materials and labour affected the provision of housing for Canadians.¹⁴

While on-site barracks were considered as a solution to the housing shortage, and were used for single workers, concerns about morale, productivity, turnover, and fire safety led planners to consider solutions more in keeping with "conventional" housing; alternately, such concerns may have been used to justify a pre-existing preference for the individual, free-standing dwelling. Individual houses were also in keeping with a conservative outlook on family housing shared by many. Left unspoken in this process was the assumption that a "home" was a stand-alone entity and that row-housing

¹² Wade, "Wartime Housing Limited," 44; Kennedy, *History of the Department of Munitions and Supply, Volume I*, 480-481.

¹³ Borins, "World War II Crown Corporations," 458.

¹⁴ Wade, "Wartime Housing Limited," 44-46; Keshen, *Saints, Sinners, and Soldiers*, 75, 81-85.

smacked of working-class subsistence.¹⁵ As J.M. Piggott, president of WHL noted, “there was a definite limit to the economies that might be practiced at the expense of appearance. The housing projects had to be sufficiently attractive to meet public approval, otherwise we faced unending trouble securing locations.”¹⁶ WHL undertook studies to determine the most suitable standardized type of house or houses for construction in Canada. Designs would have to balance attractiveness, living conditions, cost, and use of materials. Rents would also have to be affordable; all too often, spending on food and clothing was cut back in order to pay for housing.¹⁷ In the process of supplying worker accommodations, Wartime Housing was responsible for acquiring land and obtaining local government approval, as well as for planning and house designs. The construction itself, however, was contracted out.¹⁸

Based on earlier research, WHL developed a prefabricated system for the design and construction of its houses. The four standardized designs were built on cedar posts with a simple hot air heater, cupboards and closets without doors, and basic lighting fixtures with pull-string switches.¹⁹ Prefabrication and economies of scale were expected to make such designs more economical to construct, as well as reducing construction time. Ease of disassembly of the houses was also promoted, and they were often referred

¹⁵ On these underlying assumptions, see, amongst others, Harris, *Creeping Conformity*, 33-45. For some, however, ideological and economic imperatives could overcome such objections; Deputy Minister of Finance W.C. Clark supported the use of workers' barracks in order to minimize costs, to decrease the dislocation caused by the influx of workers, and to facilitate the re-establishment of pre-war population distributions following the war. Bacher, *Keeping to the Marketplace*, 123. Keshen observes that earlier, in 1940, Clark had dismissed the demands of Canadian mayors for federal funds for emergency low-cost housing, arguing that the war effort required that Canadians accept “an increasing amount of ‘doubling up’ and overcrowding.” Keshen, *Saints, Sinners, and Soldiers*, 79. Clark, it must be concluded, chose to emphasize the “wartime” rather than the “housing” part of WHL’s name.

¹⁶ Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 21-22.

¹⁷ Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 14-18.

¹⁸ Borins, “World War II Crown Corporations,” 457-458.

¹⁹ In the case of the smaller of the two house designs used in Ville St. Laurent, for example, the heater was simply a coal stove. Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 17-18, 24, 81-82, 135.

to as “demountable” instead of “prefabricated”. Disassembly would not only allow the construction materials to be salvaged after the war, but would also allow the houses to be rebuilt elsewhere. Private builders welcomed this feature, since they were concerned that permanent wartime houses might flood the postwar housing market. They were reassured by WHL that housing would be built only for defence projects, and that it would be removed within a “reasonable time” after the end of the war. Arrangements for the postwar removal of houses were made with municipalities, who were also concerned about the longer-term implications of WHL houses. There was apprehension, some of it based on American experiences, that the housing might deteriorate into slums, but its deliberately temporary “demountable” nature helped allay those fears.²⁰ American problems with worker housing definitely provided observers with reasons for concern. The inadequate provision of worker housing at Ford’s giant Willow Run aircraft plant in Michigan, for instance, had led to conditions that rivaled nineteenth-century urban slums and that resulted in a national scandal in addition to an employee turnover rate of over one hundred percent a month in early 1942.²¹ Neither outcome was particularly desirable, especially since employee turnover could greatly limit the productivity of wartime industry.

In some ways, historians have noted, WHL’s mandate was contradictory. While it had to satisfy concerns from private-sector builders and local governments that its buildings would be temporary – the “demountable” label was part of the response to these

²⁰ *Ibid.*, 18-21, 139.

²¹ The opposition to public housing programmes for the workers at Willow Run – both by Henry Ford and by local business, civic, and government groups – only served to exacerbate the situation. Margaret Crawford, “Daily Life on the Home Front: Women, Blacks, and the Struggle for Public Housing,” in *World War II and the American Dream*, Donald Albrecht, ed., (Cambridge, MA: MIT Press, 1995), 114-119. For a more general overview of the issue of worker housing in the United States during the Second World War, see Crawford, *passim*, 90-143.

concerns – it also had to provide its tenants, or at least those in the individual family houses, with a sense of permanence and stability in their accommodations, a difficult task with standardized temporary housing. Some of WHL's solutions in this area, recent commentators have noted, established a precedent for postwar private sector developments where planners wanted to meet many of the same objectives – making standardized, cost-saving designs look different, making them seem part of their surroundings, and how to turn farmland into appealing developments.²² After the war, shrewd private sector leaders like E.P. Taylor and his Argus Corporation capitalized on this experience and on their own time as “dollar-a-year” men in Ottawa to bring these implications of wartime housing policy home to roost in the Keynesian postwar economy. Taylor's Don Mills development would be Canada's first taste of this comfortable suburban life.²³

While the modular and temporary nature of WHL house construction offered theoretical advantages in cost and speed of construction, in practice it proved to be more expensive than similar houses built using more conventional methods. The quick-to-

²² Part of the latter goal was accomplished through variations in plans and finishes of the houses, as well as in the planning and layout of developments. Where possible, street layouts avoided the use of a simple grid. WHL's house designs were conventional in appearance and locations on their lots, which also reflected the concerns of the designers for sanitation, ventilation, and natural light. The provision of large lots, fresh air, and green space for tenants was also to some degree intended to offset the consequences of living in temporary wartime housing, and also allowed them to grow food in “Victory Gardens”. Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 14, 22-25, 139-142.

²³ Michael Bliss, *Northern Enterprise: Five Centuries of Canadian Business*, (Toronto: McClelland and Stewart, 1987), 466-469; Richard Harris, *Creeping Conformity: How Canada Became Suburban, 1900-1960*, (Toronto: University of Toronto Press, 2004), 136-141; The archetype of postwar suburban development was, of course, Levittown, near Hempstead, Long Island. For an overview of Levittown, see, amongst others, David Halberstam, *The Fifties*, (New York: Villard Books, 1993), 131-143; Kenneth T. Jackson, *Crabgrass Frontier: The Suburbanization of the United States*, (New York: Oxford University Press, 1985), 234-245. For a more critical view of Levittown, particularly the degree to which the development process deliberately imposed a wide variety of costs on local municipalities, see Dolores Hayden, *Building Suburbia: Green Fields and Urban Growth, 1820-2000*, (New York: Pantheon Books, 2003), 132-137. Well worth noting is Bill Levitt's wartime experience as a builder of workers' homes, which was not only a parallel with WHL's wartime role but which led him to fundamentally change the approach to house construction that had previously been used. Halberstam, *The Fifties*, 132-133; Hayden, *Building Suburbia*, 133-134.

assemble and disassemble panel system, which required expensive fasteners and extra material to be used at its joints, increased costs, although it did speed up erection of the houses on their sites. "Demountable" construction was perhaps more successful in meeting its political goals of acceptance by private sector housing contractors and local politicians. Postwar, housing construction would return to more conventional methods, and prefabrication did not re-emerge until much later. WHL projects also seemed to theoretically offer the advantages of scale, but at a time when building materials were tightly controlled there was little benefit from buying them in bulk. The absence of proper foundations also contributed to the premature deterioration of framing in houses, which presented problems when ostensibly "temporary" houses were made "permanent" after the war. WHL also scrimped on roof framing, a cost-cutting measure which would return to bother postwar occupants.²⁴ Thus, WHL was an example of wartime expediency, efficient and timely in some senses, but shoddy in other, longer term ways.

The pressure of wartime and WHL's independent status also prompted and facilitated such expediency. In favourable conditions, planning and construction could progress quite rapidly; in the case of Ville St-Laurent, developed to provide housing for workers at the new aircraft plant for Canadian Vickers (later Canadair) and other local war industries, less than a year elapsed between the establishment of the new aircraft factory and the completion of the first of the houses for its workforce.²⁵ Such an achievement did, however, place a premium on organization and here too a state-mandated Crown corporation enjoyed the commanding heights. In order to organize and

²⁴ James McKellar, "Building Technology and the Production Process," in *House, Home, and Community: Progress in Housing Canadians, 1945-1986*, John R. Miron, ed., (Montreal and Kingston: McGill-Queen's University Press, 1993), 140-143; Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 138-139.

²⁵ Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 147, 27-28; Ron Pickler and Larry Milberry, *Canadair: The First 50 Years*, (Toronto: CANAV Books, 1995), 20-21, 29.

co-ordinate these tasks, WHL adopted a decentralized structure, which its foremost chronicler has described as functioning “more like a large independent builder in the private sector than a federal housing agency.”²⁶ Strong central authority allowed WHL to be nimble and decentralized in the actual exercise of its activities. This structure was mirrored in its board of directors, which represented architects, business, and labour, and in its president, Joseph M. Piggott, a Hamilton contractor, who reported directly to C.D. Howe. As has often been suggested, Howe loved this kind of delegation – a strong, centrally-imposed mandate coupled with a tremendous degree of day-to-day autonomy. Results were what mattered. As a reflection of this decentralization and autonomy, WHL’s head office was located in Toronto, but by 1945 fifty-one branch offices were supervising work in seventy-three separate municipalities.²⁷

The primary intended tenants of WHL houses were workers considered essential to the war effort. As the war progressed, however, service personnel returned from general service, their dependents, and the dependents of those serving outside Canada or who had been killed on active service, were also given consideration. Despite these criteria, there was such a strong demand for WHL housing that eligibility had to be determined by a merit point system. WHL charged relatively steep rents, but most of its tenants had war industry jobs that were steady and well-paying, although if they lost their jobs they would also be evicted. In many cases they had few other housing options.²⁸ In

²⁶ Wade, “Wartime Housing Limited,” 44.

²⁷ *Ibid.*, 44-45; Bothwell and Kilbourn, *C.D. Howe*, 114-115; Peter C. Newman, *The Canadian Establishment, Volume One*, (Toronto: McClelland and Stewart, 1975), 326-329. Piggott was a very successful Hamilton contractor who had also been president of the Canadian Construction Association from 1923-1924. *The Canadian Who's Who, Volume X: 1964-1966*, (Toronto: Trans-Canada Press, 1966), 878.

²⁸ Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 25, 142. Bacher also points out that while WHL’s pragmatism led to the creation of rental housing that was moderate in cost and had a full range of community support services – a product with broader social implications – the housing provided by the corporation was segregated, with separate quarters for “coloured” and Chinese single male workers.

addition to rent, tenants were responsible for paying water, gas, and electricity charges. For its part, WHL paid the city or municipality an annual sum for use of the land and to maintain utilities services and hookups. In return for these payments, the city agreed not to tax the tenants of the houses.²⁹ In short, WHL housing was intended to be a going, viable economic entity, not a welfare palliative. It was intended to pay its way, while at the same time alleviating a crucial bottleneck in the wartime economy – housing the economic combatants on the home front.

Providing housing for these people was indeed an urgent and substantial requirement, which was reflected in WHL's output.³⁰ By the time the last wartime house for munitions workers was completed in late 1944, WHL had built 17,910 houses, a large number of staff houses, as well as schools, fire halls, pump houses, garage and office buildings, community halls and administration buildings. In a foreshadowing of one of its future roles, it had also acted as a contractor for other government departments requiring similar sorts of temporary construction.³¹ By this time, however, WHL found itself involved in other wartime housing exigencies as well.

May of 1944 marked the turning point for housing policy from the provision of housing for war workers and their families to the provision of housing for returning veterans and their families. The threat of mass evictions in the spring of 1944 left numerous tenants across Canada, many of whom were the dependents of military personnel serving overseas, facing an unpleasant future. Instead of altering rental regulations, however, the federal government chose to expand and alter WHL's housing

Similarly, the "staff houses" for single female workers were a low priority item. Bacher, *Keeping to the Marketplace*, 133.

²⁹ Adams, Beardsley, and Sijpkes, *Ville St-Laurent Revisited*, 26.

³⁰ Wade, "Wartime Housing Limited," 42, 44.

³¹ Kennedy, *History of the Department of Munitions and Supply, Volume 1*, 484.

construction activities to provide housing for servicemen's families that would be more permanent and of better quality than the housing provided for war workers. WHL had demonstrated its utility as an instrument of policy by equipping the government with a flexible means of responding to a wartime housing crisis that changed its complexion as the war progressed. With such a tool at its disposal, Ottawa could make adjustments to changed housing demands with a few commands from C.D. Howe.³²

The provision of affordable housing was to be a vital element of post-war economic planning. Indirect intervention took the form of new legislation that encouraged home ownership and the construction of rental housing, and the Veterans Land Act (VLA) that provided assistance to veterans purchasing housing and land.³³ Mindful of its success hitherto in the war, post-war plans for the veterans involved direct intervention through WHL, the VLA administration, price controls, and other administrations and plans. With the exception of the VLA undertakings, these operations would be consolidated in the Central Mortgage and Housing Corporation (CMHC) in 1946-47.³⁴ If CMHC was to be the command post for postwar housing, WHL would become involved in the considerable task of providing housing for returning veterans and their families – Ottawa's builder of homes.

By 1944, it had become apparent that returning veterans would create housing shortages similar to those caused by wartime industrial expansion. The 1944 housing study produced by the Advisory Committee on Reconstruction, also known as the Curtis

³² The problem of spring evictions was made particularly acute by October 1943 WPTB regulations that effectively forbade wintertime evictions. Wade, "Wartime Housing Limited," 44-46.

³³ For a recent discussion of the Veterans' and Act, see Richard Harris and Tricia Shulist, "Canada's Reluctant Housing Program: The Veterans' Land Act, 1942-75," *Canadian Historical Review* 82:2 (June 2001): 253-282.

³⁴ Wade, "Wartime Housing Limited," 46; Harris and Tricia Shulist, "Canada's Reluctant Housing Program," 265.

Report, argued that the total demand that had accumulated between 1939 and 1945 for urban housing stood at 500,000 units, with low and medium income tenants having the greatest need.³⁵ Coupled with the housing shortfall that had built up during the Depression years, the anticipated demobilization of some 620,000 veterans between June 1945 and June 1946 would only worsen the housing shortages in Canada.³⁶

WHL, with its experience in providing housing for munitions workers, was the obvious choice to deal with this situation. The corporation now began to produce plans for permanent houses on permanent foundations which would become part of the community. The houses were to be inexpensive enough that returning veterans could afford the rent, and while the initial demand was for housing in Ontario and Quebec, the demand had shifted by 1945 to the prairie provinces, where, incidentally, very few munitions workers' houses had been built. By the end of the year, WHL had completed or was building almost 8,000 houses for returning veterans, with demand for housing continuing to be heavy.³⁷ The 1945 increase was driven in part by another threat of mass evictions of tenants. Once again, WHL had again been called upon to help alleviate the housing shortages, with Howe ordering a threefold increase in the production of housing in late July.³⁸

By 1945 the war – in Europe, at least – was visibly drawing to an end, and the federal government sought to outline what had been done and what would be done about

³⁵ Wade, "Wartime Housing Limited," 42-44; Keshen, *Saints, Sinners, and Soldiers*, 85-86. The study in question is Canada, Advisory Committee on Reconstruction, Subcommittee on Housing and Community Planning, *Final Report of the Subcommittee, March 24, 1944*, (Ottawa: King's Printer, 1946). While the study was written by sociologist Leonard Marsh, who had earlier written the *Report on Social Security for Canada*, the report was named after the subcommittee chair, C.A. Curtis. *Ibid*, 56, n.4; Granatstein, *Canada's War*, 255-262.

³⁶ Wade, "Wartime Housing Limited," 42; Keshen, *Saints, Sinners, and Soldiers*, 85-86.

³⁷ Kennedy, *History of the Department of Munitions and Supply, Volume 1*, 484.

³⁸ Bacher, *Keeping to the Marketplace*, 173-176.

the matter of postwar reconstruction. Ottawa's outline of its postwar economic policy was outlined in the April 1945 booklet *Employment and Income, with Special Reference to the Initial Period of Reconstruction*, commonly referred to as the *White Paper on Employment and Income*, or simply the 1945 *White Paper*.³⁹ The *White Paper* mentioned housing as part of its discussion of private investment in the final stages of the war and after the conflict. A clear but unspoken implication of the *White Paper* was that postwar housing would be a matter for private investment; its discussion of the issue made no mention of direct government involvement.⁴⁰ An organization like Wartime Housing Limited, therefore, would seem to have no place in such arrangements.

By 1945, the Canadian government had given its citizens solid proof that one of their fundamental social needs – housing – had not gone unheeded in the war. If, in the First World War, Canadian workers had been left to fend for themselves, during the Second World War some Canadian workers had seen the state put a roof over their heads so that they could “do their bit” for the war economy. In meeting this challenge, Ottawa had discovered that a Crown corporation – strongly endowed with central authority and managed in a flexible and decentralized manner – was the most expedient way to proceed. Not surprisingly, some officials in Ottawa could not resist the temptation of applying this wisdom, and WHL, to the challenge of peacetime housing. In May of 1945,

³⁹ Granatstein, *Canada's War*, 277-278; Granatstein, *The Ottawa Men*, 166-168; W.A. Mackintosh, “The White Paper on Employment and Income in its 1945 Setting,” in *Canadian Economic Policy Since the War: A series of six public lectures in commemoration of the twentieth anniversary of the “White Paper” on Employment and Income of 1945*, S.F. Kaliski, ed., (Montreal: Canadian Trade Committee, 1966), 9-21. See also a useful and concise discussion of plans for postwar reconstruction in Bellamy, *Profiting the Crown*, 61-65.

⁴⁰ Canada, Department of Reconstruction, *Employment and Income, with Special Reference to the Initial Period of Reconstruction*, (hereafter *White Paper on Employment and Income*) (Ottawa: King's Printer, 1945), 10-12. In 1965, Mackintosh, who had drafted the original version of the paper, noted some twenty years later that military planners had expected that the war against Japan would last for some eighteen months following the defeat of Germany, which explains the references such as “the first full construction year following the end of the European war,” or, more commonly, “Stage II” of the war. Mackintosh, “The White Paper on Employment and Income,” 17.

for instance, WHL's President, J.M. Piggott, had suggested that the company could be used to provide low cost housing for returning veterans and other Canadians, and the ministers of Finance and of Reconstruction and Supply had discussed and rejected such an approach.⁴¹ This decision reflected the beliefs of elements of the private sector and senior officials within the government who were opposed to public involvement in the provision of housing. The latter, concentrated in the Department of Finance, and including Deputy Minister W.C. Clark, began to work on plans that would encourage private investment in housing at the expense of government involvement, and which culminated in the creation of the Central Mortgage and Housing Corporation (CMHC) in 1946.⁴²

In the meantime, Wartime Housing Limited continued to build to meet the demand for veterans' housing, and became part of CMHC in the 1946-47 fiscal year, as did the National Housing Administration and the Central Mortgage Bank. On 1 April, CMHC came under the notional authority of C.D. Howe in his duties as Minister of Reconstruction. The Department of Finance, however, retained actual control of CMHC since it had the majority of seats on the corporation's executive board. According to D.B. Mansur, CMHC's first president, Howe consolidated WHL with CMHC because the former "wasn't doing very well," although in these reminiscences Mansur did not elaborate any further. His description was almost certainly coloured by his fundamental hostility to direct government involvement in the provision of housing and his central

⁴¹ Wade, "Wartime Housing Limited," 42.

⁴² Bacher, *Keeping to the Marketplace*, 176-180; Wade, "Wartime Housing Limited," 54. Clark had been vice-president of an American-owned real estate investment firm, and in commenting on his Depression-era opposition to government housing projects, Jeff Keshen notes that he "clearly favoured private enterprise over publicly assisted housing.... His strong belief, shared by many in government, was that ownership of private property was a social good because its acquisition forced people to work hard and save, whereas subsidized public accommodation encouraged lethargy." Keshen, *Saints, Sinners, and Soldiers*, 75.

role in the creation of the CMHC. Regardless of how well WHL may or may not have been doing at the time, Howe had been planning the eventual liquidation of the company, which made its consolidation with the new organization almost certain.⁴³

In the process, CMHC acquired WHL's assets, buildings, and employees.⁴⁴ CMHC took over 14,486 wartime houses at a nominal value of \$100 each. On average, \$785.24 was spent to make them permanent before they were put up for sale, and by 31 May 1950 4,831 had been sold for a total of \$12,939,916.31.⁴⁵ A large part of making the houses permanent involved remedying the legacy of wartime expediency through the building of new foundations to replace the cedar posts supporting the original structures, but the priority assigned to new house construction meant that in some cases there were considerable delays before proper foundations were provided for the "temporary" wartime houses. To meet the continuing demand, in addition to the 25,000 WHL houses, CMHC built a further 20,000 veterans' houses.⁴⁶

At this point, WHL would seem to have disappeared. The charters for the veterans' housing companies in Toronto and Ottawa, incorporated in May 1945, were surrendered in December 1948, and the assets and personnel of WHL had been taken over by CMHC.⁴⁷ Even if it had for all intents and purposes ceased to exist, WHL had

⁴³ Kennedy, *History of the Department of Munitions and Supply, Volume 1*, 488; Bacher, *Keeping to the Marketplace*, 175-180; Wade "Wartime Housing Limited," 54. In his work on preparing a draft bill for the creation of CMHC, for instance, Mansur had argued that the corporation would measure its success "by the amount of activity not undertaken" by government agencies "in the public housing field," with its "primary duty" being "one of finding ways and means for private enterprise to look after needs in the economic field." Borins, "World War II Crown Corporations," 463; D.B. Mansur, "A Sense of Mission," http://www.cmhc-schl.gc.ca/en/About/hiry/hiry_002.cfm, accessed 28 April 2005. Mansur's comments on the "primary duty" of the CMHC are quoted in Bacher, *Keeping to the Marketplace*, 177.

⁴⁴ Mansur, "A Sense of Mission."

⁴⁵ House of Commons, *Debates*, 28 June 1950, 4253-4254.

⁴⁶ Adams, Beardsley, and Sijpkens, *Ville St-Laurent Revisited*, 29; Mansur, "A Sense of Mission."

⁴⁷ See materials in the file "Veterans Housing Project (Toronto) Limited," LAC, RG83, vol. 71; and "Veterans Housing (Ottawa) Limited" LAC, RG83, vol. 71. For the wrapping up of the two corporations, see "Minutes of a Special Meeting of the Shareholders," 15 December 1948, LAC, RG83, vol. 71, file

left a lasting impression on the Canadian landscape. Its wartime houses, and CMHC's veterans' houses, were built across Canada and even though postwar renovations may have changed the size and shape of the buildings, their basic structure is often still identifiable. The "wartime house" and its closely-related postwar kin remain an identifiable part of many Canadian communities, and a lasting reminder of WHL.⁴⁸ Despite its apparent descent into oblivion, however, Wartime Housing Limited's charter was not surrendered, and following the outbreak of the Korean war in 1950 C.D. Howe would take advantage of this situation to create Defence Construction Limited.

Wartime Housing Limited created a lasting impression that extended beyond its material legacy in other ways. The corporation also left a legacy as an instrument of state policy. Its brief period of active existence had demonstrated the ability of a Crown corporation to expeditiously address a crisis; comparable conclusions could be drawn from the careers of many of Munitions and Supply's other wartime "Crowns."⁴⁹ WHL's career as an instrument of policy had demonstrated its utility as a means of attaching the central authority of the state to a flexible means of getting things done. In the future, when similar crises and opportunities presented themselves as a consequence of the Cold War, Ottawa, and C.D. Howe in particular, would again turn to Crown corporations as a tool to help meet policy goals.

"Veterans Housing Project (Toronto) Limited"; Minutes of a Special Meeting of the Shareholders, 15 December 1948, LAC, RG83, vol. 71, file "Veterans Housing (Ottawa) Limited".

⁴⁸ Wade, "Wartime Housing Limited," 48; McKellar, "Building Technology and the Production Process," 140-141; Adams, Beardsley, and Sijpkes, *Ville St-Laurent Revisited*, 6.

⁴⁹ Borins, "World War II Crown Corporations," 447-460.

Defence Construction Limited and Defence Construction (1951) Limited

The few years between the end of the Second World War and the outbreak of war in Korea were marked both by increasing postwar prosperity following the austerity and restraint of wartime and by the increasing East-West tensions of the Cold War. By the end of the war in August of 1945, the demobilization of the Canadian military and the reconversion of the country's economy to a peacetime was well underway. A Committee on Reconstruction had been created in early 1941. It was later weakened and supplanted by another entity more responsible to the mandarins of the Economic Advisory Committee, while an inter-departmental committee on post-hostilities problems intended to consider "Canada's place in the postwar world" had been established in 1943. Furthermore, as noted above, in April of 1945 the Liberals had released a white paper on employment and income, setting forth plans for the reconstruction of the economy once the war had been won. Towards the end of the Second World War and in the early postwar period, Ottawa's emphasis had therefore been on reconstruction – a return to civilian life, while avoiding a return to the Depression of the 1930s or a repetition of the economic dislocations that followed the First World War.⁵⁰ While the postwar Canadian economy boomed, driven by wartime savings and deferred demand dating back to the outset of the Depression, the nation's military strength and expenditures fell precipitously. Prime Minister William Lyon Mackenzie King's oft quoted remark in late 1946 that "what we needed now was to get back to the old Liberal principles of economy,

⁵⁰ *White Paper on Employment and Income*; Granatstein, *Canada's War*, 254-278; John W. Holmes, *The Shaping of Peace: Canada and the Search for World Order 1943-1957, Volume I*, (Toronto: University of Toronto Press, 1979), 25, 107; Granatstein, *The Ottawa Men*, 167-168; Bothwell and Kilbourn, *C.D. Howe*, 180-196.

reduction of taxation, anti-militarism, etc.” epitomized both his attitudes towards military spending and those of a number of other senior government officials⁵¹

Despite the downturn in defence expenditures in both Canada and the United States, planning and some basic arrangements for continental defence were made. The wartime Permanent Joint Board on Defence (PJBD) continued its operations, and a “Canadian-United States Military Co-operation Committee” (MCC) was formed in May of 1946 as a joint planning staff for defence issues.⁵² The MCC created a “Basic Security Plan” that included an ambitious and ultimately unbuilt draft “Air Interceptor and Air Warning Plan” for the aerial defence of the North American continent. Continuing cooperation in this field was evidenced in February of 1947, when the American and Canadian governments issued a “Joint Statement on Defense Collaboration,” derived from an earlier PJBD recommendation on the subject, that emphasized the continuing importance of co-operative defence planning and ongoing efforts.⁵³ Finally, beginning in 1948, the Canadian government began to undertake a rearmament programme, focusing on the expansion of the Royal Canadian Air Force (RCAF) and the maintenance of an aircraft industry that would meet defence requirements and provide employment in new high-technology fields.⁵⁴

⁵¹ Kenneth Norrie, Doug Owsram, and J.C. Herbert Emery, *A History of the Canadian Economy*, (Scarborough, ON: Nelson, 2002), 374-377; James Eayrs, *In Defence of Canada, Volume III: Peacemaking and Deterrence*, (Toronto: University of Toronto Press, 1972), 92. On the postwar decline in military strength and defence expenditures, see *ibid.*, 75-99. Among those sharing King’s view was Douglas Abbott, who had recently become Minister of Finance.

⁵² Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987), 14-17.

⁵³ *Ibid.*, 17-20, 28-29; David Bercuson, *True Patriot The Life of Brooke Claxton, 1898-1960*, (Toronto: University of Toronto Press, 1993), 154-158.

⁵⁴ Lawrence Aronsen, “‘A Leading Arsenal of Democracy’: American Rearmament and the Continental Integration of the Canadian Aircraft Industry, 1948-1953,” *The International History Review*, 13:3 (August 1991): 483-485. On the broader issue of the RCAF, postwar fighter procurement, and the building up of a domestic military aircraft manufacturing industry, see Randall Wakelam, “Flights of Fancy: RCAF Fighter Procurement, 1945-1954,” (M.A. thesis, Royal Military College of Canada, 1997).

These continental defence measures were driven by the emergence of the Cold War and growing East-West tensions. Allied relations with the Soviet Union had already begun to break down towards the end of the Second World War, and the revelations of Soviet wartime espionage operations in Canada and the United States by Igor Gouzenko, a Soviet intelligence officer who defected in Ottawa in early September of 1945, only added to the growing tensions.⁵⁵ Stalin's abandonment of his largely conciliatory wartime posture, coupled with the creation of a Soviet "buffer zone" of satellite countries in eastern Europe, fears that France or Italy might become communist countries, and the 1948 coup in Czechoslovakia that installed a Communist government all reinforced many peoples' perceptions and concerns that the Soviet Union was both hostile and expansionist.⁵⁶

One of the responses to such concerns was the creation of the North Atlantic Treaty Organization (NATO). Following the Second World War, Canada was worried that the US was again becoming isolationist. Coupled with the inability of the war-weakened UK and France to resume their prewar international influence, this presented an unpleasant picture for Canadian government officials. The solution, they thought, involved an alliance of democratic countries on both sides of the Atlantic which would commit the US to involvement in world affairs while at the same time protecting western Europe from Soviet attack. Historians of Canadian foreign policy have often portrayed this initial post-war decade as a "golden age" of the country's diplomacy, one in which Canada fulfilled certain functions in the free world, one of which was the cementing of

⁵⁵ Hillmer and Granatstein, *Empire to Umpire*, 181-190. Friedman, *The Fifty Year War*, 43-56.

⁵⁶ Hillmer and Granatstein, *Empire to Umpire*, 199-205; Eayrs, *In Defence of Canada, Volume IV*, 20-30, 38-62; Friedman, *The Fifty-Year War*, 57-73.

defensive alliances.⁵⁷ Initial Canadian pronouncements on this issue in the fall of 1947 were followed by secret talks with the British and Americans, and by formal negotiations for a larger alliance by late 1948. The NATO treaty was signed on 4 April 1949, but little was to come of it for more than a year.⁵⁸

In the meantime, events and Soviet actions reinforced the concerns of many, including North American decision makers. The testing of the first Soviet atomic bomb at the end of August 1949 put an end to America's atomic monopoly, and the successful Soviet reverse-engineered copy of the American B-29 strategic bomber (the Tupolev Tu-4, which made its first public appearance in August 1947) led to growing worry about the threat of aerial attack on North America.⁵⁹ Unlike the previous two world wars, technology had conspired to make North America a potential battlefield in any future conflict. The victory of Communist forces under Mao Zedong in China after a lengthy civil war and the declaration of the People's Republic of China on 1 October 1949 only served to confirm the apprehensions of many Americans about communist expansionism; the Canadian reaction was more ambivalent.⁶⁰

⁵⁷ Hillmer and Granatstein, for example, refer to the Canadian actions during the Suez Crisis as "Pearson's Shining Hour." Hillmer and Granatstein, *Empire to Umpire*, 222-238.

⁵⁸ *Ibid.*, 198-205; Eayrs, *In Defence of Canada, Volume IV*, *passim*; John Hilliker and Donald Barry, *Canada's Department of External Affairs, Volume II: Coming of Age, 1946-1968*, (Montreal and Kingston: McGill-Queen's University Press, 1995), 75-78.

⁵⁹ Eayrs, *In Defence of Canada, Volume III*, 358; Steve Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 5-18; Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Air Force History Support Office, 1991), 57, 130-131; Friedman, *The Fifty Year War*, 116. Schaffel credits the Tu-4 with a greater range than Zaloga, but the latter's figures are probably more accurate due to his much greater access to Russian and former Soviet sources. In early 1951 discussions of the Pinetree line, for instance, the Tu-4 threat was invoked by Brooke Claxton both in Cabinet and in Parliament. Cabinet Conclusions, 24 January 1951, 16, LAC, RG2, series A-5-a, vol. 2647; Canada, House of Commons, *Debates*, 5 February 1951, 91.

⁶⁰ Friedman, *The Fifty-Year War*, 91-101; Hilliker and Barry, *Canada's Department of External Affairs, Volume II*, 55-56; John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, (Montreal & Kingston: McGill-Queen's University Press, 1994), 185-187.

These fears were further reinforced by news of the North Korean invasion of South Korea on 25 June 1950, which brought about strong, widespread reactions. While the Canadian government's response was somewhat delayed, the American government and the UN reacted quickly. Concerns rapidly developed that war in Europe was imminent, and that the threat to North America was growing – the Korean War confirmed mistrust about Soviet motives and actions. The Canadian government responded to these events with an unprecedented peacetime military buildup: a planned expenditure of some five billion dollars over three years. As part of this programme, the 1950 Throne Speech committed the government to establishing a Department of Defence Production (DDP) that would act as a procurement agency for the Canadian military and for foreign countries procuring military supplies from Canadian industry. The Defence Production Act, passed on 1 April 1951, created DDP, which replaced the Department of Reconstruction and Supply. Perhaps not surprisingly, given his wartime duties and influence, C.D. Howe was made the new Minister of Defence Production. While Howe had far more senior deputies in DDP than he had had in Munitions and Supply, and the enabling legislation conferred upon him extraordinary powers, the end result was a department unlike its antecedent. As Howe's biographers explain,

while Munitions and Supply had been a free-wheeling agency largely independent of Canadian requirements, Defence Production was strictly a subordinate purchasing agency for the Canadian armed forces.... Once the first frantic months were past, Defence Production settled down to a quiet routine. It was really a large procurement agency with certain specialized skills and functions. It spent large amounts of money, and because of that, it was a significant factor in the Canadian economy.⁶¹

In terms of actual power and organization, therefore, the new department was a pale imitation of its wartime predecessor, but the significance of the expenditures it controlled

⁶¹ Bothwell and Kilbourn, *C.D. Howe*, 257. On DDP generally, see *ibid*, 251-260.

allowed Howe to retain his economic power and gave the department national importance in the first years of the Cold War. Despite allowing Howe to maintain his national influence, however, Bothwell and Kilbourn also argue that the department “was not entirely to Howe’s taste. He could not take its mission, the preparation of Canada for war, completely seriously.... Defence Production, more than any other of Howe’s ministerial creations, was routine: unexciting to its staff..., it was boring to its minister.”⁶²

Significantly, they point to Conservative J.M. Macdonnell’s observation in the House of Commons that Howe was “returning to tried and true methods because he had used them, and knew they worked” as “close to the mark.”⁶³ Macdonnell, a frequent critic of Howe in the years prior to the Liberal defeat in 1957, was acknowledging Howe’s propensity for expedient and proven techniques. These factors would shape Defence Production even if the department’s operations did not supply Howe with the challenges and excitement of Munitions and Supply.

While much of Canada’s military expansion involved additional personnel and equipment, upgrades and additions to defence infrastructure were also required. Although the traditional elements of military infrastructure – army bases, naval dockyards, and airfields – formed an appreciable part of these requirements, the rapid technical developments of modern warfare also created a requirement for newer structures and systems, including one of the iconographic symbols of the Cold War in the 1950s – the radar lines built across and around the North American continent. Providing this infrastructure in Canada was one of the many responsibilities of the Department of Defence Production and C.D. Howe, who turned to one of his favourite solutions for such

⁶² *Ibid.*, 258.

⁶³ *Ibid.*

situations – the Crown corporation. The resultant creation of Defence Construction Limited and its immediate successor, Defence Construction (1951) Limited, was thus a direct result of postwar world events and the Canadian government's reaction to them.⁶⁴

Howe's Depression-era experience with the Canadian Broadcasting Corporation, and his extensive wartime use of the Department of Munitions and Supply's many Crown corporations as instruments of government policy were factors that predisposed him to such solutions, but there were certainly other forces at work as well. His preference for business-like arrangements also drove him to favour "Crowns" as a solution to the challenges he faced. As he explained in the House of Commons,

the reason I like corporations is that we know how they keep their books. Everyone understands a corporation; everyone understands a corporate statement. If the departmental organization is carried too far it becomes very difficult to follow. The government's method of keeping books is not the method of a businessman...and if we have a big job to do I prefer to handle it in a corporate structure where bookkeeping methods are well defined and well understood by everyone.⁶⁵

Due to the pressure of work and the limited time available, Howe reactivated the dormant Wartime Housing Limited, renamed it "Defence Construction Limited" (DCL), and put it to work in conjunction with Central Mortgage and Housing Corporation to provide for Canadian defence construction requirements. By May of 1951, a successor to DCL, Defence Construction (1951) Limited, was established and operating as tendering and supervisory authority for the Department of National Defence's construction requirements. These requirements would be extensive – between the 1951 and 1955 fiscal

⁶⁴ Note: for this chapter, and this chapter only, DC(1951)L will be used as an abbreviation for Defence Construction (1951) Limited in order to avoid confusion in the text. After this chapter, DCL will be used to refer to the new company.

⁶⁵ Canada, House of Commons, *Debates*, 16 May 1951, 3099.

years, for instance, some forty per cent of the federal government's construction expenditures other than housing were handled by DCL.⁶⁶

Once again, as he had during the Second World War, Howe had sought an expedient response to one of the many challenges he and the government faced. The nature of the crisis that overtook the Canadian government in 1950, however, differed fundamentally from its predecessor in 1939. First, the North Korean offensive came as a surprise, catching the country off guard, and thereby begging an expedient response. This serves in part to explain the reactivation of an instrument of policy that had already proved its worth in this respect. Second, this was a "cold" war, involving diplomacy and deterrence rather than open conflict between the major protagonists. The challenge for DCL in this instance would thus be to act as Ottawa's "Cold War handyman," an adaptable instrument of policy that could help build and maintain the fence that would ultimately separate East and West. This crisis would not be just about housing.⁶⁷

Howe would explain the corporation and its mandate to Parliament in June 1951, stating that

Defence Construction Limited, which is a crown company set up as part of the [DDP] production branch, is responsible for construction required by our armed forces. By the end of May, Defence Construction Limited was administering contracts with a total value of \$110 million, of which \$44 million worth were taken from the Canadian Commercial Corporation. Defence construction requirements have increased sharply in recent months, *and the present rate of contract awards exceeds \$4 million per week*. It is estimated that by the end of the current fiscal year Defence Construction Limited will have under administration over \$200 million in construction contracts.⁶⁸

⁶⁶ Royal Bank of Canada, *The Canadian Construction Industry*, (Ottawa: Royal Commission on Canada's Economic Prospects, 1956), 7.

⁶⁷ "Caught off guard" aptly describes the events in and around Ottawa when news was received of the war in Korea. See, for instance, Hilliker and Barry, *Canada's Department of External Affairs, Volume II*, 78-79.

⁶⁸ House of Commons, *Debates*, 14 June 1951, 4072. Emphasis added.

As DCL's second president, A.G. (Joe) Bland (1963-1985), later explained in an April 1965 speech to the Association of Consulting Engineers of Canada,

It had been decided to up-date the defence establishment in Canada – to spend in the order of \$100 million in a crash program over two to three years. No existing department or agency was geared to administer such a program and the government resorted to a favourite child of the Honourable C.D. Howe, a Crown Corporation, *which would operate clear of the Civil Service Act, enlist key people from industry, get into operation quickly, and disband when the crash program had been accomplished.* This program represented the largest concentration of federal expenditure to that time in both design and construction”⁶⁹

DCL's first president, R.G. Johnson (1950-1963), once mentioned that Howe had expected DCL to last “three years or so.”⁷⁰ DCL was created as an expedient and ostensibly temporary response to this initial need, but would prove too useful to disband once the crash programme was over, especially since other defence infrastructure requirements – many of them directly linked to continental defence projects – soon arose. The corporation's ability to help furnish the necessary infrastructure for these projects and to help the Canadian government meet other goals related to these undertakings, such as the awarding of construction work to Canadian firms, made DCL a useful and flexible instrument of policy, which also helped guarantee its continued survival. As Macdonnell had noted in 1951, Howe was returning to “tried and true” methods in the creation of the Department of Defence Production. Among these methods was the use of Crown corporations to perform specialized tasks. Wartime Housing Limited had demonstrated its utility in providing housing for war industry workers and veterans and serving broader

⁶⁹ A.G. Bland, Speech to the Association of Consulting Engineers of Canada, 27 April 1965, DCC in-house file, “Bland Speeches”. Emphasis added.

⁷⁰ R.G. Johnson, “Nostalgia,” speech delivered to DCL's 25th anniversary reunion party, 14 November 1975. In a 1951 speech to the CCA, Johnson, after thanking the association for making him available on loan to DCL looked forward to his return to the CCA, which suggests that he anticipated a fairly short existence for DCL, or at least a short tenure as the corporation's president. “Operation of Defence Construction Limited,” *Proceedings of the 33rd Annual General Meeting of the Canadian Construction Association*, 1951, 13.

policy goals to help the Canadian war effort and postwar reconstruction; Defence Construction Limited would demonstrate its utility in providing defence infrastructure for projects in Canada and overseas, and would serve broader policy goals in protecting the interests of the Canadian construction industry and its suppliers, as well as through the provision of services for special projects at home and overseas.

DCL would have to take over an existing and rapidly expanding construction programme from existing agencies. In the first few years after the end of the war, as Canada had slipped back into a minimalist national defence strategy, the Department of National Defence's limited requirements for construction and procurement had been handled by the Canadian Commercial Corporation (CCC), which was responsible to the Minister of Trade and Commerce, C.D. Howe. With the new defence construction programmes resulting from the outbreak of the Korean War, the CCC was not considered an appropriate agency for the task, since it would take too long to build up a sufficiently large staff to handle the workload.⁷¹ Defence construction would have to be carried out by the CCC or a limited number of other organizations, however, because according to the Defence Production Act, the Minister of Defence Production was limited to selecting a company covered by the Government Companies Operation Act, which had been passed in 1946 to regularize the legal and fiscal position of Crown corporations. This description fit Wartime Housing Limited but not CMHC, which had taken over WHL's responsibilities a few years earlier. WHL's charter, which would also apply to Defence Construction Limited, permitted it to employ a corporation to manage part or all of its

⁷¹ C.A. Ashley and R.G.H. Smails, *Canadian Crown Corporations: Some Aspects of their Administration and Control*, (Toronto: Macmillan, 1965), 116-119; K.J. Holmes, *The History of the Canadian Military Engineers*, Vol. III, (Toronto, ON: Military Engineering Institute of Canada, 1997), 42-43; Canada, House of Commons, Standing Committee on Public Accounts, *Minutes of Proceedings and Evidence*, #17, 29 May 1951, 540; C.D. Howe to House of Commons, Debates, 8 February 1951, 180.

affairs, which allowed CMHC to act as an operating and financial agent for DCL.⁷² The use of CMHC's personnel and administrative structures was an expedient move that would be a crucial element in defence construction plans and in the establishment of DCL as an effective enterprise.

An undated page on the "Defence Construction Proposal" in DCL's archive lists what were seen as the advantages and disadvantages of this bureaucratic sleight of hand.⁷³ Many of the advantages revolved around CMHC's existing nation-wide construction organization, which was already established at most military sites. Expanding such an organization would be easier than building up a similar organization in the CCC or elsewhere, and furthermore the direct defence construction operations, which would be separate from CMHC's more normal long-term operations could be turned over to a more suitable organization at any time. Advantage number seven was quite telling – "No other workable arrangement has been suggested."⁷⁴ A number of disadvantages, however, were also listed. Among them was the requirement that WHL's charter had to be surrendered according to the 1948 amendments to the National Housing Act, and that the arrangement with CMHC threatened to reduce the overall quality of the latter's operations.⁷⁵

⁷² Memo, H.C. Linkletter to D.B. Mansur, "Re: The Defence Supplies Act," 3 November 1950; Memo, H.C. Linkletter to D.B. Mansur, "Re: Construction Defence Projects," 4 November 1950, DCC in-house file 011-2, "Historical Information". In 1951, the Government Companies Operation Act was supplanted by provisions of the more broadly applicable Financial Administration Act. Lloyd D. Musolf, *Public Ownership and Accountability: The Canadian Experience*, (Cambridge, MA: Harvard University Press, 1959), 39-40.

⁷³ "Defence Construction Proposal," c. November 1950, DCC in-house file 011-2, "Historical Information".

⁷⁴ *Ibid.*

⁷⁵ *Ibid.* For more details on the requirement that the charter be surrendered see Auditor General (Watson Sellar) to President and Directors of Defence Construction Limited, 29 January 1952, National Archives of Canada, RG 58, vol. 264, file 6, "Defence Construction Ltd. – Audit Reports & Correspondence."

These concerns, however, did not interfere with the creation of Defence Construction Limited. On 14 November 1950, H.C. Linkletter, CMHC's General Counsel, wrote to the Under Secretary of State with an inquiry about supplementary Letters Patent to change WHL's name to the more appropriate "Defence Construction Limited."⁷⁶ The following day, an answer indicated that the proposed name would be available.⁷⁷ The 16th witnessed the signing of a Memorandum of Arrangement dealing with the construction of defence projects by the Minister of Trade and Commerce (MTC) for the Minister of National Defence in accordance with the Defence Supplies Act. The memorandum proposed that WHL, which met the requirements for defence construction projects, would enter into a contract with the MTC, subject to cabinet approval. Wartime Housing Limited's name would be changed to Defence Construction Limited, subject to the Secretary of State's approval, and it would enter into an agreement with CMHC, which would supply management, supervisory, and other services to DCL. As part of the contract with MTC, DCL would be paid a fee that would cover its administrative expenses, as well as the fee it would pay to CMHC for its services.⁷⁸ DND would supply plans and specifications for projects, as well as the necessary land, while DCL would arrange for the construction of the project in accordance with the plans and specifications. Supervision and inspection of the contractor's work would be DCL's responsibility, while DND inspections during construction would be made as a basis for acceptance of the completed project. Projects currently underway through the Canadian Commercial

⁷⁶ H.C. Linkletter to Under Secretary of State, Attn: A.A. Cattanach, "Re: Wartime Housing Limited", 14 November 1950, DCC in-house file 011-2, "Historical Information".

⁷⁷ A.A. Cattanach for Acting USS to H.C. Linkletter, 15 November 1950, DCC in-house file 011-2, "Historical Information".

⁷⁸ "Memorandum of Arrangement Regarding the Construction of Defence Projects by the Minister of Trade and Commerce for the Minister of National Defence Pursuant to the Defence Supplies Act," 16 November 1950, DCC in-house file 011-4, "Documents of Reference".

Corporation were to be taken over by DCL at a date to be determined. Because of the methods used to finance married quarters for DND, they remained the responsibility of CMHC.⁷⁹ Through these arrangements, Ottawa had devised a cosy, expedient means of meeting a material crisis of the Cold War. A meeting was held the same day to consider the memorandum. Representatives from DND, Finance, the services, CMHC, and R.G. Johnson, who was representing Howe's interests as Minister of Trade and Commerce, discussed issues raised by DND representatives. In the end, "it was agreed that the Memorandum of Arrangement was generally satisfactory, but that it would require the co-operation of all parties to make this a satisfactory operation."⁸⁰

The military's concerns would not appear to have been entirely allayed by this meeting. The following day, at a meeting of the Chiefs of Staff Committee, the Chief of the General Staff (CGS) and the Acting Chief of the Air Staff expressed misgivings about the plan. The former was concerned about the loss of control of defence construction projects, drawing parallels with equipment procurement, where although the Chiefs "were held responsible for the efficiency and functioning of their services, at present they had little control over the procurement of equipment" and where the agency responsible "accepted no responsibility for late delivery or non-delivery and the consequent effects on Canada's defence preparedness. If this condition were now to apply also to defence construction, the position of the Chiefs of Staff would be made very difficult."⁸¹ The Acting Chief of the Air Staff, on the other hand, was concerned that a new defence

⁷⁹ *Ibid.* CMHC responsibility for such projects was confirmed by Cabinet in April of 1951. Cabinet Conclusions, 20 April 1951, 7-8, LAC, RG 2, series A-5-a, volume 2647.

⁸⁰ "Report of Meeting held November 16th to Consider Memorandum of Arrangement Regarding the Construction of Defence Projects," DCC in-house file 011-2, "Information – Historical".

⁸¹ The CGS also drew comparisons with the provision of married quarters, where "the services had not been allowed to influence the design, specification or construction...to any extent but had more or less to accept quarters regardless of any undesirable features or arrangements." Minutes of a Special Meeting of the Chiefs of Staff Committee, 17 November 1950, 1, DHH 73/1223, box 61, file 1306B.

construction organization might require specifications for buildings that were more detailed than those currently provided. The provision of plans “completed in all details” before work began, he argued, was not always possible, and he hoped that “reasonable latitude” in the matter would still be possible.⁸² The military, therefore, was concerned both about the loss of control over defence construction and about the possibility of extra demands on its engineering and planning resources. While these objections seem to have had little effect on the creation of DCL, this would not be the last time in the corporation’s existence that its client – the Canadian military – would express concerns about its operations.

Howe brought the issue to cabinet on 22 November 1950. According to the record of cabinet conclusions, he

reported that considerable difficulty had been experienced in carrying out efficiently defence construction projects. This was largely because the Canadian Commercial Corporation, presently responsible for this work, did not have the necessary managerial, engineering and supervisory staff, and, as a result, the responsibilities of various participating agencies were not clearly defined.⁸³

After laying out the details of the proposed solution, Howe obtained approval for the creation of DCL and its administrative agreements. That same day, PC 5654 changed the name of Wartime Housing Limited to Defence Construction Limited, while PC 5655 authorized working capital for DCL, and PC 5656 authorized CMHC to act as an agent for the new corporation.⁸⁴ November 22 also saw H.C. Linkletter, CMHC’s General Counsel, writing to the Corporations Branch, requesting the supplementary Letters Patent

⁸² *Ibid.*, 2.

⁸³ Cabinet Conclusions, 22 November 1950, LAC, RG2, series A-5-a, vol. 2646.

⁸⁴ PC 5654, 22 November 1950; PC 5655, 22 November 1950; PC 5656, 22 November 1950, DCC in-house file 011-2, “Historical Information”.

to change WHL's name to Defence Construction Limited, with a date of November 24th if at all possible.⁸⁵

The agencies involved handled the transfer of responsibilities expeditiously. A total of 123 construction contracts worth some \$43.2 million were involved in this handover, and CCC readied a form letter to contractors, advising them that their contracts would henceforth be under the administration of DCL.⁸⁶ CMHC regional supervisors were also advised of the transfer and its implications. On-site staff in CMHC's construction division were to become DCL employees, as would any new on-site employees, while the remainder of CMHC's construction employees would remain with the corporation in order to manage and supervise defence projects.⁸⁷

Wartime Housing Limited held its last meetings on 23 November, when its Board of Directors and shareholders met to change the corporation's name and take care of procedural business.⁸⁸ The following day, R.G. Johnson, the new corporation's president, informed C.M. Drury, the Deputy Minister of National Defence, that DCL was now responsible for the procurement of new construction for DND.⁸⁹

The working relationship with CMHC meant that DCL's Chief Engineer would also have to work closely with his CMHC counterpart. A DCL staff structure was also

⁸⁵ H.C. Linkletter to Under Secretary of State, attn. A.A. Cattanach, "Re: Wartime Housing Limited", 22 November 1950, DCC in-house file 011-2, "Historical Information".

⁸⁶ Canada, House of Commons, Special Committee on Defence Expenditure, *Minutes of Proceedings and Evidence*, #16, 24 March 1953, 447; J.D. McCarthy to contractors, blank form letter, November 1950. DCC in-house file H-11, "Organization - Old Company".

⁸⁷ Telegram, Eric R. Gold, Secretary, CMHC to CMHC Regional Supervisors, DCC in-house file 011-2, "Historical Information".

⁸⁸ Minutes of meeting of Board of Directors of WHL held 3PM, 23 November 1950; Minutes of annual meeting of shareholders of WHL, held 3:15PM, 23 November 1950; Minutes of meeting of Board of Directors of WHL held 4PM, 23 November 1950, DCC in-house file, minute book "Volume III: Wartime Housing Limited (Defence Construction Limited)."

⁸⁹ R.G. Johnson to C.M. Drury, 24 November 1950, DCC in-house file 011-2, "Historical Information". In some recollections published on the CMHC website, David Mansur, CMHC's first president, also claims to have been DCL's first president. This appears to be the only instance of this claim, which is not borne out by any other records. Mansur, "A Sense of Mission."

created to deal with defence construction projects. Since the Army, Navy, and Air Force each dealt with their own construction needs, an Engineer-in-Charge was also created for each of the three services.⁹⁰ The Board of Directors of DCL would be composed entirely of Howe's nominees from the Department of Trade and Commerce.⁹¹ This pattern would be continued once the Department of Defence Production was created, and the establishment of the new corporation's headquarters in a building adjoining the one that would be occupied by DDP – Number Four Temporary, at the corner of Wellington and Lyon Streets – only served to further reinforce these links. Although the new corporation was soon up and running, a number of significant details still had to be settled. Foremost among these was the arrangement with CMHC for site management and inspection services, for which a draft had been created by mid-December.⁹²

That same month the issue of a French language designation for Defence Construction Limited was raised – the answer from the CMHC secretariat was that “there is no official translation of D.C.L. and unless it is accepted or inserted in the letters patent, I suggest that we do not translate it.”⁹³ On 2 January 1951, DCL's secretary noted in a memorandum to Regional Office secretaries across the country that since the supplementary letters patent changing WHL's name to DCL made no provision for a

⁹⁰ Holmes, *History of the Canadian Military Engineers*, 44.

⁹¹ “Memorandum Covering Organization of Defence Construction Limited and the Integration of Activities of Defence Construction Limited and Construction Division of C.M.H.C.,” 25 November 1950, DCC in-house file 011-2, “Information – Historical”.

⁹² Minutes of meeting of Board of Directors of WHL 23 November 1950; Minutes of meeting of Board of Directors, 12 December 1950, DCC in-house file, minute book “Volume III: Wartime Housing Limited (Defence Construction Limited).” See also D.B. Mansur to C.D. Howe, 18 December 1950, DCC in-house file 011-2, “Historical Information”. The majority of DDP offices were located in Number One and Number Two Temporary Buildings. Department of Defence Production, *Directory*, 1 October 1951.

⁹³ CMHC Inter-office Memo, H. Lajoie to Secretariat, Ottawa, 21 December 1950, DCC In-house file 011-2, “Historical information”.

*Figure 1: Department of Defence Production
Organization as at 31 December 1955⁹⁴*

French translation of the title, "D.C.L. should be referred to as Defence Construction Limited when used in either an English or a French context."⁹⁵

⁹⁴ Derived from DDP, *Fifth Report of the Department of Defence Production, 1955*, (Ottawa: Queen's Printer, 1956), 37. For reasons of clarity, the Parliamentary Assistant to the Minister and Deputy Minister has been omitted, as has the private secretary to the Minister and the executive assistant to the Deputy Minister.

⁹⁵ H.S. Rowbotham to Regional Office Secretaries, "Translation – Defence Construction Limited," 2 January 1951, DCC in-house file 011-2, "Historical Information". This status would endure until 1965, when DCL's official name became bilingual – "Defence Construction (1951) Limited – Construction de Defense (1951) Limitee." "Historical Aspects," 90-02-10, 7. This change represented part of a broader move towards bilingualism in the public service; French language training was first offered to DCL employees in 1964, and in 1967 company president A.G. Bland spent a year in Quebec as part of a language training programme for senior civil servants; among the other participants that year was Secretary to the Cabinet Gordon Robertson. DCL, *Annual Report, 1973-74*, 17; Minutes of Meeting of Board of Directors, 31 January 1967; Gordon Robertson, *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau*, (Toronto: University of Toronto Press, 2000), 235-236.

In order to limit its obligations under the new arrangements, CMHC was careful to restrict its functions to the provision of personnel and facilities so that it did not have to provide head-office management and other services; these were to be the responsibility of Defence Construction. Personnel provided under the agreement were to be considered employees of DCL in order to avoid involving CMHC's directors, a decision that ultimately would have far-reaching consequences for DCL's personnel policies.⁹⁶ The management contract was approved by DCL's board of directors on 12 December, as was the agreement with the Minister of Trade and Commerce, with the addition of one small amendment by DCL. In order to increase the flexibility of the arrangements and presumably to decrease bureaucratic complications, the minister delegated authority to DCL to enter into contracts for less than \$15,000. When a formal request for tenders had been issued, this limit was raised to \$50,000.⁹⁷ Both agreements were set to expire at the end of 1952 unless they were extended, a further indication of DCL's ostensibly temporary nature.⁹⁸

In explaining these arrangements, Howe would later describe Central Mortgage and Housing as "consultants, really, or inspectors for Defence Construction."⁹⁹ These arrangements were a masterful bureaucratic sleight-of-hand, involving the reactivation of a dormant Crown corporation and the adaptation of existing agencies as

⁹⁶ H.C. Linkletter to P.S. Secord, "Agreement between CMHC and DCL," 2 December 1950, DCC in-house file 011-2, "Historical Information".

⁹⁷ Memo, D.B. Mansur to C.D. Howe, "Re: Defence Construction Limited," 18 December 1950, DCC in-house file 011-2, "Historical Information"; Minutes of Board of Directors Meeting, 12 December 1950, DCC in-house file, minute book, "Volume III, Wartime Housing Limited (Defence Construction Limited)"; H.C. Linkletter to Mansur, Johnson, Wilson, Rowbotham, "Agreement between Minister and DCL," 11 December 1950; DCC in-house file 011-2, "Historical Information".

⁹⁸ See correspondence in LAC, RG83, vol. 72, File "Agreement Between DCL and Central Mortgage and Housing Corporation - 1950," and LAC, RG83, vol. 72, file "Agreement Between Minister of Trade and Commerce and DCL - 1950".

⁹⁹ House of Commons, *Debates*, 16 May 1951, 3099.

part of the government's, and especially C.D. Howe's, reaction to the exigencies of Canada's Cold War rearmament programme. They offered the advantage of a rapid reaction to an urgent requirement, but the use of a Crown corporation to perform what were essentially departmental functions ran the risk of creating an entity operating beyond public review. These actions, however, were in keeping with Howe's penchant for direct, expedient action and tendency to resort to the "tried and true." This tendency was exemplified by the selection of a president for this new organization. Howe chose the "tried and true" once again, turning to past associations in order to find his man. R.G. Johnson was General Manager of the Canadian Construction Association, a position he had held since 1945. Johnson was originally a lawyer who had worked for Howe in the Department of Munitions and Supply during the Second World War, and had been head of construction in that department before becoming secretary of the Department of Reconstruction and Supply during the last year of the war.¹⁰⁰ As such, he offered both experience in the construction field and, perhaps more importantly, a sound record in government work and an established relationship with Howe.

A DCL board of directors meeting on 18 January 1951 cleared up issues related to signing authority, and also created an agreement with the Canadian Construction Association to reimburse the latter for R.G. Johnson's services while he was on loan to

¹⁰⁰ Richard Golding Johnson was born in Calgary, Alberta, in 1913. He received his BA from the University of Alberta in 1933, and his LLB from the same institution in 1935. He practiced law in Edmonton until 1937, and was then in London, Ontario, with a trust company from 1937 to 1940. He entered federal government service as solicitor in the Legal Branch of C.D. Howe's Department of Munitions and Supply in 1940. Between 1941 and 1944, he was promoted – from contracts officer to assistant director to director of Defence Projects Branch, Department of Munitions and Supply. Upon the creation of the Department of Reconstruction and Supply in 1944, he was named its secretary, but in 1945, left government service and was appointed general manager of the Canadian Construction Association. At the time of the creation of Defence Construction Limited in 1950, federal officials requested that Johnson be loaned to Defence Construction from the CCA. Ben Dworkin, "Ottawa and the Construction Industry," *Daily Commercial News and Building Record*, 12 February, 1959; House of Commons, *Debates*, 14 June 1951, 4118; *The Canadian Who's Who, Volume X: 1964-1966*, (Toronto: Trans-Canada Press, 1966), 549.

Defence Construction. Although Howe would describe him in Parliament as a “dollar-a-year man,” unlike earlier arrangements during the Second World War the CCA was in fact reimbursed for the whole of his salary by DCL, and it was not until April of 1955 that Johnson would finally become an employee of DCL.¹⁰¹ Johnson was not alone in coming to DCL from the construction industry. During the first years of its existence, personnel at a number of levels in Defence Construction would come to the corporation from the private sector and from other government organizations. The corporate background of these men – and *all* of them were men – included the Foundation Company of Canada, the Ontario Hydro-Electric Commission, Abitibi Pulp and Paper, Dominion Bridge Ltd., Dominion Structural Steel Ltd., Warnock-Hersey Ltd., Angus Robertson Ltd., Fraser-Brace Ltd., and the Canadian Construction Association.¹⁰² The last of these was a confirmed supporter of the corporation’s undertakings, issuing a proclamation in favour of defence works on the day Johnson became DCL’s president.¹⁰³ In return, Johnson also used his presidency of DCL to implement tendering and contract reforms urged by the CCA, which were largely aimed at increasing the openness and accountability of the bidding procedure and speeding up the flow of payments to contractors. Communications between the CCA and the federal government were also improved; it was at Johnson’s insistence in the early 1950s, for instance, that the CCA began to present annual briefs to Cabinet, a development which further expanded the

¹⁰¹ Minutes of meeting of Board of Directors of WHL held 18 January 1951. DCC in-house files, minute book “Volume III, Wartime Housing Limited (Defence Construction Ltd.); House of Commons, *Debates*, 29 June 1951, 4966; Minutes of meeting of Board of Directors, 28 February 1955, DCL Minute Book, 1955-1970; House of Commons, *Debates*, 29 June 1951, 4966. The Board also resolved at the 18 January meeting that senior CMHC officials working for DCL would retain the same job titles and responsibilities.

¹⁰² Ben Dworkin, “Ottawa Today: DCL’s important roles,” *Daily Commercial News and Building Record*, 16 March 1965.

¹⁰³ R.G. Johnson, “Operation of Defence Construction Limited,” *Proceedings of the 33rd Annual General Meeting of the Canadian Construction Association*, 1951, 13.

close relationship that already existed with some ministers, including, of course, C.D. Howe.¹⁰⁴

While the nature of the senior leadership at DCL might arguably have constituted a “thin edge of the wedge” of a Canadian military-industrial complex centered on the construction of defence projects, a number of factors appear to have prevented such a situation from developing. In general, Lawrence Aronsen has argued, Canada does not appear to have developed a military-industrial complex of the sort that emerged in the United States; it instead developed a national security bureaucracy “that interreacted with and was dependent on cabinet authority and the prime minister.”¹⁰⁵ Furthermore, many of the continental defence projects with which DCL was involved would not have been readily subject to the whims of a Canadian military-industrial complex in any case, since many if not all of the fundamental decisions affecting American and joint Canadian-American defence projects being built in Canada were made in Washington rather than in Ottawa. The construction record of these projects argues far more strongly in favour of Aronsen’s interpretation than it does in favour of the existence of a Canadian military-industrial complex centered on the construction of defence infrastructure.

Farewell Defence Construction Limited, Hello Defence Construction (1951) Limited

The original DCL was intended as an interim organization, assembled from available resources until the necessary Crown corporation could be set up as part of the new Department of Defence Production. The use of CMHC personnel and organizational

¹⁰⁴ Neil John Lawrie, “The Canadian Construction Association: An Interest-Group and its Environment,” (PhD. dissertation, University of Toronto, 1975), 247-251, 287-288.

¹⁰⁵ In this area, Lawrence Aronsen’s work on Canadian economic mobilization and its relationship with the United States is particularly useful. Lawrence R. Aronsen, “Canada’s Postwar Re-armament: Another Look at American Theories of the Military-Industrial Complex,” *CHA Historical Papers* (1981): 193.

structures allowed DCL to begin operations promptly, rather than having to hire and train its own employees to handle these tasks.¹⁰⁶ Discussions involving the new company that was to replace WHL/DCL had begun in the autumn of 1950 if not earlier; by mid-January of 1951 DCL was already discussing arrangements with the Department of Defence Production (DDP) for a draft agreement between the not-yet-formally established department and the not-yet-existent Defence Construction (1951) Limited.¹⁰⁷

By the end of March 1951 DCL had a staff of twenty-nine and was administering over \$80 million in contracts, about half of which had been taken over from the CCC.¹⁰⁸ As the defence construction programme grew, CMHC found it necessary to re-organize its construction division that handled DCL's work, and a number of personnel were transferred to DCL.¹⁰⁹ By early April 1951, CMHC management acknowledged that "although the present arrangement was not one sought by Central Mortgage, it does seem to be working with reasonable satisfaction. Central Mortgage does not seek a change in the Management Contract or its operation at this time."¹¹⁰ The only significant problem involved the shortage of steel supplies, especially reinforcing steel, for the contractors.¹¹¹ Steel was an essential material for the defence construction programme; reinforcing steel was required for the reinforced concrete construction used in foundations, walls, and floors, while structural steel was essential to the framework of buildings. The

¹⁰⁶ Holmes, *History of the Canadian Military Engineers*, 45.

¹⁰⁷ J.D. Jennison to D.A. Golden, Director, Legal Branch, DDP, 14 January 1951, DCC in-house file 011-2, "Historical Information".

¹⁰⁸ R.G. Johnson, "Nostalgia," speech delivered to DCL's 25th anniversary reunion party, 14 November 1975.

¹⁰⁹ CMHC Secretary's General Memorandum, "Re: Re-Organization of Construction Division, Head Office," 10 February 1951, DCC in-house file H-11, "Organization – Old Company".

¹¹⁰ CMHC Memorandum, "CMHC – DCL Arrangements," 7 April 1951, DCC in-house file H-11, "Organization – Old Company".

¹¹¹ *Ibid.* Howe noted in Parliament that the "extensive [construction] program is making heavy demands on critically short materials, particularly reinforcing steel." House of Commons, *Debates*, 14 June 1951, 4072.

consequences of these shortages, the extensive steel controls emplaced by DDP, and DCL's role in the providing of steel to contractors, will be discussed in the next chapter.

By this time, however, DCL was ready to proceed with the incorporation of a successor company and the surrender of its charter. According to the Corporations Branch of the Secretary of State, the name of the new company would have to differ from the current organization's, and it was suggested that the new name could be "Defence Construction (1951) Limited." The new company would assume the obligations of its predecessor, and the charter of the present company would be surrendered some six months after the incorporation of its successor.¹¹² At the same time, measures were taken to repay the \$500,000 advance made to DCL, presumably to get rid of this obligation before the change-over was made.¹¹³

PC 2269 of 10 May 1951 authorized the incorporation of "Defence Construction (1951) Limited pursuant to sub-section 1 of Section 7 of the DDP Act."¹¹⁴ The Letters Patent were issued on 18 May 1951, and were forwarded to the Deputy Minister for Defence Production on the 28th.¹¹⁵ On 27 July, a series of meetings of the shareholders and Board of Directors of Defence Construction Limited authorized the transfer of assets to Defence Construction (1951) Limited and the surrender of the older corporation's

¹¹² Memo, H.C. Linkletter, General Counsel, CMHC, to R.G. Johnson, "Re-Incorporation of DCL," 21 April 1951, DCC in-house file 011-2, "Historical Information."

¹¹³ Requisition for Cheque to Receiver General of Canada, 2 May 1951, DCC in-house file H-11, "Organization - Old Company."

¹¹⁴ PC 2269, 10 May 1951, DCC in-house file 011-4, "Documents of Reference"; also available in DCC in-house file 011-2, "Historical Information."

¹¹⁵ *Ibid*; B. Aubrey for Asst USS to DM/DDP, 28 May 1951, DCC in-house file 011-2, "Historical Information". In mid-July, DC(1951)L discovered an error in the letters patent, but this was rapidly corrected. J.D. Jennison to A.A. Cattnach, 17 July 1951; A.A. Cattnach to J.D. Jennison, 19 July 1951, DCC in-house file 011-2, "Historical Information".

charter. In the space of forty-five minutes, the formal change-over was made.¹¹⁶ The agreement transferring assets from DCL to DC(1951)L took effect on 1 August 1951, and by late October, preparations were being made to surrender the old company's charter.¹¹⁷ Some legal requirements had to be met before the surrender of the old company's Letters Patent was finally accepted over a year later on 18 August 1952.¹¹⁸ In the meantime, work was undertaken on finalizing a new agreement between the company and the Minister of Defence Production. An agreement was reached by mid-January of 1952, and the new agreement was to terminate by the end of the year unless it was otherwise changed or extended.¹¹⁹ A new agreement was approved just before the deadline, and another agreement, amending the existing arrangements, was also signed between

¹¹⁶ Employees were notified the same day of the change in name, and a memo to "all secretaries" informed them that until new stationery was available, the "(1951)" would have to be inserted on all company letterhead. H.C. Linkletter to J.D. Jennison, "Defence Construction Limited," 16 July 1951, DCC in-house file 011-2, "Historical Information"; Minutes of meeting of Board of Directors of DCL, 2:30PM, 27 July 1951; Minutes of Special General Meeting of Shareholders of DCL, 2:45 PM, 27 July 1951; Minutes of Meeting of Board of Directors of DCL, 3:00 PM, 27 July 1951; DCC in-house file, minute book "Volume III, Wartime Housing Limited (Defence Construction Limited); J.D. Jennison to DCL Secretaries, 27 July 1951, DCC in-house file 011-2, "Historical Information".

¹¹⁷ See LAC, RG 83, vol. 72, file "Agreement between DCL and DC(1951)L – Transfer of Assets"; J.D. Jennison to H.C. Linkletter, "Re: Defence Construction Limited, Surrender Charter," October 1951, n.d. but sometime before the 23rd; H.C. Linkletter to J.D. Jennison, 23 October 1951; J.D. Jennison to F.T. Shearns, "Surrender of Charter of Defence Construction (1951) Limited," 24 October 1951, DCC in-house file 011-2, "Historical Information".

¹¹⁸ J.D. Jennison to A.A. Cattanaach, "122-1, Defence Construction Limited – Surrender of Charter," 14 March 1952; A.A. Cattanaach to DC(1951)L, 29 July 1952; R.G. Johnson to Department of Secretary of State, 5 August 1952; A.A. Cattanaach to DCL, 18 August 1952; R.G. Johnson to H.C. Linkletter, 20 August 1952, DCC in-house file 011-2, "Historical Information". These requirements included an undertaking from the new company that it would not raise a technical defence of "lack of privity of contract" if actions were brought against the old company. "Privity" refers to a relationship between the two companies which had successive interest in the same rights or properties. The Corporations Branch wanted to ensure that DC(1951)L would not be able to protect itself from claims brought against DCL by claiming that there was no relationship between the two companies.

¹¹⁹ DC(1951)L Inter-Office memo, H.S. Rowbotham to J.D. Jennison, "Re: Draft Agreement – Minister of Defence Production (or Minister of Trade and Commerce) Defence Construction Limited (or Defence Construction (1951) Limited)," 27 August 1951; CMHC Inter-office memo, H.C. Linkletter to J.D. Jennison, "re: Draft Agreement DCL, DC(1951)L and CMHC," 11 January 1952; D.A. Golden, Director, Legal Branch, DDP, to J.D. Jennison, 15 January 1952; J.D. Jennison to R.G. Johnson, "Agreement – Minister of Defence Production – Defence Construction (1951) Limited," 18 January 1952, DCC in-house file 011-2, "Historical Information".

DC(1951)L and CMHC on 3 April 1952.¹²⁰ Given that work forged ahead on contracts while these arrangements were being negotiated, their primary purpose was more to formalize arrangements already worked out and to meet legal requirements than it was to set ground rules for these relationships. Again, an expedient approach had been sought and found.

By the middle of 1952, DCL's responsibilities were widening. In order to consolidate DDP functions dealing with construction contracts, the department planned to transfer the activities of the Building Maintenance Section of its General Purchasing Branch to DC(1951)L. No change would be required to the formal agreement between the two organizations, since a directive from the Minister, which was ultimately signed on 3 June, would suffice.¹²¹ The relationship that had begun with DCL and the Minister of Trade and Commerce was now continued with DC(1951)L and the Minister of Defence Production.¹²² In addition to its responsibilities for the maintenance, repair, and remodeling of DND property, the section was also responsible for purchasing pre-fabricated buildings required by the military. During its first year of operation, some 151 contracts worth \$11.3 million were let by the section.¹²³

¹²⁰ J.D. Jennison to Douglas Owen, Private Secretary to Minister of DDP, 30 December 1952; J.D. Jennison to Douglas Owen, 2 January 1953; J.D. Jennison to H.C. Linkletter, 5 January 1953; CMHC Inter-Office Memo, G.A. Flannery, Legal Division, to F.T. Shearns, "Re: Defence Construction (1951) Limited Central Mortgage and Housing Corporation Contract," 4 April 1952, DCC in-house file 011-2, "Historical Information".

¹²¹ D.A. Golden to J.D. Jennison, 3 June 1952; J.D. Jennison to D.A. Golden, 4 June 1952; R.M. Brophy, DM/DDP to C.M. Drury, DM/DND, "Re: Defence Construction"; D.A. Golden to J.D. Jennison, 30 May 1952; Memo to file, J.D. Jennison, "Re: Transfer Building and Maintenance Section, DDP, to DC (1951) Ltd.," 2 June 1952; D.A. Golden to J.D. Jennison, 3 June 1952; J.D. Jennison to D.A. Golden, 4 June 1952, DCC in-house file 011-2, "Historical Information."

¹²² PC 4115, 24 September 1952, DCC in-house files 011-4, "Documents of Reference," 011-3, "DND Integration."

¹²³ Canada. House of Commons. Special Committee on Defence Expenditure, *Minutes of Proceedings and Evidence*, #16, 24 March 1953, 447.

As a consequence of these intricate administrative manoeuvres, Defence Construction (1951) Limited now existed as a corporation, with its own management, agreements with government departments, and formal and informal relationships with other government agencies. It had, in other words, been given a place within Ottawa's bureaucratic environment. The process of its establishment, however, had not taken place in isolation from surrounding events; rather, it had been a direct consequence of C.D. Howe's reaction to them. WHL's reactivation had been part of the Canadian government's response to international events, and particularly to the course of the Cold War. Even while the administrative tasks of changing from WHL to DCL to DC(1951)L had been under way, the company found itself taking part in significant defence construction projects. The growth in Canada's military in reaction to the Korean War led to the construction of facilities for all three services as part of the Accelerated Defence Programme, while concerns about the Soviet aerial threat to North America, and closer defence co-operation with the United States, led to the construction of radar stations that would form part of the Pinetree Line. In addition to these projects, subsequent commitments to defence construction programmes in Canada and Europe, and to foreign aid projects as part of the Colombo Plan, meant that Defence Construction (1951) Limited was about to enter what would prove to be the busiest decade of its existence.

In the process of creating this corporation, C.D. Howe had demonstrated his talent for expedient action, reviving a dormant Crown corporation and using the services of another department to rapidly provide an organization with the ability to furnish defence infrastructure for the country's Cold War rearmament programme. The use of a Crown corporation also reflected Howe's oft-stated preferences for a business form of

organization in preference to its departmental counterpart. Furthermore, Defence Construction provided him a means of operating free of the civil service regulations that would have delayed a comparable undertaking using personnel from the Department of Defence Production. Howe's preference for "tried and true" methods and people had also played a part; once again, he had drawn on wartime experience from Munitions and Supply by turning to a "Crown" as a rapid solution to the problems he faced and by bringing a wartime associate back into his fold from the private sector. That such arrangements ran the risk of creating an organization operating beyond public review or control, and offered the possibility that personnel recruited from the private sector might have undue influence on the activities of a public corporation does not appear to have bothered Howe. Given his penchant for expediency and his close relationship with Canada's business community, this lack of concern is in retrospect hardly surprising.

The End of the CMHC Management Contract

While of tremendous utility to the fledgling Defence Construction (1951) Limited, the management agreement with the Central Mortgage and Housing Corporation was brought to an end by the middle of 1954. In large part, this was a consequence of the 1954 National Housing Act, which opened up the lending of home mortgages to Canadian banks, backed by the CMHC.¹²⁴ In its 1953-54 annual report, DCL explained that

¹²⁴ Duncan McDowall, *Quick to the Frontier: Canada's Royal Bank*, (Toronto: McClelland and Stewart, 1993), 334-335; Canada, Central Mortgage and Housing Corporation, *Annual Report*, 1954, (Ottawa: Queen's Printer, 1954), 11-15, 45-46. For a critical view of the origins of the National Housing Act of 1954, see Bacher, *Keeping to the Marketplace*, 181-210, and especially 203-210; see also the condensed discussion of the issue in Bacher's "Canadian "Housing" Policy in Perspective," *Urban History Review* 15:1 (June 1986), 3-18.

late in 1953 it became apparent that a period of reduced defence construction volume was occurring at the same time that CMHC was about to engage in considerably increased activity in the housing construction field, as a result of proposed changes to the Bank Act. It was, therefore, decided to terminate the management agreement so that CMHC might retire from its supervisory function. DCL had had a number of major projects under its direct supervision for some time and, as this stage of the programme, this step appeared desirable as a natural means of consolidation for the remaining work.¹²⁵

The assistance provided by Central Mortgage and Housing had been of considerable assistance to Defence Construction Limited while the latter was starting out in the midst of a Cold War infrastructure building boom. In the same annual report, DCL noted that of the \$660 million in contracts the corporation had administered by the end of that fiscal year, over 60% had been carried out under CMHC supervision.¹²⁶ CMHC, for its part, made similar comments in its annual report for that year, noting that “from November 22, 1950, to May 1, 1954, the Corporation awarded and administered a total of 1,369 contracts with a value of \$416.3 million and put in place in this period, work to the value of \$396.6 million. At completion of turnover to Defence Construction at May 1, 1954, about \$40.8 million of construction still remained to be put in place.”¹²⁷ Considering the volume of work handled in such a short period of time, the management contract had proved its utility as an expedient solution to a significant challenge.

In a 13 January 1954 letter to C.M. Drury, the Deputy Minister of National Defence, Johnson discussed the impending end of the DCL-CMHC arrangements. The management contract was to be retired in progressive stages, beginning on 1 February 1954 and ending on 30 June of the same year. Johnson foresaw no major changes in policy or procedure, and noted that “continuity of job administration and supervision is

¹²⁵ DCL, *Annual Report*, 1953-54, 3.

¹²⁶ *Ibid.*

¹²⁷ CMHC, *Annual Report*, 1954, 28.

assured by the fact that most of the employees of CMHC who have been engaged in the administration and supervision of DCL projects will be transferred to DCL.”¹²⁸ The major change would be organizational, and Johnson explained a scheme that epitomized the Howe “style” of organization, operation, and control. DCL would now be administering the contracts on a centralized basis with most of the responsibility for major decisions resting with Head Office in Ottawa. Johnson pointed out, however, that there would be an emphasis on local control when dealing with decisions affecting the immediate progress of the job, and of having a direct line of communication to Head Office available when decisions were beyond the authority or qualifications of on-site personnel. Small DCL branch offices would replace the CMHC regional offices, but it was planned that most of the paperwork, including progress claims, would be dealt with at head office rather than at the local level. Most of the CMHC Head Office engineers who had been supervising the DND projects would also be transferred to DCL.¹²⁹

These engineers were not the only CMHC personnel to be transferred to Defence Construction. Before assuming full administration and supervision of defence construction contracts in the spring of 1954, DCL had a staff of 101. At that time, CMHC had 374 full-time and 418 part-time personnel on defence construction work. By April of 1954, DCL had a staff of 480 and branch offices in Halifax, Montreal, Toronto, Winnipeg, Edmonton, and Vancouver. As of 31 March 1955, its staff had grown to 579, 201 of whom were CMHC personnel who had been transferred to DCL.¹³⁰ The treatment of these new employees in terms of pay and benefits was a concern to a number of

¹²⁸ R.G. Johnson to C.M. Drury, DM/DND, “Re: Defence Construction (1951) Limited Agreement with Central Mortgage & Housing Corporation,” 13 January 1954, DCC in-house file, unlabelled folder.

¹²⁹ *Ibid.* On the Howe “style” of organization, see, amongst others, Bothwell and Kilbourn, *C.D. Howe*, 114-115; Newman, *The Canadian Establishment*, 326-329.

¹³⁰ *DCL Annual Report, 1954-55*, 3-4.

people, including C.D. Howe. On the first day of the change-over period, Howe wrote to Johnson about this issue. "I am informed," he wrote,

that your arrangement with Central Mortgage and Housing Corporation is that these employees are to be employed by you on terms not less favourable than those which they enjoyed while with such corporation. While these employees were with such corporation they had certain medical, hospital and insurance benefits under group arrangements, and it will be in order for you to continue with such arrangements pending final consideration of a report now being prepared by your officers.¹³¹

On the same day, Howe renewed the agreement between DDP and DCL, which had expired at the end of 1953. The agreement, retroactive to the first of the year, expired on 1 January 1954.¹³²

The following day, Howe also wrote to R.H. Winters, Minister of Public Works, to whom CMHC was responsible, thanking him for his cooperation in closing out the management contract. Howe noted that with his own approval discussions had already taken place between DCL and CMHC officials "on the basis that the substantial reduction in the volume of defence construction, the primary concern of CMHC with housing and the growth of the DCL organization over the past three years made practicable this re-arrangement of functions at this stage of the programme."¹³³ Howe also referred to the transfer of personnel, emphasizing the importance of continuity of personnel to the administration of defence projects.¹³⁴ At about the same time, arrangements were made for DCL employees to be included in the Public Service Superannuation Act, a measure

¹³¹ C.D. Howe to R.G. Johnson, 1 February 1954, DCC in-house file, unlabelled folder.

¹³² *Ibid.*

¹³³ C.D. Howe to R.H. Winters, 2 February 1954, DCC in-house file, unlabelled folder.

¹³⁴ *Ibid.*

that had already been taken for employees of other Crown corporations, including the CCC.¹³⁵

DCL continued to carry out the work necessary for the transition; on 16 March 1954, the corporation's legal advisor, J.D. Jennison, wrote to DDP's general counsel, enclosing a draft of the proposed submission to Cabinet covering DCL's assumption of management, supervision, and other services related to the construction of defence projects, as well as the corresponding retirement of CMHC from its management agreement with DCL.¹³⁶ Two days later, Jennison contacted CMHC's secretary about the same issue.¹³⁷ On 8 April 1954, Cabinet passed PC 1954/6/501, terminating the management agreement with CMHC at a date no later than 30 June 30.¹³⁸

Although the management contract had been terminated, a number of obligations remained as a result of the DCL-CMHC arrangement. Over 200 employees had been transferred to DCL from CMHC, and as Howe had made clear to Johnson, they were to continue to enjoy the same benefits that they would have received had they remained with CMHC. In December of 1954, Johnson wrote a series of letters to the Treasury Board to clarify the situation of DCL's employees with respect to insurance coverage – DCL had decided that the most satisfactory course would be to have all its employees covered by the group life insurance scheme to which the former CMHC employees belonged; the alternative was to have half of the workforce covered by the scheme, while the other half would be covered by similar insurance under the government's

¹³⁵ D.C. Abbott to C.D. Howe, 11 February 1954, DCC in-house file "Organization – Defence Construction (1951) Limited"; House of Commons, *Debates*, 14 May 1951, 2975.

¹³⁶ J.D. Jennison to D.A. Golden, 16 March 1954, DCC Documentation binder, item #26.

¹³⁷ J.D. Jennison to E.R. Gold, Secretary, CMHC, 18 March 1954, DCC Documentation binder, item #27.

¹³⁸ Copy of Minute of meeting of the Treasury Board, TB 468295, approved by Cabinet 8 April 1954, PC 1954/6/501, DCC in-house file H-11, "Organization – Old Company".

Superannuation Act.¹³⁹ The obligations towards CMHC personnel imposed by Howe and the measures taken to meet these obligations would have lasting effects for DCL's employment policies in the decades that followed the end of the management agreement.

In many ways, Defence Construction (1951) Limited had come a long way from its origins as Wartime Housing Limited. Resurrected by its creator, C.D. Howe, as an expedient and ostensibly temporary means of filling an urgent government requirement, Wartime Housing Limited found itself renamed Defence Construction Limited and charged with the responsibilities of a tendering and supervisory authority for the Department of National Defence. A management contract with the Central Mortgage and Housing Corporation – which, in an interesting turn of events, had assumed responsibility for many of WHL's remaining functions in the mid-1940s – allowed DCL to be up and running and fulfilling its mandate in short order. By 1954, a brief downturn in defence construction requirements and an anticipated upswing in CMHC's housing obligations provided a lull for DCL to take full responsibility for its functions. The management agreement with CMHC was phased out, and DCL gained the services of hundreds of experienced employees.

In other ways, some elements had not changed between the creation of Wartime Housing Limited and the establishment of Defence Construction (1951) Limited as a distinct entity. Both, of course, were Crown corporations responsible to C.D. Howe, and both had been created as expedient responses to military crises – WHL for the Second World War, and DC(1951)L for the early Cold War. Both corporations also made extensive use of private-sector personnel and expertise, but this was perhaps more

¹³⁹ R.G. Johnson to J.J. Deutsch, Secretary, Treasury Board, "Re: Superannuation Act and Supplementary Death Benefit," 22 December 1954, DCC in-house file, unlabelled folder. Johnson refers to earlier letters on this matter which do not appear to have survived in DCC files.

obviously the case for Defence Construction than for its predecessor. Furthermore, both also served as policy instruments to help meet the government's broader goals. WHL was an agent for providing housing to war workers and veterans, and as such assisted the prosecution of Canada's war effort and the transition to a peacetime economy. Defence Construction, in addition to providing infrastructure for Cold War defence programmes in Canada and abroad, would, as will be seen, play an important role in Ottawa's goal of furthering the interests of the Canadian construction industry, its suppliers, and related services. These similarities also underline Howe's penchant for expedient solutions and the "tried and true"; in both instances a "Crown" offered a solution to the problem of providing infrastructure for government programmes that was quicker than the building up of this capability within an existing or new department.

While this bureaucratic sleight-of-hand arguably demonstrated a flexible, pragmatic, and expedient approach to meeting the government's objectives, a cynic might have noted that what was going on was a tremendous and non-Parliamentary concentration of power in one outfit. Such criticisms had been leveled against the Department of Defence Production at the time of its creation, and would continue to dog the department while Howe remained its minister. By and large, however, these were directed at the department's never-used emergency powers rather than at the actions of its "Crowns."¹⁴⁰ Such criticism as was leveled at these organizations centered more on the potential for duplication of effort between the Department of National Defence, DDP employees, the Canadian Commercial Corporation, and Defence Construction, rather

¹⁴⁰ Bothwell and Kilbourn, *C.D. Howe*, 255-257; 299-302.

than at the lack of Parliamentary oversight.¹⁴¹ In a striking contrast with contemporary sensibilities, the close relationship of DCL and the private sector, however, does not appear to have received much, if any, attention or criticism from politicians or the press, or from industry itself.¹⁴²

At the end of June 1954, therefore, DCL had assumed the full burden of its mandate. The corporation was responsible for the supervision of defence construction contracts in Canada and for Canadian forces in Europe. These projects encompassed radar early warning systems in Canada, facilities for the Royal Canadian Navy, the Canadian Army, and the Royal Canadian Air Force at home, and for the Royal Canadian Air Force's squadrons based in Europe as part of Canada's NATO commitments. In years to come it would continue with similar undertakings while adding the responsibility of Colombo Plan foreign aid projects and other specialized tasks for the government. It is to these tasks that this thesis will turn in the next chapters.

¹⁴¹ See, for instance, House of Commons, *Debates*, 16 May 1951, 3096-3101; 24 May 1951, 3346-3349. On contemporary concerns about limited Parliamentary oversight of Crown corporations, see House of Commons, *Debates*, 15 December 1951, 2002-2008.

¹⁴² Howe defended this use of private sector personnel in senior DDP positions, arguing that it had been used "chiefly to secure specialists from industry." House of Commons, *Debates*, 14 June 1951, 4069.

Chapter 2

The First Round: The Pinetree Line and the Accelerated Defence Programme, 1950-1958

If you want to understand the complex U.S. – Canadian air defence structure it helps to be a financial as well as a military expert.

Clive Baxter, 1963¹

The creation of Defence Construction (1951) Limited was a direct outcome of the Canadian government's response to mounting Cold War tensions that had been brought to a head by the June 1950 outbreak of the war in Korea. Acting on a growing sense of vulnerability and uncertainty, Ottawa had already approved the development of a jet-engined interceptor, the Avro Canada CF-100, which was to perform the dual roles of defending Canadian airspace against Soviet bombers and stimulating the development of a high-tech domestic aircraft industry. By 1948, the government was already increasing defence expenditures and committing itself to a policy of limited rearmament and preparation for the threat of war.² The choice of an interceptor and the fears of Soviet bombers clearly revealed where the Canadian military and the Canadian government believed the threat lay. Advances in aviation technology during the Second World War meant that North America was no longer secure behind the Atlantic and Pacific Oceans and the Arctic ice cap. The development of the atomic bomb by the end of the war also made the bomber a vastly more dangerous threat; a single aircraft could now inflict intolerable damage on a target as large as a city. The Soviet development of a modern bomber capability, coupled with the testing of the Soviet Union's first atomic bomb in

¹ Clive Baxter, "Here is the Full Defence Story," *Financial Post*, 23 February 1963, 22.

² Greig Stewart, *Shutting Down the National Dream: A.V. Roe and the Tragedy of the Avro Arrow*, (Toronto: McGraw-Hill Ryerson, 1997), 59-66; Robert Bothwell and William Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland and Stewart, 1979), 266; Lawrence R. Aronsen, "Canada's Postwar Re-armament: Another Look at American Theories of the Military-Industrial Complex," *CHA Historical Papers*, 1981, 175-186.

1949 had given additional encouragement to American and Canadian plans for continental air defence that had been under development since 1946. The outbreak of war in Korea not only drove the construction of such air defences, but also prompted urgent and significant rearmament programmes in Canada, the United States, and other western countries.

Defence Construction Limited's first major projects involved the creation of defence infrastructure to meet both Canadian and American military requirements in response to these concerns about Soviet intentions and the Korean War. The Pinetree Line was a joint Canadian-American radar warning and interceptor control network, while the Accelerated Defence Programme provided for the expansion and rearmament of Canada's military. A significant element of Canadian rearmament plans was predicated on the provision of various forms of infrastructure, including air bases, army camps, port installations, and a wide range of support facilities such as ammunition depots. Both of these major undertakings were a response to concerns about the Soviet threat. Pinetree formed the first significant element of permanent North American defences against Soviet bombers, while the Accelerated Defence Programme involved infrastructure such as air bases that contributed to continental defence as well as installations such as port facilities and army bases that were intended to help Canada meet external military obligations that were a central part of its membership in the North Atlantic Treaty Organization.

The Pinetree Line ultimately consisted of forty-four radar stations on Canadian and American territory. As initially planned and built, these installations stretched roughly along the 49th parallel, but growing concerns about the threat posed by Soviet

bombers led to its almost immediate expansion. Additional stations were built stretching northwards along the Labrador coast, while supplementary radar sites were created to cover gaps in the existing coverage at various locations around the country. The Accelerated Defence Programme, launched as a direct response to the outbreak of war in Korea, provided for the expansion and rearmament of Canada's armed forces. While much of the expenditure was on new personnel, training, and equipment, expansion and rearmament also required new infrastructure for the military. Such work was not evenly apportioned, and highlighted the significance of continental defence for both planners and politicians. The highest priority was assigned to projects for the Royal Canadian Air Force (RCAF), which also received the greatest portion, both in amount and in value, of construction contracts administered by DCL.³ The Army, with its requirements for new bases and training facilities, came second, while the Royal Canadian Navy (RCN) appears to have been a distant third when it came to the apportioning of infrastructure projects, and much the same held true for the expenditures on their activities as a whole.⁴

This lopsided distribution was to persist through the rearmament programme of the 1950s. In part, it was a reflection of the relative importance assigned to each of the services, with the RCAF's role in continental defence justifying and necessitating this pattern of expenditures, but it was also a consequence of the RCAF's expertise at employing the national security bureaucracy in Ottawa to meet its own agenda. For much of the 1950s, the air force was the most effective of the services at obtaining approval for

³ "This News Spells \$100 Millions," *Financial Post*, 29 January 1955, 20.

⁴ The 1956-57 appropriations, for instance, were \$872,383,000 for the RCAF, \$476,739,000 for the Army, and \$325,000,000 for the RCN. Canada, Department of National Defence, *Report on National Defence*, (Ottawa: Queen's Printer, 1957), 37. For a concise summary of the expanding size of the RCAF in the postwar era, see Sandy Babcock, "Withered on the Vine: The Postwar RCAF Auxiliary," in *Canadian History Since the 17th Century: Proceedings of the Canadian Military History Conference, Ottawa, 5-9 May 2000*, Yves Tremblay, ed., 395-397.

its projects (and those of the USAF) and, more importantly, the most effective at obtaining *funds* for these undertakings. Only towards the end of the 1950s, with the retrenchment in military expenditures and the advent of new threats would the RCAF find itself ensnared in the very committee system that it had so successfully manipulated.⁵ The delays and obstacles that eventually emerged as the system grew more and more complicated contributed in no small part to the dramatic and controversial cancellation of the Avro Arrow interceptor in early 1959.

The Pinetree Line

One of the most enduring symbols of the early Cold War is the radar base, an integral part of the aerial defence against the threat of Soviet bombers and their crews intent on dropping nuclear weapons on North American targets. These bases were built to provide early warning of attack and to help co-ordinate and control defending forces; they had no capability of engaging the bombers themselves. Although serving an explicitly military purpose, these stations would not have been identifiable as warlike to earlier generations. In their function, they were more like a watchtower than a fort, meant to provide warning of an attack rather than to try to stop it. Often built on the highest ground to maximize the effectiveness of their radar coverage of the surrounding airspace, with their white radomes protecting the radar equipment from the environment, these radar bases became distinctive landmarks evocative of a new, highly technological era of aerial warfare. In Canada, while networks of these installations ultimately stretched across the country from east to west and north to south, the earliest installment was built

⁵ Robert H. Clark, "Canadian Weapons Acquisition: The Case of the Bomarc Missile," (M.A. Thesis, Royal Military College of Canada, 1983), 24-44, 72-77; Russell Isinger, "The Avro Canada CF-105 Arrow Programme: Decisions and Determinants," (MA Thesis, University of Saskatchewan, 1997).

in the southern part of the country as part of a joint Canadian-American defence agreement – the Pinetree Line.⁶

The Pinetree line was a significant consequence of the early Cold War, the outbreak of the Korean War, and the emergence of a new focus on continental defence against aerial attack. Given Canada's location in the middle of the shortest aerial routes between the Soviet Union and the United States – across the Arctic – and in light of Canada's wartime alliance with America, it was not surprising that Canada and Canadian territory would be directly involved in American air defence plans. Although it is well-known by historians that Canada was involved in much of the planning for such defence systems when Canadian territory was involved, it is not as widely known that the conditions laid out in the agreements governing the various projects and the behind-the-scenes negotiations that accompanied them specified equal or even preferential treatment for Canadian construction contractors and suppliers.⁷ In some cases in the later 1950s,

⁶ Radar coverage was affected by terrain; hills blocked the necessary signals, and because of design limitations many radars had difficulty tracking aircraft flying at low altitudes. Minimizing interference from terrain required preliminary site surveys and often led to the radar being sited on high points. The Pinetree Line station at Foymount, Ontario, for instance, was sited at the highest inhabited point in the southern part of the province. Providing low-altitude coverage was more challenging, and for much of the 1950s involved Ground Observer Corps – volunteer aircraft spotters, in other words – in both Canada and the United States. By the latter part of the decade, however, these observers were replaced by specialized “gap filler” radars that provided low-altitude coverage. David F. Winkler, *Searching the Skies: The Legacy of the United States Cold War Defense Radar Program*, (United States Air Force Air Combat Command, 1997), 35-36. Strictly speaking, not all of the radar networks built in Canada made use of radomes. The Mid-Canada Line, discussed in Chapter Three, made use of rather different detection equipment, with the result that its installations used towers with parabolic antennae that looked much like modern-day communications towers for microwave signals.

⁷ Canada's role in the development of North American air defences has received intermittent attention over the years, but following the 1987 publication of Joseph Jockel's *No Boundaries Upstairs*, a number of historians and political scientists have more closely examined Canada's actions and its debates both within the government and with the United States. See, amongst others, Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987); Ann Denholm Crosby, *Dilemmas in Defence Decision-Making: Constructing Canada's Role in NORAD, 1958-96*, (New York: St. Martin's Press, 1998); Andrew Richter, *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950-63*, (Vancouver: UBC Press, 2002). One of the most accessible studies of Canadian defence policy in the crucial years of the

eligibility was limited to Canadian firms. In addition to its obvious defence construction duties in the building of these sites, DCL was directly involved in the negotiation and implementation of many of these conditions on projects from the 1950s onwards. Even at the early stage of continental defence projects represented by the Pinetree Line, the Canadian government intended that Canadian firms, particularly construction contractors, should benefit from these undertakings. In its dealings with Canadian and American officials as part of the Pinetree Line construction effort, DCL helped advance the interests of the Canadian construction industry by attempting to maximize the involvement of domestic contractors in preference to their American counterparts. As a consequence of these actions, DCL was working as an instrument of government policy not only to expedite the construction of these sites, but also in representing and advancing the interests of the Canadian construction industry.

The negotiation and construction of the Pinetree Line took place within a framework of continental defence co-operation that dated back to the early days of the Second World War. Formal Canadian-American defence co-operation dated back to the 18 August 1940 Ogdensburg Declaration that sanctioned the establishment of the Permanent Joint Board on Defence (PJBD) and the concept of joint Canada-US defence planning. While wartime continental defence plans were initiated, the Allies' improving fortunes in the war meant that by late 1943 these were of reduced priority to Canadian-American defence relations.⁸ Immediately following the end of the war, there was little

late 1950s and early 1960s remains Jon B. McLin's *Canada's changing defence policy, 1957-1963: The Problems of a Middle Power in Alliance*, (Baltimore: Johns Hopkins Press, 1967).

⁸ C.P. Stacey, *Arms, Men and Governments: The War Policies of Canada, 1939-1945*, (Ottawa: Queen's Printer, 1970), 327-395, but especially 343-354; Stanley W. Dziuban, *Military Relations Between the United States and Canada*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1959), 1-141; John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, (Montreal & Kingston: McGill-Queen's University Press, 1994), 156-166.

interest, and few resources, especially in Canada, for joint military planning and activities, but some discussions continued nevertheless. An American initiative at the January 1946 meeting of the PJBD first proposed a joint Canadian-American Chiefs of Staff as an element of the postwar joint security plan came to naught, but a joint planning staff, which referred to itself as the "Canadian-United States Military Co-operation Committee" (MCC), was formed in May of 1946.⁹

The MCC quickly created and approved an "Appreciation of the Requirements for Canadian-U.S. Security" and a "Joint Canadian-United States Basic Security Plan." By about 1950, the planners projected, the "potential enemy" (*i.e.* the Soviet Union) would likely have the atomic bomb and might be able to use it to attack vulnerable areas in Canada and the United States. While preparedness for the offense was emphasized, defensive measures against this threat were also considered by the MCC, which urged that action to implement defence plans be taken in short order. The committee worked on various appendices to the Basic Security Plan through the summer and fall of 1946, and by November had finished a draft of an "Air Interceptor and Air Warning Plan."¹⁰ The scheme was ambitious, expensive and, given the technology of the time, almost certainly unworkable. The planners laid out a radar perimeter for the continent and the northern and eastern coasts of Greenland, as well as dense radar coverage of the industrial

⁹ When discussed by the Board in March of that year, this ambitious suggestion raised eyebrows in Washington and caused concern in Ottawa. The American Joint Chiefs of Staff had been concerned that a joint Canadian-American Chiefs of Staff organization would create a precedent for other organizations that they would have to meet with in the event of war. The Canadian concerns were even stronger, and centered around the form and implications of the statement, which gave the impression of being a joint security pact rather than a working paper on the principles of defence co-operation to be used by defence planners. The proposal was accordingly dropped. Jockel, *No Boundaries Upstairs*, 14-17; James Eayrs, *In Defence of Canada, Volume III: Peacemaking and Deterrence*, (Toronto: University of Toronto Press, 1972), 336-337.

¹⁰ *Ibid.*, 336-344; Jockel, *No Boundaries Upstairs*, 17-19. A copy of the December 1946 draft of the Basic Security Plan, including the Air Interceptor and Air Warning Appendix, can be found in Library and Archives Canada (hereafter LAC), RG24, vol. 8067, file NSMS 1270-15-7(1).

heartland of the northeastern United States and the St. Lawrence River valley and the lower Great Lakes in Canada. Joseph Jockel has referred to this plan as “a bombshell, calling for, in essence, Fortress North America,” and has noted that the threat to which it was designed to respond was overstated.¹¹

Not surprisingly, the political reaction to this plan was lethargic. At that time, the threat of Soviet aerial attack was not seen as significant, and defence budgets were limited. Plans on such a scale would not have been implemented even if they had been technologically feasible. Furthermore, a belief appears to have developed among some senior officials, including US President Harry Truman, that war with the Soviet Union would be unlikely so long as the Americans possessed a monopoly on the atomic bomb. Given these circumstances, the proposed air defence plan stood little chance of acceptance, and was rightly seen as overly ambitious and impractical. As Minister of National Defence Brooke Claxton would later note in his memoirs, “the effectiveness of such a plan at the time was doubtful and the cost of this was fantastic, particularly in the light of the post-war defence budgets.”¹²

Further complicating matters, this work was taking place at the same time that Ottawa was receiving American requests to use Canadian territory for weather stations

¹¹ Jockel, *No Boundaries Upstairs*, 19-20. See comments on technical challenges in the January 1950 radar document, specifically the “trailer” aircraft and the problems with northern radio communications. Given what intelligence sources revealed about Soviet bomber strengths a few years later, and given what we now know of Soviet capabilities at that time, the ability of the Soviet Union to carry out an intercontinental bomber attack in late 1946 or early 1947 was nonexistent, particularly since the USSR did not yet have long range bombers or the nuclear weapons with which to arm them. Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Air Force History Support Office, 1991), 130; Steve Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 12-16.

¹² Brooke Claxton, *Memoirs*, 958-959, Library and Archives of Canada (hereafter referred to as LAC), MG32 B5, vol.253. On the effects of the American atomic monopoly, see, amongst others, Norman Friedman, *The Fifty Year War: Conflict and Strategy in the Cold War*, (Annapolis: Naval Institute Press, 2000), 33-40, 123-137; Harry R. Borowski, *A Hollow Threat: Strategic Air Power and Containment before Korea*, (Westport, CT: Greenwood Press, 1982).

and other defence purposes.¹³ Bilateral meetings in late 1946 did little or nothing to dispel Canadian apprehensions about American plans for the Arctic, although Truman and Mackenzie King agreed that further discussions would be carried out at the diplomatic rather than at the inter-service level. Decisions on the draft Air Warning and Air Interceptor Appendix and the PJBD's 35th Recommendation – that Canada and the United States continue their wartime collaboration on continental defence – were also deferred by Cabinet.¹⁴ It ordered an end to Canadian participation in MCC work pending the completion of diplomatic discussions, while the 35th Recommendation would be considered once it was formally referred by the PJBD. The bilateral discussions ultimately drew a distinction between planning and implementation – the Basic Security Plan and its appendices would become a planning document for Canadian and American military staff rather than an actual plan of action agreed to or rejected by their governments.¹⁵ In Canada, at least, this approach had the advantage of avoiding financially unworkable commitments at a time of constrained defence spending and limited concern about continental defence. Furthermore, the avoidance of this significant commitment would also have sat well with Prime Minister Mackenzie King. Near retirement, he was profoundly reluctant to have Canada enter into an agreement on defence co-operation with the United States that excluded Great Britain, since such a

¹³ Jockel, *No Boundaries Upstairs*, 20-24; Eayrs, *In Defence of Canada, Volume III*, 351-356.

¹⁴ Richter, *Avoiding Armageddon*, 22-23; Jockel, *No Boundaries Upstairs*, 26-28. In light of the draft AW&AI Appendix's significance for the RCAF, it is interesting to note that the Chief of the Air Staff (CAS), Air Marshal Robert Leckie, did not support the ambitious plan when it was presented at the Cabinet Defence Committee meeting in November 1946. According to Jockel, Air Vice-Marshal W.A. Curtis, Canada's MCC chairman and Leckie's successor as CAS, "bitterly resented" Leckie's position on the matter. The following year, however, Leckie reversed his position and argued for the partial implementation of the appendix, apparently in an effort to obtain more funding for the RCAF. *Ibid.*

¹⁵ Jockel, *No Boundaries Upstairs*, 24-29.

bilateral move would have broken with a fundamental Liberal foreign policy principle of keeping “in step” with both countries.¹⁶

In February of 1947, the American and Canadian governments issued a “Joint Statement on Defense Collaboration” based largely on the recommendations of the PJBD. It emphasized the continuing importance of co-operative defence planning and ongoing efforts, but made no mention of the MCC and joint defence planning.¹⁷ Shortly thereafter, Canadian-American economic relations were challenged by Canada’s shrinking foreign exchange reserves, a situation brought about by British financial hardships that disrupted pre-war import-export patterns. Later in 1947 and into 1948, discussions of a proposed customs union eventually came to naught as Mackenzie King had second thoughts about its broader implications, harkening back to the 1911 Liberal defeat over the issue of reciprocity. A Prime Minister who mistrusted the ulterior motives of the United States and was reluctant to enter into a bilateral commitment with that country – an arrangement that he feared might affect the historical pattern of the “North Atlantic Triangle” with Canada as linchpin – as well as the absence of an obvious direct Soviet military threat to North America does much to explain the Canadian government’s reluctance to undertake more extensive continental defence measures than those it had agreed to in early 1947.¹⁸

¹⁶ Eayrs, *In Defence of Canada, Volume III*, 345; Richter, *Avoiding Armageddon*, 23. More broadly, King also appears to have had significant reservations about entering into agreements as part of international organizations. John Hilliker and Donald Barry, *Canada’s Department of External Affairs, Volume II: Coming of Age, 1946-1968*, (Montreal and Kingston: McGill-Queen’s University Press, 1995), 37-39, 41-43.

¹⁷ Jockel, *No Boundaries Upstairs*, 28-29; Richter, *Avoiding Armageddon*, 23; David Bercuson, *True Patriot The Life of Brooke Claxton, 1898-1960*, (Toronto: University of Toronto Press, 1993), 154-158.

¹⁸ R.D. Cuff and J.L. Granatstein, *American Dollars – Canadian Prosperity: Canadian-American Economic Relations, 1945-1950*, (Toronto: Samuel-Stevens, 1978), 21-82; Bothwell and Kilbourn, *C.D. Howe*, 216-220; Hilliker and Barry, *Canada’s Department of External Affairs, Volume II*, 37-39; Thompson and Randall, *Canada and the United States*, 199-202. Eayrs, *In Defence of Canada, Volume III*, 344-346. Unfortunately, the history of the Department of External Affairs is frustratingly silent on this and other matters concerning continental defence prior to 1952.

In the years that followed, some efforts to establish the basic elements of a Canadian air defence system were made. During 1947 and 1948, planning for the postwar RCAF produced a decision to focus on a fighter force, which led to the formulation of a Model Interceptor Plan calling for a number of radars located to protect some Canadian cities. As originally approved by the Cabinet Defence Committee (CDC) in November of 1947, the plan would have been sited in the area north and west of Lake Superior, but it was subsequently relocated to eastern Canada. The plan was intended to provide the air force with experience in radar and fighter operations, to test air defence concepts, and to facilitate further advances in the field. The RCAF's Air Defence Group was established on 1 December 1948, and had aircraft deployed at RCAF Station St. Hubert in 1949. By early 1950, however, the RCAF was proposing to develop an air defence system in place of the model interceptor plan. In contrast with its predecessor, the new system would be able to provide protection for the "hard core" of vital targets in Ontario and Quebec, along the north shore of the lower Great Lakes and the St. Lawrence River. The system, it was expected, would be installed and operational by 1954.¹⁹

South of the border, the United States had already begun extremely limited experimental operations of air defence systems by the end of 1947. Deteriorating East-West relations in early 1948 prompted the fielding of Second World War vintage radars

¹⁹ "Some Aspects of Canada's Air Defence System," 15 March 1954, LAC, RG2, Series B2, accession 90-91/154, box 28, file D-28-3, pt.2, "Department of National Defence – Canada-United States Defence Relations – Official"; "Canadian Radar System," 12 January 1950, DHH 73/404; "An Extract from the Memorandum for Cabinet Defence Committee on Defence Estimates 1950-51 (Dated 16 Feb 50)," 15 March 1950, Appendix B – "Royal Canadian Air Force: Air Defence System – 1950-55"; Memorandum, CAS to AMAP, "Armed Forces Programme: 1950-51," 23 February 1950, DHH 73/1223, Series 3, Box 65, file 1324. For a detailed discussion of RCAF planning and fighter procurement at this time, including the consequences of reduced defence expenditures and the subsequent decision to focus on fighters, see Randall Wakelam, "Flights of Fancy: RCAF Fighter Procurement, 1945-1954," (MA Thesis, RMC, 1997), 72-106. A summary of Canadian radar defence planning to the start of 1950 can be found in Appendix "A" to "Canadian Radar System." Similar proposals for "model systems" intended to test air defence concepts and tactics had also been proposed in the United States. Schaffel, *The Emerging Shield*, 92.

at vital points around the country.²⁰ These installations would soon be incorporated in the aptly named temporary “Lashup” system, intended as a stopgap until a permanent system was ready. By early 1950, the forty-four radars of the completed “Lashup” system offered limited coverage of a number of key areas in the US.²¹ By this time the Americans were considering the “Permanent” system, which consisted of some eighty-five radar stations with accompanying control centres in the continental United States and in Alaska, and which would form the basis for future expansion. It received military approval in 1948, but constraints on defence expenditures meant that work was not begun until late 1949, when the United States Air Force instructed the Army Corps of Engineers to proceed with the construction of the first twenty-four sites in the system. In July of 1950, authorization was given to proceed with the next twenty-eight sites.²²

While the Americans were expanding their radar network, Canada was, as discussed above, working on its own system to defend the country’s “vital areas.” Discussions between the air forces in the two countries about coordinating their radar defence plans were perhaps unavoidable, particularly since the relatively limited scale of the Canadian plans worried the Americans, who saw radar coverage in Canada as a vital component of any American early warning system. Installations on Canadian territory could provide radar coverage further to the north, allowing more warning time in case of attack, and consequently increasing the effectiveness of American defences. Bilateral

²⁰ Winkler, *Searching the Skies*, 14-17. Schaffel, *The Emerging Shield*, 76-81.

²¹ Roy J. Fletcher, “Military Radar Defence Lines of Northern North America: An Historical Geography,” October 1989, *Polar Record* 26:159 (1990): 265-276; Winkler, *Searching the Skies*, 17-20. Schaffel, *The Emerging Shield*, 92-98, 122-124. For a map of Lashup installations as of April 1950, see Winkler, *Searching the Skies*, 20.

²² *Ibid.*, 16-22; Schaffel, *The Emerging Shield*, 119-122. The USAF did not handle its own construction requirements but was instead required to use the services of the US Army Corps of Engineers or its US Navy counterpart unless the Secretary of Defense permitted different arrangements. United States Air Force, Strategic Air Command, History and Research Division, Directorate of Information, *History of the Canadian Refueling Base Program*, (SAC Historical Study No. 87, 1962), 7.

discussions led to the establishment of the Pinetree Line, a joint undertaking which provided radar coverage in both countries, although the majority of Canada lay north of the areas covered.²³ Pinetree would incorporate the existing Canadian plans for a radar defence network; the Cabinet Defence Committee noted in December of 1950 that Canada was building nine aircraft control and warning stations, which provided Ground Controlled Interception service for interceptor aircraft, and that "the proposed acceleration of the Canada-U.S. radar plan was still under discussion with the Americans who were being asked to consider assuming the major share of the expense of various stations that might be required in Canada, in view of their importance to the United States."²⁴

In 1950, the methods for aircraft detection and interceptor control still relied on methods developed during the early years of radar leading up to the Second World War. The system, referred to as Ground Controlled Interception (GCI), relied upon radar to track both the interceptor and its target, with personnel on the ground guiding the former to within range of the latter.²⁵ While this procedure had been adequate in the relatively small European theatre and with aircraft traveling at speeds of a few hundred miles per hour, the requirements of postwar air defence pushed these techniques to their limits and beyond. The larger airspace over North America, and, more importantly, the increasing

²³ Jockel, *No Boundaries Upstairs*, 42-44; Winkler, *Searching the Skies*, 20, 22. Eayrs, *In Defence of Canada, Volume III*, 357-359.

²⁴ "Some Aspects of Canada's Air Defence System," 15 March 1954, LAC, RG 2, series B-2, accession 90-91/154, box 28, file D-28-3, pt. 2, "Department of National Defence – Canada United States Defence Relations – Official"; Minutes of 69th meeting of Cabinet Defence Committee, 28 December 1950, 7, DHH 73/1223, series 3, box 65, file 1324.

²⁵ Schaffel, *The Emerging Shield*, 197-198; B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defense from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 52-53; Brian Johnson, *The Secret War*, (London: BBC, 1978), 77-79. For much of the 1950s, both Canada and the United States also had "Ground Observer Corps" of volunteers who watched for low-flying aircraft; they provided a theoretically useful adjunct to radar systems, especially in areas where low-level radar coverage was not available. Bruce-Briggs, *The Shield of Faith*, 62-63.

speeds of bombers and interceptors, posed significant challenges to defenders, and prompted the development of more ambitious and complex air defence systems.²⁶

It was not enough to simply detect incoming aircraft, however; they then had to be identified, intercepted, and, if necessary, destroyed. While identification could be performed electronically if the aircraft on the radar screen was provided with the suitable equipment ("Identification Friend or Foe," or IFF), this method was not always reliable, and identification often had to be performed visually by defending aircraft. These aircraft also provided the third part of the process – interception – and their demanding requirements led to the development of specialized interceptor aircraft. Ideally, these interceptors would be capable of operation at night and in all sorts of weather, moving in on their targets under ground control until the radar equipment they carried allowed them to close with their targets. Given the state of electronics in the 1950s, this often resulted in interceptors with two crew members, a pilot and a radar operator (often called a "scope dope") whose responsibilities encompassed navigation, communication with the ground, and the operation of the interceptor's radar. Finally, if the target proved hostile, it had to be destroyed. The growing speed of bombers and fighters meant that the machine guns and cannon that had proved barely sufficient during the Second World War would have even less time to damage their targets as the aircraft closed with each other; higher

²⁶ These problems were recognized by the time Pinetree was under construction. In the late 1940s and early 1950s a series of committees were created in the United States to evaluate questions concerning continental defence. Composed of military personnel, scientists, and other senior officials or businessmen, including a few Canadians, these committees produced a variety of recommendations, some of which proved to be quite influential. The first such committee was the Air Defense Systems Engineering Committee, often called the Valley Committee, established by the USAF in December of 1949 under the leadership of Dr. George E. Valley of MIT, in response to the explosion of the first Soviet atomic bomb in August of 1949. The committee recognized the limitations of current GCI procedures, and made ambitious recommendations for the computerization of the system; the results of these recommendations are discussed in Chapter Seven. John F. Jacobs, "SAGE Overview," *IEEE Annals of the History of Computing* 5:4 (October 1983), 323-324; Schaffel, *The Emerging Shield*, 144-145; Bruce-Briggs, *The Shield of Faith*, 52-55. A number of these committees and their recommendations will be examined in later chapters.

bomber speeds also meant that interceptors chasing their targets for a second attack faced longer pursuits and a smaller chance of a successful attack.²⁷

Interceptor tactics and armament were consequently altered and increased; the provision of radar and onboard fire control computers allowed attacks by interceptors approaching the bombers from the front rather than requiring lengthy chases from astern; unguided rockets launched in salvos were intended to guarantee at least one hit during such frontal attacks, and also kept the interceptors out of range of the bombers' defensive weapons. Later in the 1950s, additional weapons, including guided missiles, were fielded, and by 1957 the United States applied nuclear weapons to air defence. The resultant weapon, the AIR-2A "Genie" was an unguided rocket; its flight was so fast and the yield of its warhead sufficiently large that a bomber stood virtually no chance of evasion, so a guidance system was therefore considered unnecessary. In 1950, however, such developments still lay in the future, and the interceptor forces available for continental defence consisted almost entirely of aircraft left over from the Second World War and some early postwar designs of limited capability, although purpose-built interceptors like the Avro Canada CF-100 were on the verge of entering service.²⁸

The development of these interceptor forces, as well as planning and negotiations for the Pinetree Line and the development of continental defences in general were given several strong pushes in 1949 and 1950. Although the Soviet Union had already unveiled a reverse-engineered version of the American B-29 strategic bomber in 1947, the testing of the first Soviet atomic bomb in August 1949 provided a powerful boost to the case for

²⁷ *Ibid.*, 57-60; Schaffel, *The Emerging Shield*, 98-102.

²⁸ Bill Gunston, *Avionics: The Story and Technology of Aviation Electronics*, (Wellingborough: Patrick Stevens Limited, 1990), 95-96; Bruce-Briggs, *The Shield of Faith*, 59-63; Clearwater, *U.S. Nuclear Weapons in Canada*, 45-49; Larry Milberry, *The Avro CF-100*, (Toronto: CANAV Books, 1981), 49-52, 57-58.

air defence and increased defence spending in general, particularly in the United States. The Soviet Union's nuclear capability, coupled with the means of delivering it to North American targets, marked the emergence of a new threat to a continent that had previously enjoyed the almost total protection against enemy attack provided by the Atlantic and Pacific Oceans and the vast distances of the Arctic. Increasing western apprehensions about perceived Communist expansionism had led to the pursuit of collective security through the creation of the North Atlantic Treaty Organization (NATO) in 1949. When these events were followed in June 1950 by North Korea's initially successful invasion of South Korea, dramatic increases in military forces and defence spending in NATO countries, including Canada, were among the most visible reactions.²⁹

As the Cabinet Defence Committee had noted in December 1950, Canada and the United States were discussing a joint radar defence plan. At a meeting in early January 1951, the PJBD made a series of proposals, including the creation in Canada of a joint Canada-US aircraft control and warning system. The Cabinet Defence Committee recommended acceptance in principle of the proposed system, as did Cabinet at a 24

²⁹ The reverse engineering of the B-29, several examples of which had landed in the USSR during the Second World War, was a significant accomplishment for the Soviet aircraft industry and related sectors of the country's high technology sectors. The resultant aircraft, the Tupolev Tu-4, was not simply a copy of the American aircraft; differing standards (imperial vs. metric measurements, for instance) posed significant challenges, as did the creation of advanced electronics and synthetic materials. While externally almost identical to the B-29, the Tu-4 was appreciably different, most notably in range. The provision of powerful, efficient, reliable engines were a major stumbling block – they had been a challenge for the Americans – and left the Tu-4 with a range about half that of the B-29. Adequate engines would be a recurring challenge for the designers of Soviet long-range bombers, but these and other problems were not immediately apparent to western intelligence analysts and other officials, who assumed that the Soviet equipment was equal in performance to its western counterparts. Zaloga, *The Kremlin's Nuclear Sword*, 12-16, 23-31; Eayrs, *In Defence of Canada, Volume III*, 358-359; Bruce-Briggs, *The Shield of Faith*, 49-50; Norman Hillmer and J.L. Granatstein, *Empire to Umpire: Canada and the World to the 1990s*, (Toronto: Copp Clark Longman, 1994), 199-205, 211-216; Friedman, *The Fifty Year War*, 135-143, 149-159.

January meeting.³⁰ Driven by the “serious international situation,” Minister of National Defence Brooke Claxton explained that the “Cabinet Defence Committee had recommended acceptance in principle of these proposals so as to permit the Canadian section of the P.J.B.D. to participate in a Board recommendation to the two governments along these lines.”³¹ In recommending this approach, the CDC sought to use the means of formal bilateral defence relations between the two countries to facilitate and expedite the construction of this new radar network. Claxton also acknowledged DCL’s role in the implementation of this programme, noting that

As much as possible of the equipment for the stations would be bought in Canada, where it was thought a substantial part of the electronic equipment could be produced. *Canadian contractors, through Defence Construction Corporation [sic] would build as many as possible of the stations*, although the U.S.A.F. would construct the stations in Northern Labrador (and Greenland). Any U.S. civilian contractors employed on the network would use Canadian labour and materials as much as possible and would be subject to normal employment and taxation practices.³²

In addition to the construction provisions, Claxton had also noted the possibility of Canadian companies providing electronic equipment for the Pinetree Line. He also explained that “one great advantage of the project was that Canada would not bear the responsibility alone for bombers that penetrated to the United States,” and that unlike the ambitious Air Interceptor and Air Warning plan of 1946-47, “this scheme would be

³⁰ “Department of National Defence – Canada United States Defence Relations – Official”; Minutes of 69th meeting of Cabinet Defence Committee, 28 December 1950, 7, DHH 73/1223, series 3, box 65, file 1324; Cabinet Conclusions, 24 January 1951, 14-17 LAC RG2, series A-5-a, vol. 2647.

³¹ Cabinet Conclusions, 24 January 1951, 16.

³² Cabinet Conclusions, 24 January 1951, 15-16. Senior officials – or the stenographers – sometimes proved unable to remember the corporation’s name. In 1954, Lester B. Pearson referred to DCL as the “Department of Defence Constructions.” Memorandum, SSEA to Cabinet, “Colombo Plan Aid for Pakistan,” 24 November 1954, Cabinet Document 263-54, in Canada, Department of Foreign Affairs and International Trade, *Documents on Canadian External Relations: Volume 20, 1954*, (hereafter DCER) Greg Donaghy, ed., (Ottawa: Department of Foreign Affairs and International Trade, 1997), 901.

practicable and effective.”³³ Foreshadowing the later radar programmes that would be built on Canadian territory, Claxton also noted that “it might be desirable to make some additions to the network at a later date.”³⁴ While the aerial defence of Canada and the North American continent was an important consideration for Cabinet, the added economic benefits of Canadian participation in Pinetree must also have been persuasive. Accordingly, Cabinet authorized the Canadian section of the Board to participate in the formulation of a formal PJBD recommendation to the Canadian and American governments for the establishment and operation of such a system.³⁵

The Permanent Joint Board on Defence subsequently made a series of recommendations at its 30 January – 1 February 1951 meeting. Recommendation 51/1 called for the extension and consolidation of the present control and warning system in the two countries.³⁶ Shortly thereafter, Claxton announced the government’s rearmament programme in the House of Commons, and the Pinetree Line, although not yet called by that name, received considerable play as part of the three year, \$5 billion undertaking. The defence of Canada and North America against direct attack was given as the primary objective of Canada’s national defence, and Claxton explained that

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.³⁷

³³ Cabinet Conclusions, 24 January 1951, 16.

³⁴ *Ibid.*

³⁵ *Ibid.*, 17.

³⁶ Cabinet Conclusions, 21-22 February 1951, 12-13, LAC, RG2, series A-5-a, vol. 2647; Jockel, *No Boundaries Upstairs*, 45-48.

³⁷ House of Commons, *Debates*, 5 February 1951, 91.

Given the importance assigned to this undertaking, by April of 1951 both governments had approved recommendation 51/1, and negotiations about the details of an agreement soon began.³⁸ By late April, contractors for the fourteen sites being built in addition to the nine Canadian sites already underway had been chosen and had been advised to proceed with construction without delay. At this time, the target for completion was July 1952, so the urgency of the projects and the challenge of procuring the necessary materials – particularly steel – was made clear to the contractors.³⁹ Steel had remained a controlled material following the end of the Second World War, but the demands of the Korean War rearmament programmes in western countries including Canada, the United States, and Great Britain, led to the enforcement of the even stricter controls discussed below.

Although construction had begun, arrangements with the United States to *pay* for the work had not been finalized. The US had agreed to DCL involvement in the construction of the sites, with the exception of those in Newfoundland and Labrador, to the title to the sites remaining vested in the Canadian government, and to other conditions, but did not agree with Canada's desire to keep the financial and operational arrangements a secret. Ottawa wanted to avoid the potential embarrassment of admitting that it could not staff or afford to build the entire network, and therefore wanted to keep these arrangements relatively informal through a secret approval of the also-secret PJBD Recommendation 51/1, but the United States Air Force would not agree to such conditions. Since the USAF had to pay for the American share of the undertaking, it demanded a formal agreement that could be shown to those in Washington responsible

³⁸ Cabinet Conclusions, 21-22 February 1951, 12-13, LAC, RG2, series A-5-a, vol. 2647; Jockel, *No Boundaries Upstairs*, 45-48.

³⁹ R.G. Johnson to C.D. Howe, "Re: Radio Stations," 26 April 1951, NAC MG27 IIB20, vol.195, file SD-12-1, "Defence Construction".

for budget appropriations. Furthermore, the State Department wanted the formal agreement to be publicly registered with the United Nations. These conditions were unacceptable to External Affairs, and led to protracted and sometimes unpleasant discussions on the subject between representatives of the two countries.⁴⁰ External Affairs did not want Canada to appear to be the recipient of military aid, and any publicly registered agreement setting out the division of costs – with the majority being carried by the United States – would have given this impression.

Since Defence Construction Limited was the agency responsible for the construction of these radar sites and work had already begun, the organization found itself in a difficult situation. Contractors working on the projects would have to be paid, and without an agreement the necessary funds would not be forthcoming from the United States Air Force. In late July of 1951, C.D. Howe expediently resolved the situation by directly intervening in the Pinetree negotiations in order to guarantee American payments and therefore avoid contract failures that would have affected DCL. While the Department of External Affairs had expressed its concerns about the proposed agreements, according to historian Joseph Jockel:

the matter of the Pinetree notes was summarily taken out of the hands of the diplomats by the minister for defence production, C.D. Howe.... In July Pearson, Claxton, and Prime Minister Louis St. Laurent were all out of town. Howe, who was acting prime minister and exasperated at the pending contract failures, instructed External Affairs to proceed with the exchange of notes and to accept their registration with the United Nations.⁴¹

The message to the ambassador in Washington from External Affairs made the significance of DCL's predicament to the negotiations as a whole quite clear, and noted

⁴⁰ Jockel, *No Boundaries Upstairs*, 46-48. At one point, for instance, the RCAF's Chief of the Air Staff, Air Marshal Wilfred Austin Curtis, wrote to senior American officials, requesting that funds be made available as quickly as possible. Schaffel, *The Emerging Shield*, 160.

⁴¹ Jockel, *No Boundaries Upstairs*, 48-49.

that Howe had “urgently” insisted that the issue be reviewed. External Affairs acknowledged that debate with the State Department on the agreement could continue for some time without results, which

would create an impossible situation for Defence Construction Ltd., which has been spending large sums on USAF account (and is facing the immediate requirement of further finance) without any assurance that the USAF will make a contract. Our understanding is that USAF has declined to give Defence Construction Ltd. even a “letter of intent” pending settlement between the governments of the question of an “agreement” in acceptable form, that is to say an exchange of notes.

Because of the grave practical problem faced by DCL, and on the direct instruction of Mr. Howe as Acting Prime Minister, it has now been decided to waive our objections and to accept the procedure suggested by the State Department.... That is to say, we agree to an exchange of notes to be registered with United Nations and published at that time on the understanding that registration and publication will not be effected in the near future but delayed for some time....

It should be clearly understood that, immediately upon signature and exchange of the notes, the USAF will give a suitable letter of intent to Defence Construction Ltd., and will then proceed to make a contract.

For your own information Mr. Howe decided to instruct me in the above sense because of the serious results of any further delay. He felt that if a firm commitment from the USAF were not obtained immediately he would have no option to cancellation of the Canadian contracts before further financial obligations were incurred by the Canadian Government.⁴²

By this time, the United States was prepared to compromise on some of the agreement, and although Howe’s directive to reach an immediate settlement played a major role, according to air defence historian Kenneth Schaffel, the Royal Canadian Air Force had also been able to mobilize support within Washington. At a meeting on 31 July 1951, Cabinet decided “that an exchange of notes be made with the U.S. government

⁴² SSEA to Canadian Ambassador, Washington, Signal EX-1526, 30 July 1951, LAC MG27 III B20, vol.195, file SD.10, “Radar Division”. This quotation incorporates some minor amendments in pen made on the original message that serve to clarify but not to change the message as apparently sent. See also Canada, Department of Foreign Affairs, *Documents on Canadian External Relations, Volume 17: 1951*, Greg Donaghy, ed., (Ottawa; Minister of Public Works and Government Services, 1996), 1273-1279.

concerning the defence agreement for construction of a network of 31 radar stations, on the understanding that this would be accompanied by suitable assurances that Canada would not be regarded as a recipient of U.S. aid,⁴³ a concern that was echoed and amplified by External Affairs in a telegram to the ambassador in Washington sent the same day.⁴⁴

On 1 August 1951, therefore, an agreement was reached between Canada and the United States for the establishment of the Pinetree Line. Of particular significance to Defence Construction Limited was the third paragraph of the agreement, which stated that "so far as practicable, construction of the installations required for the extension will be carried out by Canadian agencies and contractors with Canadian labour and materials. Electronic and other equipment manufactured in Canada will also be used, as far as practicable."⁴⁵ The stations resulting from the 1951 agreement were located in southern Ontario, Quebec, BC, and Atlantic Canada, and despite initial hopes for an earlier completion date would be completed by 1954.⁴⁶

Planning for Pinetree involved DCL support, Defence Research Board research, Department of Defence Production support and facilities, Bell Telephone expertise, and co-ordination of the effort by the RCAF. A "Pinetree Project Office" was established to oversee the undertaking, and occupied space in Temporary Building Number Four – the same location as DCL and close by DDP. Concurrent activity was essential to the timely

⁴³ Schaffel, *The Emerging Shield*, 160; Memorandum, DM/DND to CAS, CCOS, "Re: Cabinet Conclusions of July 31, 1951: Radar defence agreement with the United States", DHH 73/1223, Series 3, Box 66, file 1335.

⁴⁴ SSEA to Canadian Ambassador, Washington, DC, Signal EX-1530, 31 July 1951, NAC MG27 IIB20, vol. 195, file SD.10, "Radar Division".

⁴⁵ Canada, Department of External Affairs, *Exchange of Notes (August 1, 1951) Between Canada and the United States of America Constituting an Agreement Regarding the Extension and Co-Ordination of the Continental Radar Defence System*, (Ottawa: Queen's Printer, 1954).

⁴⁶ Fletcher, "Military Radar Defence Lines"; Memorandum, CAS to Carm, CAOps, C.R. File, "Air Defence," 23 October 1952, DHH 73/1223, Series 3, Box 65, file 1326.

construction of these installations, requiring close co-ordination of the various organizations involved in the programme. Standardized building designs were used to save time and make the best use of limited architectural and engineering resources, and the deadlines were so urgent that at some early sites foundations were poured before the final building dimensions were known. Buildings for radar and supporting equipment were not enough, however; the primary radar sites also had a full contingent of personnel to operate the radars, which required the provision of housing, administrative, and support structures for some 300 to 400 people and their dependents.⁴⁷

Stations where construction had already begun were wholly paid for by Canada, as were two additional sites; this was the Canadian share in accordance with the Pinetree agreement. For the twelve US-funded CANUSAD (CANada – United States Air Defence) stations, nine of which were to be staffed by the USAF, construction was to be by Canadian contractors through DCL.⁴⁸ The North East Air Command (NEAC) portion of Pinetree comprised ten stations stretching from Newfoundland to Baffin Island. These contracts were arranged by the Corps of Engineers, but used the Canadian contractor Drake-Meritt and the Canadian-American joint venture Fraser-Brace-Terminal.⁴⁹ In DCL President R.G. Johnson's discussions with the Corps of Engineers, the latter argued that it was necessary to marshal almost all construction materials in the eastern US, and that an American prime contractor in joint venture with a Canadian counterpart was essential to centralized control and responsibility. The involvement of a Canadian contractor, the

⁴⁷ K.J. Holmes, *The History of the Canadian Military Engineers, Vol. III*, (Toronto, ON: Military Engineering Institute of Canada, 1997), 125-126; "Pinetree Progress Reports Issued by Pinetree Project Office," DHH 73/390; Schaffel, *The Emerging Shield*, 160; NBC Group, *A History of the Air Defence of Canada, 1948-1997*, (Ottawa: 71 Film Canada, 1997), 33-35.

⁴⁸ Summary of Pinetree costs, undated and untitled document, DCL in-house file 122-7-12, "Pinetree Agreement".

⁴⁹ *Ibid.*

Americans acknowledged, was desirable for the recruitment of labour and to provide advice and assistance with problems encountered on site. Johnson recognized the value of this approach, but suggested

that in the event of future construction, consideration might be given to the employment of Canadian contractors, possibly as sub contractors to a U.S. prime contractor in the event that the sources of supply of labour and material, the means of transportation, and the conditions effecting the supervision of work lend themselves to this approach."⁵⁰

The representative for the Corps of Engineers indicated that they would be glad to give such consideration in the future, and indeed, the involvement of Canadian contractors would proved to be an important issue in future negotiations. These discussions with American representatives suggest that the arrangements for construction in Newfoundland and Labrador were not entirely satisfactory to DCL and other agencies of the Canadian government. This situation was laid out in a DCL summary of the programme, which explained that

the treaty provided that as far as practicable construction was to be carried out by Canadian contractors and agencies. When it came to determining practicability the U.S. authorities contended that the Corps of Engineers, US Army and US contractors, working out of New York were in the best position to carry out the construction in Newfoundland and north. *At the time Canadian government departments were not in a position to seriously dispute this proposition.* It was therefore agreed that this part of the chain would be constructed by the Corps of Engineers, with the bulk of the construction being negotiated with a joint venture of a US and a Canadian contractor.⁵¹

Design authority for the Canadian portion of Pinetree was the RCAF, while for the CANUSAD portion it was the RCAF in conjunction with the USAF.⁵² DCL acted on

⁵⁰ Memorandum, "Pinetree (NEAC Portion)," no date, DCL in-house file 122-7-12, "Pinetree Agreement".

⁵¹ "General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961," DCC In-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL". Emphasis added. The "joint venture" was Fraser-Brace Terminal.

⁵² Summary of Pinetree costs, undated and untitled document, DCL in-house file 122-7-12, "Pinetree Agreement".

behalf of the USAF for the latter stations, with plans, specifications, and requirements supplied by the RCAF. The RCAF would carry out inspections during construction and would arrange for the convening of a Board of Officers to take over completed works or portions of them. Arrangements were also made that DCL would be paid by or on behalf of the USAF cost plus a fixed fee of \$640,000 as compensation for its services. Again from the DCL programme summary,

It was agreed that all stations across Canada including those to be paid for by the US would be handled by the RCAF and DCL. In order to provide the easiest channel for the payment of the US share DCL entered into a management contract with the Corps of Engineers (Buffalo District). Through this contract DCL was reimbursed for all expenditures made on US account and in addition received a fee to cover the applicable portion of its own administration costs.⁵³

As part of these arrangements, the USAF provided DCL with a working capital of \$5,000,000 to pay the contractors in accordance with Canadian government procedure, with the US to be billed at the beginning of every month for payments made by DCL in the preceding month, an arrangement that was formalized by an agreement between DCL and the US Corps of Engineers signed on 15 August 1951.⁵⁴ The fee was based on an estimated construction cost of \$21,345,479 Canadian dollars, but additional costs of over \$5 million, changes to the sites, and a longer than expected construction programme requiring further services from DCL led to the signing of a supplementary agreement with the Corps of Engineers on 7 January 1957 that increased DCL's fixed fee from \$640,000 to \$1,140,000.⁵⁵ The financial arrangements, however, did not work out as anticipated. "In actual operation," a DCL summary noted, "the U.S. was slow in

⁵³ "General Outline of U.S. Military Construction Activities in Canada."

⁵⁴ "CANUSAD: Memorandum Setting Forth Arrangement for the Construction by Defence Construction Limited of Certain Defence Projects in Canada in which USAF is Interested," DCL in-house file 122-7-12, "Pinetree Agreement". The agreement is contained in DCL in-house file 122-7-12, "Pinetree Agreement". Technically, the agreement was between the United States and DCL.

⁵⁵ Supplementary Agreement between DCL and US Corps of Engineers, 7 January 1957, DCL in-house file 122-7-12, "Pinetree Agreement".

Figure 2: Map of Pinetree Line Radar Stations in Canada

- Canadian-financed
- American-financed

Source Map: Natural Resources Canada. Source Data: Map, DCC in-house holding: <http://www.pinetreeline.org/boundary/canada1.html>.

Key to Pinetree Line Stations shown in Figure 2

Sites funded and operated by the RCAF⁵⁶

Construction through DCL:

1 – Holberg 2 – Tofino 3 – Comox 4 – Falconbridge 5 – Edgar 6 – Foymount
7 – Senneterre 8 – Lac St. Denis 9 – Parent 10 – Mont Apica 11 – St. Margarets⁵⁷

Sites funded by the USAF and operated by the RCAF

Construction through DCL under management contract with Corps of Engineers

12 – St. Sylvestre⁵⁸ 13 – Moisie⁵⁹ 14 – Beaverbank⁶⁰ 15 – Sydney

Sites funded and operated by the USAF

Construction through DCL under management contract with Corps of Engineers

16 – Puntzi Mountain 17 – Baldy Hughes 18 – Beaverlodge⁶¹ 19 – Beausejour
20 – Sioux Lookout 21 – Armstrong 22 – Pagwa 23 – Ramore

Sites funded and operated by the USAF

Construction through Corps of Engineers

24 – St Johns⁶² 25 – Gander 26 – Stephenville⁶³ 27 – St. Anthony 28 – Cartwright
29 – Goose Bay⁶⁴ 30 – Hopedale 31 – Saglek 32 – Resolution Island
33 – Frobisher Bay

Radar Augmentation Sites – funded and operated by the USAF

Construction through DCL under management contract with the Corps

34 – Kamloops 35 – Lowther⁶⁵ 36 – Barrington

Gap Filler Sites – funded and operated by the USAF

Construction through Corps of Engineers

37 – Elliston Ridge 38 – La Scie 39 – Fox Harbour 40 – Spotted Island
41 – Cutthroat Island 42 – Cape Makkovik

⁵⁶ Note that the radar station at RCAF Cold Lake is often included among lists of Pinetree stations, but was not covered by the exchange of notes governing the Pinetree Line.

⁵⁷ Also referred to as Chatham.

⁵⁸ Also referred to as St. Marie.

⁵⁹ Also referred to as Clark City.

⁶⁰ Early Canadian designation of Halifax.

⁶¹ Also referred to as Saskatoon Mountain.

⁶² Also called Redcliffe and Torbay.

⁶³ US designation Harmon, after Harmon Air Force Base

⁶⁴ Early US designation of Melville

⁶⁵ Received US designation Oba.

reimbursing DCL and DCL had to get advances from the Canadian government totaling \$15,000,000.⁶⁶

By 1954 the initial and largest phase of the Pinetree Line was completed. The total cost of the 11 stations paid for by Canada, including approximately \$12 million worth of housing was \$52,419,132.00. Consultant costs were \$4,020,013.00, making for a total cost of \$56,439,145.00. The breakdown of CANUSAD construction costs was a little more complicated. American costs were \$47,676,187.00, less a tax adjustment of \$360,000, which meant that the total US cost for 12 sites was \$47,316,187.00. Canadian amenities, which included additional housing and facilities for personnel at 4 sites cost \$9,546,047.00. For the NEAC stations, which consisted of 10 stations from Newfoundland to Baffin Island, contracts were arranged by the Corps of Engineers. Fraser-Brace-Terminal built 7 stations for a total of \$69,000,000, and Drake-Meritt built 3 stations for a total of \$20,000,000.⁶⁷ In all cases, these figures did not include the costs of radar and other equipment necessary for the stations, so the true cost of the Pinetree Line was much higher – according to James Eayrs they had reached approximately \$450 million as of 1954, of which the Canadian share was \$150 million.⁶⁸

The Pinetree Line was significant for a number of reasons. As the numbers above suggest, it was the largest cross-border Canada-United States defence project to date, and also marked a new basis for co-operation in continental defence. While American forces had been using the leased bases in Newfoundland and Labrador since the Second World War, and had also been active in the Canadian arctic, the Pinetree Line led to the

⁶⁶ Summary of Pinetree costs, undated and untitled document, DCL in-house file 122-7-12, "Pinetree Agreement".

⁶⁷ Summary of Pinetree costs, undated and untitled document, DCL in-house file, 122-7-12, "Pinetree Agreement".

⁶⁸ Eayrs, *In Defence of Canada, Volume III*, 358.

establishment of United States military facilities in other areas of the country during a time of peace. Subsequent continental defence programmes would only expand this American presence, which would also come to be an irritant and a concern for the Canadian government and the Canadian people. The division of costs for Pinetree also set a precedent for later joint defence programmes built on Canadian territory.

Other precedents would be set by the Canadian government's actions in pursuing the agreement authorizing the Pinetree Line. Ottawa's actions had been driven by a number of concerns and objectives. Foremost was the concern about national and continental defence; as Minister of National Defence Brooke Claxton explained in 1951, the foremost objective of Canada's national defence was "the immediate defence of Canada and North America from direct attack."⁶⁹ The issue of continental defence, of course, required co-operation with the United States, which proved problematic for many in Ottawa. As the Department of External Affairs' hesitancy demonstrated, there were concerns that Canada might be seen as a recipient of military aid, a situation the government wanted desperately to avoid. The presence of American military personnel on Canadian territory, which increased significantly as a result of the Pinetree Line, would become a substantial concern in coming years as additional continental defence projects were built. These personnel, and their sometimes cavalier attitude towards Canadian sovereignty would also prove increasingly problematic as the 1950s progressed.

In addition to these concerns, however, the Canadian government was also pursuing goals intended to serve broader policy objectives. Its insistence on maximizing the project's benefits for the Canadian electronics and construction industries would be

⁶⁹ House of Commons, *Debates*, 5 February 1951, 91.

repeated as part of the negotiations for subsequent continental defence programmes. In the January 1951 Cabinet discussions about Pinetree, for instance, Brooke Claxton had raised the possibility of Canadian companies supplying much of the Pinetree Line's electronics. While this would prove to be a challenge for subsequent air defence projects, a series of events, most notably a strike at the General Electric radar factory in Syracuse, New York, resulted in a significant amount of the radar and electronics for the Pinetree Line being provided from Canadian sources.⁷⁰ Ottawa also met with substantial success in obtaining Pinetree Line construction work for Canadian contractors. With the notable exception of the installations in Newfoundland and Labrador, which were undertaken by the United States through the Army Corps of Engineers, construction of Pinetree Line sites was handled through Defence Construction Limited, which was in a position to pursue the government's goal of maximizing the involvement of Canadian construction firms. DCL, therefore, served as an instrument of government policy in pursuing this objective. The corporation would continue to perform this and related tasks for subsequent expansions of the Pinetree Line, as well as for the Accelerated Defence Programme that formed the other major element of the Canadian military buildup in the early Cold War.

ADCOM and POLE VAULT

A necessary part of any air defence network is the ability for its various elements to be able to communicate with each other in a timely and reliable manner. Even given the rather basic state of the art for air defence systems in the early 1950s – which one

⁷⁰ Cabinet Conclusions, 24 January 1951, 16; Schaffel, *The Emerging Shield*, 137-138; Winkler, *Searching the Skies*, 22; Canada, Department of Trade and Commerce, Dominion Bureau of Statistics, *The Canada Year Book, 1952-53*, (Ottawa: Queen's Printer, 1953), 1177

contemporary report clearly stated had not significantly changed since the Second World War – the communication requirements were still considerable.⁷¹ Seven separate communications channels or circuits, for instance, were required for the “handing over” of the tracking of enemy raids or enemy aircraft from one radar station to another. As the number of stations increased, so did the number of communications channels required. Communication of other sorts of information, as well as communication between the ground and interceptor aircraft, further complicated the task, as did the need for backup systems to guard against the possibility of enemy sabotage or jamming of signals or against equipment failure. This information could be passed by telephone lines, but isolated locations, where many of the radar installations would be built, often required the installation of additional lines or even the installation of microwave communications links in situations where the latter could be more flexible and economical.⁷²

Given that the RCAF was involved in the building of a radar early warning network, it was of necessity also involved in the creation of a communications system as a central element of the network. As part of the building of the Pinetree Line, the RCAF began work on ADCOM, a microwave air defence communications network in northern Ontario and Quebec. According to the early 1960s Glassco Commission, which had received briefs on the subject from the Department of National Defence, ADCOM had been chosen in 1951 because it was anticipated that it would be relatively inexpensive. Purchase was chosen over lease from commercial carriers because the necessary

⁷¹ “Some Aspects of Canada’s Air Defence System,” 15 March 1954, LAC, RG2, series B2, accession 90-91/154, box 28, file D-28-3, pt.2, “Department of National Defence – Canada-United States Defence Relations – Official”.

⁷² *Ibid.*

commercial facilities did not exist.⁷³ The technology was then in its early stages, and Bell Canada recommended that the RCAF rent communications circuits from common carriers (including, obviously, Bell Canada), but the RCAF decided to go it alone. Design and equipment problems meant that the initial \$3 million cost ballooned to over \$10 million by 1952, and then to \$22 million before the system was operational.⁷⁴

The telecommunications companies objected to the RCAF's decision to undertake ADCOM. Here, after all, was a business opportunity being taken away from them. The major national telecommunications companies in Canada – Bell Canada, Canadian National Railways, and the Canadian Pacific Railway, had recognized the potential inherent in air defence systems and their communications requirements. As a result, by early 1950 there was an active behind-the-scenes competition in Ottawa for the communications work that the planned Canadian radar system would entail.⁷⁵ A glimpse of this environment is provided by A.G. Lester, whose career with the Bell Telephone Company of Canada encompassed responsibility for the Special Contract division that

⁷³ Canada. Royal Commission on Government Organization (hereafter RCGO), *Report, Volume 2: Supporting Services for Government*, (Ottawa: Queen's Printer, 1962), 241-242. The Commission's report merely mentions that changes to the air defence system a few years later required substantial changes to ADCOM. Presumably this was the result of the introduction of the SAGE (Semi-Automatic Ground Environment) equipment as part of the CADIN (Continental Air Defence INtegration North) programme in the late 1950s and early 1960s. See Chapter Six for a discussion of CADIN, SAGE, and DCL's involvement in these programmes. Microwave communications technology, which used high frequency radio signals in a tightly focused beam, offered the prospect of secure voice and data communications over short ranges (the transmitters and receivers had to be within line of sight of each other) and could transmit a broader range of information than conventional wire communications. In isolated areas, the ability to transmit along a line of sight path using equipment mounted on towers offered cost savings over conventional pole and line communications links even if the greater capabilities of microwave transmission were taken into account.

⁷⁴ A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, 4, DHH 78/512; T.W. Eadie, Vice-President, Bell Telephone Company of Canada, to Secretary, Canadian Commercial Corporation, 5, September 1950, LAC, MG27 IIB20, vol.195, file SD.10, "Radar Division". On microwave communications in the early postwar years, see Philip L. Cantelon, "The Origins of Microwave Telephony – Waves of Change," *Technology and Culture* 36:3 (July 1995), 560-573. For Howe's misgivings on this project, see correspondence in LAC, MG27 IIB20, vol. 195, file SD.10, "Radar Division".

⁷⁵ See the correspondence in LAC, RG30, vol. 13170, file V7345-1-1, "Canadian Overseas Telecommunications Corporation, Formation Of – Radar – Micro-Wave," 1949-1950.

built the POLE VAULT communications system along the Labrador Coast (discussed below), and served as the management contractor for the Mid-Canada Line (discussed in the following chapter). By early 1950 this competition had been replaced by a committee of representatives from CP, CN, and Bell had been created to allocate the furnishing of communications circuits to each company, a committee, Lester recalled, that reached its decisions “depending on who had the facilities available or who was in the best position to build them.”⁷⁶ While activities in this field were obviously intended to be covert – senior military and government officials were approached, as were politicians – it would seem reasonable to assume that Lester’s committee supplanted the lobbying efforts of the telecommunications companies that had previously held sway. Given the generally competitive relationship between the three companies in question, this co-operation was an interesting element of the continental defence projects of the 1950s and early 1960s, and would warrant further examination in its own right.

DCL’s involvement in ADCOM is unclear, largely because surviving corporate records make little or no mention of the project. Since its predecessor in defence construction, the Canadian Commercial Corporation, was involved, DCL may well have been involved in the construction and maintenance of the ADCOM sites, particularly since much of the equipment was located at the radar stations for which the corporation was responsible. DCL was definitely involved, however, in the follow-on to ADCOM built in the late 1950s and early 1960s. At that time, improvements to the air defence system exceeded the capabilities of ADCOM, requiring the construction of a more

⁷⁶ A.G. Lester, “Taped Recollections,” DHH 77/493, 7-8.

complex communications system. This successor, ADCOM II, and DCL's involvement in its implementation, is discussed in Chapter Six.⁷⁷

For Pinetree communications outside of Ontario and Quebec, as well as for general command and administrative facilities in Canada, the armed forces leased commercial telephone and telegraph circuits. The only exception lay along the Labrador coast, an area where population was so sparse that commercial communications links were nonexistent.⁷⁸ There, Bell and the American military were involved with the construction of a groundbreaking communications system based on cutting-edge communications principles to connect a series of isolated early warning radar stations. Best known by its project name of POLE VAULT, the undertaking arose from the need to provide communications between the nine radar stations of the Pinetree chain, stretching from St. John's to Stephenville and Gander, then along the Labrador coast, including Goose Bay and eventually reaching Frobisher Bay (now Iqaluit) on Baffin Island. Given the rough terrain, the shallow waters of the continental shelf, high tides in Frobisher Bay, heavy ice every winter, and a short construction season, a physical link using landlines and submarine cables was not a viable option. In northern areas, magnetic disturbances in the atmosphere cause short-wave radio blackouts, so other systems had to be used to provide voice and data communication links. In mid-1952, the Pinetree Project Office, responsible for the Pinetree Line, was working with DDP to come up with a suitable communications system.⁷⁹

⁷⁷ RCGO, *Report, Volume 2*, 241-242. The Commission's report merely mentions that changes to the air defence system a few years later required substantial changes to ADCOM. Presumably this was the result of the introduction of the SAGE (Semi-Automatic Ground Environment) equipment as part of the CADIN (Continental Air Defence INtegration North) programme in the late 1950s and early 1960s. See Chapter Six for a discussion of CADIN, SAGE, and DCL's involvement in these programmes.

⁷⁸ Lester, *Special Contract*, 4.

⁷⁹ Fletcher, "Military Radar Defence Lines"; Lester, *Special Contract*, 7-19.

Bell Telephone became involved at the request of one of its employees seconded to DDP, which led to Bell assuming the management contract for the project. The Canadian government was not interested in establishing a Crown corporation to assume responsibility for such projects, nor was it willing to admit to the Americans that Canada was unable to perform the task – undoubtedly an important issue if the government wanted to continue its policy of preferential treatment for Canadian contractors and suppliers on such projects. The third option was to hire Bell as a contractor to manage the programme, taking advantage of its organization and personnel with telecommunications experience. Perhaps not surprisingly, government officials chose the third option.⁸⁰

The original microwave communications equipment, which would have required some twenty stations linking Gander to Goose Bay as the first phase of the network, was superseded by the introduction of a tropospheric scatter system which offered much greater range between sites than conventional microwave links whose range was limited by the curvature of the earth. The tropospheric scatter system involved a greatly increased signal strength that resulted in microwaves being reflected off the troposphere (a layer in the atmosphere) to points a considerable distance away. Large dish-type antennas (sometimes called “billboards”) were necessary to send and receive the signal, but the greatly increased range provided by tropospheric scatter techniques made their construction worthwhile. This was particularly true for the Pole Vault system; instead of installing some 50 conventional microwave relay stations between St. Johns and Frobisher, the scatter relay points could be located at the radar sites, which offered substantial savings in construction costs and time, as well as easing maintenance and repair. As one historian later put it, POLE VAULT “was a reliable, expensive, brute-

⁸⁰ *Ibid.*, 8-9.

force method” of providing the necessary communications links.⁸¹ The first test signals were passed along the system on 14 February 1955, but additional requirements from the USAF, including housing for personnel and increased signals capacity at the northern end of the network meant that the overall completion date for the project was 31 December 1956.⁸²

While DCL was not involved with POLE VAULT, the project merits a brief examination for a number reasons. On a technical level, this was the first large-scale implementation of an important communications technology that made possible the communications links between northern military installations. Without tropospheric scatter, it would have been much harder if not actually impossible to tie together the radar stations and military bases that rapidly began to dot the Arctic in the 1950s. Furthermore, POLE VAULT marked the substantive beginning of Bell’s involvement with military communications projects in Canada. Its early planning stages also offer an example of a path *not* taken in the building of defence projects in Canada. The creation of special Crown corporations for individual projects offered an alternative to the use of DCL, and while such an approach was probably impracticable, it remains an interesting possibility. The wartime experience of the Department of Munitions and Supply, as well as the Northern Ontario Pipe Line Crown Corporation of the late 1950s reveal that C.D. Howe was not adverse to such special purpose “Crowns” when he felt they were warranted.

These defence projects brought results in areas beyond their immediately apparent military significance. In conjunction with POLE VAULT, the PINETREE installations,

⁸¹ *Ibid.*, 20-23; Fletcher, “Military Radar Defence Lines”. Typical Pole Vault installations consisted of four parabolic antennae 60 feet in diameter, an equipment building, a diversity building to help handle signal traffic, a diesel generator building, two fuel storage tanks, raceways to carry waveguides and cables, and enclosed corridors connecting the various buildings. Lester, *Special Contract*, 39.

⁸² *Ibid.*, 40-42.

work at Goose Bay and at the American bases in Newfoundland, the United States was making a considerable outlay of money. This was one of the pay-offs for the efforts of the Canadian government and its agencies – including DCL – to entrench Canadian preference in the diplomatic agreements covering many of these installations.⁸³ These expenditures were indeed considerable. A 1954 Canadian estimate was that by the end of that year, the United States would have completed construction in the Canadian areas of the Northeast Command totaling some \$325 million.⁸⁴ Despite these already substantial expenditures, however, the construction of additional air defence radars would continue in the mid-1950s in response to the perceived growing threat of the Soviet Union's long-range bombers.

Gap Filler and Radar Augmentation

So far as planners in the Royal Canadian Air Force and the United States Air Force were concerned, the radar stations of the Pinetree/Permanent system marked a beginning and not an end to the construction of early warning radars in North America. At the time the Pinetree sites were being built, plans were well in hand for the construction of additional radar sites. "Gap Filler" radars – a term that would receive frequent use – were intended, as their name suggests, to fill gaps in existing radar coverage, and were usually intended to detect low-flying aircraft attempting to evade detection by existing radars. "Radar Augmentation," on the other hand, usually referred to extending radar coverage, usually in a more northerly direction. A recurring theme in North American air defence planning and DCL's involvement in its construction is this

⁸³ It should be noted that until the late 1950s construction provisions at the leased bases in Newfoundland and Labrador essentially excluded Canadian firms.

⁸⁴ MacKay, "Report of Visit to United States Northeast Command," 10.

push to provide earlier detection of hostile aircraft by extending radar coverage further to the north.

Following the authorization of the 33 Pinetree stations, the United States produced a proposal for nine additional “gap filler” temporary radar stations in British Columbia and Eastern Canada in order to improve the radar coverage provided by the existing network. Surveys were authorized by the Cabinet Defence Committee (CDC) in February 1953, and at the same time it was decided that, when it was eventually received, a US request to build the stations would be granted. The CDC understood that the nine stations would be paid for and operated by the US, and that one of the stations might be located in Nova Scotia. As of October of that year, however, a formal request had not yet been made to build the stations.⁸⁵

In February 1954, high-level concerns were expressed about the period of tenure for the proposed bases. The conditions contained in the Pinetree agreement meant, according to Secretary of State for External Affairs Lester B. Pearson, that “in theory at least, that so long as the United States Government considers any stations in the Pinetree system are necessary, that they must be kept in operation, regardless of the views of the Canadian government.”⁸⁶ This issue was addressed by others, including the secretary of the Cabinet Defence Committee, R.A.J. Phillips, who noted rather philosophically that

⁸⁵ Memorandum, DEA to Cabinet, 3 October 1953, in External Affairs and International Trade Canada, *Documents on Canadian External Relations: Volume 19, 1953*, Donald Berry, ed. (Ottawa: External Affairs and International Trade Canada), 1082-1085; “Record of Cabinet Defence Committee Decision, 91st Meeting, Tuesday, February 10th, 1953, Item IV: Proposed establishment of nine additional temporary radar stations in Canada; U.S. request for additional radar stations”, DHH 73/1223, series 3, box 65, file 1327; Chiefs of Staff Committee, Minutes of 546th Meeting, 7 October 1953, 4,6, DHH 73/1223, series 3, box 61, file 1307.

⁸⁶ Memorandum, SSEA to Cabinet, “Proposed Establishment by the United States Air Force of Nine Additional Temporary Radar Stations in Canada,” 5 February 1954, LAC, RG2, series B2, accession 90-91/154, box 28, file D-28-3-, pt.2, “Department of National Defence – Canada-United States Defence Relations – Official”.

“we cannot take a chance on hampering radar defences by refusing to allow construction for political reasons. On the other hand, if defences are really necessary to the United States, it is unlikely that they will refuse to build them because the political or budgetary arrangements fall short of their objective.”⁸⁷ Concern about this issue eventually made its way to Cabinet, which on 25 February 1954 approved a lengthy and detailed paragraph outlining the terms of tenure for the proposed radar stations.⁸⁸ Final agreements, however, were still some way off.

The Cabinet Defence Committee and Cabinet discussed the establishment of four permanent radar stations in March of 1955 at Barrington, NS, Oba, ON, Marathon, ON, and Kamloops, BC, and provided authorization in principle for the US to build, staff, and operate the four stations, subject to an agreement to be negotiated between the United States and Canada.⁸⁹ Before any such agreement was reached, however, further revisions to air defence plans meant that the four stations would become three. The stations that would ultimately be covered by the Gap Filler notes received comparable attention shortly thereafter. The six installations were situated along Canada’s eastern coast, at Cape Makkovik, Cutthroat Island, Spotted Island, and Fox Harbour, Labrador, and at La Scie and Elliston Ridge, Newfoundland.⁹⁰ These six stations were intended to extend the low-level coverage offered by the Mid-Canada Line, discussed in the following chapter,

⁸⁷ Memorandum, R.A.J. Phillips (Secretary, CDC), to Bryce, “Proposed establishment by the U.S.A.F. of nine additional temporary radar stations in Canada,” 15 February 1954, LAC, RG2, series B2, accession 90-91/154, box 28, file D-28-3-, pt.2, “Department of National Defence – Canada-United States Defence Relations – Official”.

⁸⁸ Memorandum, Office of DM/DND to CCOS, CAS, “Re: Cabinet Conclusions of February 25, 1954 – Proposed establishment by U.S. Air Force of additional temporary radar stations in Canada”, DHH 73/1223, series 3, box 66, file 1337.

⁸⁹ “Record of Cabinet Defence Committee Decision, 104th Meeting, Thursday, March 3, 1955 – Item III: Proposed establishment of four additional permanent radar stations in Canada,” 7 April 1955, DHH 73/1223, series 3, box 65, file 1329.

⁹⁰ “Pinetree,” DCC in-house file “Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL”, 3.

southward from the line's eastern terminus at Hopedale, Labrador, to Cape Race. Cabinet discussed these additional stations in early May of 1955, when it noted the urgency attached to the agreement by the USAF. The Americans had postponed their request to begin construction, proposing that the Distant Early Warning Line agreement would provide a model for the agreement on these sites. Delays in the negotiation of the DEW Line agreement, however, endangered the funding for the Labrador sites. If an agreement could not be reached by 30 June 1955, the end of the American fiscal year, the funds set aside for their construction would have to be returned to the US Treasury. In the discussion that followed, construction provisions received attention in the same way they had during earlier Pinetree discussions. "As much consideration as possible should be given to Canadian contractors in the matter of supplying equipment and erecting buildings and living quarters," the Cabinet conclusions note.

For installations in the Maritime Provinces, the work should be done by contractors for the area when this was feasible. In this connection, it was observed that under the proposed conditions governing the project, Canadian contractors would receive equal consideration with U.S. contractors and preference would be given to qualified Canadian labour.⁹¹

In addition to pursuing favourable construction conditions for Canadian contractors, therefore, the Canadian government was also sought to assist firms in the Atlantic region. The necessities of defence, in this case necessities paid for by the United States, were also being used to further the goals of regional economic development. At much the same time, a comparable approach was being used for the construction of Camp Gagetown in New Brunswick, discussed below. At that Canadian-funded undertaking, large projects

⁹¹ Cabinet Conclusions, 6 May 1955, 4, LAC, RG2, series A-5-a, vol.2657.

had been broken down into smaller contracts in order to assist Maritime construction firms bidding on the projects.⁹²

On 12 May, Cabinet authorized the exchanges of notes governing the construction of the sites for both projects, subject to arrangements generally similar to those being negotiated for the Distant Early Warning Line. Preliminary procurement, shipment, and placement of materials, along with other preparatory measures by the US was authorized, and Cabinet also noted “that every effort be made to ensure that proper and tactful methods be followed when acquiring land belonging to the Crown in the right of a province” – a comment referring to earlier difficulties involving the acquisition of land from Saskatchewan. The federal government had the constitutional authority to take over provincial Crown lands for defence purposes, but the acquisition of such lands appears to have been problematic, judging by Cabinet discussions referring to the “very confused state” of such agreements and the Prime Minister’s suggestion that negotiations with the provinces “should be such as to avoid clashes and embarrassment.” Certainly, St. Laurent himself had been involved in an earlier dispute with Quebec premier Maurice Duplessis over access to Pinetree Line sites in that province, and it appears that the acquisition of lands continued to pose a challenge.⁹³

Following Cabinet authorization, the exchange of notes on the nine Gap Filler and Radar Augmentation sites was completed in June of 1955. The additional stations built at US expense for these agreements were subject to arrangements similar to those for other

⁹² Holmes, *History of the Canadian Military Engineers*, 273.

⁹³ 12 May 1955, 17-18, LAC, RG2, series A-5-a, vol. 2658. The matter was also discussed at the 6 May Cabinet meeting. On the acquisition of land in Quebec, see the St. Laurent – Duplessis correspondence in LAC, MG26 L, vol. 90, file D-24-4-C, “Department of National Defence – Quebec – Personal and Confidential”. See also correspondence in LAC, MG27 II B20, vol. 195, file SD-12-1.

US-financed radar stations, using the Pinetree and DEW Line agreements as a model.⁹⁴

The agreements specified "equal opportunity" for US and Canadian contractors. For the six stations covered by the Gap Filler agreement, bids were solicited from both Canadian and US contractors by the Corps of Engineers, Eastern Ocean District, and the contracts were administered by the Corps.⁹⁵ Even though the work was awarded to a US contractor, much of the work was subcontracted to one of the Canadian contractors who had been involved in the construction of Pinetree sites in the area a few years earlier.⁹⁶ DCL may have helped to find suitable Canadian contractors, but its role in the construction of these sites remains unclear.

For the three stations built in Kamloops, British Columbia, Lowther, Ontario, and Barrington, Nova Scotia as part of the Radar Augmentation agreement, DCL entered into a management contract with the US Army Corps of Engineers, Eastern Ocean District (EOD), and as with the original Pinetree arrangements, received a fee to cover its costs.⁹⁷ An advantage of this arrangement for DCL was that a relationship was established with this district of the Corps, which would prove helpful in years to come. Since the EOD was responsible for construction work at the leased US bases at Harmon Field (near Stephenville) and Goose Bay, this allowed DCL to remain informed about the construction programmes at those bases.⁹⁸ In the case of the Radar Augmentation treaty, bids were solicited from both Canadian and American contractors, but no US firms bid

⁹⁴ The DCL version of events refers to Pinetree; while the Cabinet conclusions refer to the DEW Line. "Pinetree," DCC in-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL," 2-3; "General Outline of U.S. Military Construction Activities in Canada," 1-2.

⁹⁵ "Pinetree," 3.

⁹⁶ "General Outline of U.S. Military Construction Activities in Canada," 1-2.

⁹⁷ The USAF did not usually handle its own construction, but was required to use the Corps of Engineers as a design and construction agency unless the responsibility was otherwise assigned by the Secretary of Defense.

⁹⁸ "General Outline of U.S. Military Construction Activities in Canada," 2; "Pinetree," 2, DCC in-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL".

on the contract. DCL administered the contracts under what it described as “close surveillance” by the Corps of Engineers, with the three stations being completed in 1957-58.⁹⁹ While the Canadian contractors did not have to face competition from their American counterparts under the “equal consideration” provisions contained in the exchange of notes, the use of DCL as an agent for the Corps of Engineers was important. While the corporation had already performed such duties for earlier Pinetree radar stations, its assumption of this role for the Radar Augmentation sites helped strengthen its relationship with the Corps. DCL’s role also helped to more firmly establish the precedent of a Canadian government agency acting on behalf of the US military for the building of defence projects in Canada. Before the decade was out, both of these factors would contribute to DCL becoming the agency responsible for all such work in Canada.

Many of the details surrounding the construction of these sites and DCL’s involvement with them appear to have been determined at a meeting held in the office of David Golden, the Deputy Minister of Defence Production, on 5 May 1955 to cover procurement, construction arrangements for the gap filler sites in Newfoundland, the augmentation sites in Ontario and British Columbia, and the Mid-Canada Line.¹⁰⁰ Among those present were DCL president R.G. Johnson and a number of American representatives. In their discussions, they reached agreement on a number of issues pertaining to these projects, including the provisions for construction. In this area, the Canadians pressed hard for the interests of Canadian construction firms and the involvement of Canadian agencies in the building of American projects. Golden, for instance, suggested that the USAF’s proposal to handle the contracts for the construction

⁹⁹ *Ibid.*, 3; “An Introduction to Defence Construction (1951) Limited,” 1, DCC in-house holding.

¹⁰⁰ Memorandum for Record, 5 May 1955, NAC, RG49, vol. 332, file 152-47-1, “Electronics Branch – North East Air Command Radio Link (NEAC) – General Correspondence”.

of the Gap Filler stations in Newfoundland and Labrador through the Corps of Engineers represented the "hard way," as opposed to the employment of DCL through a management contract as had been done for some of the Pinetree Line sites. These arguments appear to have had some effect; the memorandum for the record noted that the Corps of Engineers' Eastern Ocean District

would request bids from both U.S. and Canadian contractors for construction of buildings. DCL will furnish names of competent Canadian contractors to the Corps of Engineers and then in a sense monitor to insure that Canadian interests are being protected. The Corps of Engineers would be the construction agency for the erection of the buildings and facilities.¹⁰¹

For the three Radar Augmentation sites, the meeting concluded that DCL was

to contract for Canadian architect engineers. The Corps of Engineers is to sit in with DCL in the awarding of these contracts to insure that design requirements are met. USAF will furnish definitives for use by DCL and the architect engineers. In all likelihood, several architect engineers will be employed due to the separation of the Augmentation Sites. Following the design, DCL will contract for construction on a privately negotiated (by invitation to selected Canadian contractors) lump-sum type contract. DCL will contract for erection of towers.¹⁰²

Some concerns had been raised within DCL that at stations covered by the Radar Augmentation and Gap Filler agreements, equal opportunity for US contractors could be claimed as a right under the applicable diplomatic notes. It was also noted, however, that when discussing the issue prior to this date the contracting officer at the Corps of Engineers, EOD, agreed to DCL's position that all of the work should be handled by Canadian contractors. Johnson had proposed such an arrangement in earlier discussions with the Corps about the initial batch of radar stations along the Labrador coast, but it remains unclear to what degree this influenced the Corps' decision. The American justification for their position in this instance was that the jobs were too small to be likely

¹⁰¹ *Ibid.*

¹⁰² *Ibid.*

to be of interest to US contractors, and that in any case many of those contractors had Canadian subsidiaries who would bid on the contracts, an interesting point to consider given the focus of DCL and the Canadian government on maximizing benefits for the Canadian construction industry.¹⁰³ This meeting and other exchanges on the construction of American and joint Canadian-American defence projects in Canada demonstrate how quickly both countries seem to have established a new norm and a workable consensus on these issues.

For fiscal year 1958-59, additional work was carried out on a number of RCAF Pinetree stations, largely to expand accommodations and support infrastructure, add classrooms, and combined chapels. Some of the stations had been financed by the US, while the others were Canadian-financed stations. Some twenty contracts with a total value of \$1.8 million were administered by DCL at the ten stations.¹⁰⁴ The Corps also accepted DCL's argument that it could handle future construction at Pinetree stations in Newfoundland and Labrador that had originally been handled by the Corps, and this formed the basis for another management contract.¹⁰⁵

By the mid-1950s, therefore, a set of pragmatic assumptions appears to have informed Canada-US relations on the building of defence construction projects on Canadian territory. As evidenced by the May 1955 meeting discussed above, both Canadian and American officials were planning and discussing the broad issues of

¹⁰³ "Pinetree," 4; Memorandum, "Pinetree (NEAC Portion)," no date, DCC in-house file 122-7-12, "Pinetree Agreement".

¹⁰⁴ "Additional work on Existing Pinetree R.C.A.F. A.C.&W. Sites," DCC In-house file "Statements – Various Canadian and U.S. Government Programs"; DCL, *Annual Report*, 1959-60, 10.

¹⁰⁵ DCL also entered into another contract with the Corps' EOD in the summer of 1958; this time it was for additional buildings at various Pinetree Line stations that were financed by the US; this is discussed in more detail in Chapter Six. "General Outline of U.S. Military Construction Activities in Canada," 5; "Additional Work on Existing CANUSAD A.C.&W. Sites," DCC in-house file "Statements – Various Canadian and U.S. Government Programs".

building the infrastructure for continental defence. In the few short years since the start of work on the Pinetree Line, existing bilateral relationships, such as those between the United States Air Force and the Royal Canadian Air Force, had been expanded and solidified, while new relationships were created. Among these new linkages were those between the Department of Defence Production and its American counterparts, and between the United States Army Corps of Engineers and Defence Construction (1951) Limited. The management contracts DCL executed for the Corps gave the Americans the benefit of an organization with local experience, established relationships with other Canadian government agencies, and with ties to the Canadian construction industry. For the Canadian government, the use of DCL to carry out such contracts allowed Ottawa to employ this agency as an instrument of policy in an effort to maximize the involvement of the Canadian construction industry and its supporting elements. As the Cabinet discussions revealed, the use of an agency like DCL offered the possibility of tailoring contracts to meet even more specific goals, such as the use of local firms in Atlantic Canada. The Crown corporation was thus proving its mettle as Canada's "Cold War handyman." While this approach may not have been entirely successful for the gap-filler radars on the Labrador coast, it would be implemented for the construction of Camp Gagetown in New Brunswick, one of the largest projects in Canada's Accelerated Defence Programme.

The Accelerated Defence Programme

The 1950s marked the high point of Canadian peacetime defence expenditures. While the Pinetree Line and its later extensions were a significant part of the

infrastructure built as a result of this upsurge, a correspondingly large effort to provide other elements of military infrastructure for Canada's armed forces was also undertaken during this decade. As part of Canada's reaction to the Korean War, on 5 February 1951 the Minister of National Defence unveiled the Accelerated Defence Programme (ADP), whose objective was to strengthen the armed forces and which involved the expenditure of \$5 billion over a three year period. In the early 1950s, this dramatic growth in military spending meant that at its peak defence consumed almost half of federal government expenditures.¹⁰⁶ While much of the ADP was intended to expand and re-equip the services, part of the expenditure would be for the upgrading and expansion of DND facilities – some \$200 to \$300 million was earmarked for this purpose, a sum that overshadowed other government public works programmes. The breakdowns of overall expenditures on the Navy, Army, and Air Force was reflected in the infrastructure programmes carried out for each of them, and as a consequence the extent to which DCL carried out work for each service. The RCAF received the greatest share of expenditures at this time – half of the spending in 1954-55 went to the Air Force, for instance, with the Army receiving much of the rest and the Navy gaining relatively little.¹⁰⁷ This distribution was to persist through the rearmament programme of the 1950s.

While these undertakings were significant, and Canadian construction firms might well have welcomed the projects that formed part of Pinetree and the Accelerated Defence Programme, other elements of the broader construction industry, particularly the

¹⁰⁶ House of Commons, *Debates*, 5 February 1951, 90-98. Bercuson points out that in 1952, the high water mark of postwar defence expenditures, defence spending amounted to some 45 per cent of the federal budget. David J. Bercuson, "Canada, NATO, and Rearmament, 1950-1954: Why Canada Made a Difference (but not for very long)," in *Making a Difference? Canada's Foreign Policy in a Changing World Order*, John English and Norman Hillmer, eds., (Toronto: Lester Publishing, 1992), 104.

¹⁰⁷ Bercuson, *True Patriot*, 222-224; Marc Milner, *Canada's Navy: The First Century*, (Toronto: University of Toronto Press, 1999), 204-205; Holmes, *History of the Canadian Military Engineers*, 41-42, 98.

engineering consultants who performed design work and provided supervision of construction projects, were not entirely happy with DCL's actions in implementing them. One of the initial reasons for DCL's creation as a Crown corporation had been its ability to circumvent the provisions of the Civil Service Commission and quickly hire from outside of government. This ability was not uniformly appreciated by the private sector. In April of 1951, R.G. Johnson fielded a complaint from the Association of Consulting Engineers of Canada that the new Crown corporation was attempting to lure employees away from private sector firms. Johnson denied the charge, although he acknowledged that some employees from private firms may have applied for DCL jobs. In an interesting contrast with the large number of the corporation's senior managers who had come from the private sector, Johnson noted that

Defence Construction Limited has advertised engineering positions but very few of those employed have come from private professional firms. I am sure you will appreciate that it is impossible for a Government agency to carry out a large construction programme without an adequate engineering staff. My impression is that such staff as our Company has taken on has resulted in virtually no dislocation to private consulting firms.¹⁰⁸

Furthermore, he argued that the arrangements for the design and supervision of the defence construction programme were "much more to the advantage of private consulting firms than was the case during the last war." During the war, most of the design had been carried out by the Department of National Defence and most of the supervision of construction was performed by military personnel. For the present programmes, Johnson noted, most of the design work was being carried out by private architectural and engineering firms and "a great deal more" of the supervision was under their direction than during the Second World War. Johnson argued that "any situation which may have

¹⁰⁸ R.G. Johnson to E.A. Ryan, President, The Association of Consulting Engineers of Canada, 13 April 1951, DCC in-house file, unlabelled folder.

given rise to your letter is most exceptional and that the facts are that the professions are being given a predominant position, far beyond anything previously experienced, in participating in the defence construction programme.”¹⁰⁹ Unfortunately, only a single letter from this correspondence appears to have survived, so the ultimate outcome of these discussions remains obscure. The issue does not appear to have been raised in Parliament, however, and Johnson’s successor as president, A.G. Bland, would later address at least one meeting of ACEC, which suggests that this rift was ultimately mended.

Operation Bulldozer

Given the focus on continental air defence that prompted Canadian plans for an air defence programme in the late 1940s and the country’s subsequent involvement in the planning and building of the Pinetree Line, it is unsurprising that priority was given to RCAF needs in the first part of the Accelerated Defence Programme; R.G. Johnson stated in early 1955 that in fiscal year 1952-53, 78% of all contract awards had been on its behalf, with the largest expenditures being made on the Pinetree line.¹¹⁰ While the air force’s needs were many, and included the radar installations of the Pinetree Line, new aircraft, and additional personnel, the construction of new air bases and the refurbishing and rebuilding of existing facilities was a significant requirement, and not surprisingly formed the largest element of its infrastructure programme outside of the radar installations. Undertaken between 1950 and 1957 and given the name “Operation Bulldozer,” this undertaking was designed to meet the immediate needs of a rapidly

¹⁰⁹ *Ibid.*

¹¹⁰ “History, Responsibilities & Operations of Defence Construction (1951) Limited,” June 1957, 3; “This News Spells \$100 Millions.”

expanding air force. Bulldozer involved upgrades and new construction at existing stations, the re-opening of other stations that had been declared surplus to requirements and closed after the end of the Second World War, and the building of completely new stations. The RCAF's own construction engineering section was responsible for producing plans and specifications, while DCL's responsibility was to call the tenders and provide supervision of the work. By mutual consent between Minister of National Defence Brooke Claxton and Minister of Defence Production C.D. Howe, however, work on the runways and taxi strips at these bases remained the responsibility of the Department of Transport, as it had during the Second World War.¹¹¹

As part of Bulldozer, upgrades were undertaken at eighteen of the RCAF's thirty-two airfields.¹¹² The major projects were bases at Goose Bay, Labrador, Chatham, New Brunswick, St. Hubert, Quebec, Camp Borden, Clinton, and North Bay, Ontario, Winnipeg, Manitoba, Moose Jaw, Saskatchewan, and Penhold, and Cold Lake, Alberta. Some of these projects involved modifications to existing airfields or those that had been declared surplus to requirements following the Second World War, like Penhold, while others, like the large base at Cold Lake discussed below, were entirely new undertakings. The bases were used for training, active service flying, or, on occasion, both purposes. North Bay, for instance, was developed as a fighter aircraft base to protect southern Ontario against aircraft approaching from the north and northwest, as well as guarding

¹¹¹ Holmes, *History of the Canadian Military Engineers*, 102; Brooke Claxton to C.D. Howe, 16 April 1951; Howe to Claxton, 17 April 1951, LAC MG27 IIB20, vol. 195, file SD-12-1, "Defence Construction".

¹¹² "Canada's Airforce – Airfield Engineers, Cold War," http://www.airforce.forces.dnd.ca/airfield_engineers/history/history_4_e.htm, 6 May 2002.

the vital locks and industries at Sault Ste. Marie from aircraft approaching from the north and northeast.¹¹³

While some aerial defence measures had been taken during the Second World War to guard the coasts and vital inland targets, including the aluminum smelter at Arvida and the locks and industries at the Sault against the remote possibility of aerial attack by Axis raiders, these had been taken more as precautions that reflected the essential nature of these targets rather than as measures that reflected a genuine aerial threat. These new airfields and the radar installations of the Pinetree Line, however, were an explicit acknowledgement that Canada and North America now had to guard against the very real possibility of large-scale direct air attack by the Soviet Union. Up to then, airbases in Canada had largely been used for training and peacetime operations, although the Second World War had brought combat air operations – largely related to the Battle of the Atlantic – to Canadian soil.¹¹⁴ In this new world of the Cold War, however, air bases assumed a new significance for the country's, and the continent's, defence.

As part of being able to support combat operations, many of these air bases would also have to accommodate the new jet aircraft that were beginning to enter service with the RCAF. While the air force had acquired British-built de Havilland Vampire jet fighters in 1948, the aircraft were relatively undemanding in terms of additional operational and support facilities. The introduction of the CF-100 all-weather interceptor in 1953, however, meant that new and upgraded facilities were required in

¹¹³ "History, Responsibilities & Opérations," 3; Memorandum, CAS to AMAP, "Airport Development – North Bay," 30 October 1950, DHH 73/1223, series 3, box 65, file 1324.

¹¹⁴ For a general overview of the air defence of Canada during the Second World War, see W.A.B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force, Volume II*, (Toronto: University of Toronto Press, 1986), 373–427. On the PJBD's wartime concerns about the significance of the locks at Sault Ste. Marie, see Hugh L. Keenleyside, *Memoirs of Hugh L. Keenleyside, Volume 2: On the Bridge of Time*, (Toronto: McClelland and Stewart, 1982), 67.

*Figure 3: Map of Major Accelerated Defence Programme Projects:
Operation Bulldozer, Home Station Development Programme, Royal Canadian Navy*

- RCAF Stations: 1 – Chatham; 2 – St. Hubert; 3 – Borden; 4 – Clinton; 5 – North Bay; 6 – Winnipeg; 7 – Moose Jaw; 8 – Penhold; 9 – Cold Lake
- Army Sites: 1 – Gagetown; 2 – Valcartier; 3 – Petawawa; 4 – London; 5 – Winnipeg; 6 – Edmonton; 7 – Calgary
- ▲ Navy Sites: 1 – Sydney; 2 – Dartmouth; 3 – Esquimalt

Source Map: Natural Resources Canada. Source Data: Holmes, History of the Canadian Military Engineers.

Canada. The CF-100 was larger, more complex, and had to be able to operate around the clock and in all weather conditions. New runways therefore had to be built and existing ones expanded to accommodate take-off and landing runs. Alert facilities were also required, so that interceptors and their crews could stand by at the ready to take off on short notice. Arrestor gear installations, designed to bring aircraft to a halt in case of damage or problems with their brakes, were also required for the larger, heavier, and faster CF-100.¹¹⁵ The operational training of crews for the new interceptor was also essential to the effectiveness of Canada's aerial defences, and while this work was initially carried out at RCAF Station North Bay, Ontario, it would subsequently be moved to Cold Lake, Alberta, the site of an ambitious air base construction programme.¹¹⁶

The development of RCAF Station Cold Lake was a significant element of Operation Bulldozer. In 1950-51, the government set aside some 4,600 square miles to form the Primrose Lake Evaluation Range, a facility intended to facilitate armament testing and aircrew training. An airfield was established nearby at Cold Lake in order to make the best possible use of the new range, and construction began in the spring of 1952.¹¹⁷ The airfield site had been selected using criteria that included accessibility, weather, and the suitability of the land for airfield construction.¹¹⁸ The airfield and its associated facilities were ready two years later, although the barracks were not completed

¹¹⁵ Holmes, *History of the Canadian Military Engineers*, 109-111; Kostenuk and Griffin, *RCAF Squadrons and Aircraft*, 145 "Canada's Airforce – Airfield Engineers, Cold War," http://www.airforce.forces.dnd.ca/airfield_engineers/history/history_4_e.htm, 6 May 2002. The CF-100 had first been delivered to the RCAF by Avro Canada in 1951, but a persistent structural problem required significant redesign before the aircraft entered service in 1952. Stewart, *Shutting Down the National Dream*, 142-154, 168-171.

¹¹⁶ NBC Group, *A History of the Air Defence of Canada*, 146-147.

¹¹⁷ "This News Spells \$100 Millions"; Holmes, *History of the Canadian Military Engineers*, 104-105.

¹¹⁸ "4 Wing – History," http://www.airforce.forces.ca/4wing/about_us/history_e.cfm, 10 June 2002.

until 1955. By that point the air base was in operation, although the additional work required to put the base into full service would not be completed until June 1955.¹¹⁹ The complex at Cold Lake covered some ten square miles, and involved more than a dozen contractors.¹²⁰ Construction of the Primrose Lake range was more challenging, however. Access to the Primrose Lake facility required the construction of a forty-two mile access road through bush and muskeg. Parts of the road required corduroy construction – up to five layers in some areas – and wooden bridges, but even then access was difficult due to mud and flooding from beaver dams.¹²¹

In addition to its importance as a training facility, Cold Lake also exemplified the challenges inherent in construction in northerly areas of Canada. While still well south of the Arctic Circle, and of much of Canada's land mass, and enjoying the benefits of a railway connection to the south for the transportation of people and materials, both the climate and the terrain had posed problems for builders, and would continue to do so for future projects.¹²² Cold Lake was the northernmost "Bulldozer" site, and while Goose Bay presented challenges of both climate and terrain, work there had the benefit of being carried out at a substantial, already established base – the existing installation at Cold Lake, however, had been quite limited. The other infrastructure elements of the Accelerated Defence Programme – the Home Station Development Programme for the Army's bases, for instance, and the Navy's various installations, were not subject to such problems. While some of these projects may have been located in relatively isolated areas, they were still within regions served by ordinary construction firms. Subsequent

¹¹⁹ "This News Spells \$100 Millions"; Holmes, *The History of the Canadian Military Engineers*, 104-105.

¹²⁰ "Canada's Airforce – Airfield Engineers, Cold War."

http://www.airforce.forces.dnd.ca/airfield_engineers/history/history_4_e.htm, 6 May 2002.

¹²¹ *Ibid.*

¹²² *History of the Canadian Refueling Base Program*, 16, 32-35.

defence construction projects, however, including the Mid-Canada and Distant Early Warning Lines, would require extensive – and expensive – measures simply to bring materials and workers to their northerly sites; the requirements for special techniques to deal with muskeg and permafrost, and to allow year-round work and re-supply in the midst of the Arctic were yet an additional complication.

This northerly turn marked a significant change in DCL's operations. Its predecessor, Wartime Housing Limited, had been created as an instrument of policy to provide housing for war workers, and later for veterans, but its worker housing projects had been brought into being in places where the private sector had considered it *economically* challenging or infeasible to provide houses. The veterans' housing had been provided in a similar vein, with the corporation being used as a means of state intervention. With projects like Cold Lake, however, the Canadian construction industry was drawn northward and learning how to carry out work in areas that had previously been considered *technically* challenging or infeasible. In both cases, of course, the imperatives of national defence overrode some economic objections, and were used to justify expenditures that would almost certainly not have been made by the private sector. There was, for instance, no commercial requirement for a large airfield in northern Alberta, much less a market demand for a weapons testing range. DCL president R.G. Johnson promoted the importance of such defence work for the Canadian construction industry in 1958. In a position paper on the industry, he noted the results of its involvement in such projects, arguing that "where in 1950 we could not reasonably undertake to commit Canadian construction industry to efficient and economic work in the areas where it has limited experience, the situation is entirely different today and

there is no real reason why all defence works in Canada should not be carried out by the Canadian construction industry.”¹²³

If national dreams like transcontinental railways drew development in their wake, so did other projects. The Rideau Canal – a significant defence infrastructure project of the early 19th century – brought European settlement and proto-industrial development in its wake, and the northern projects of the Second World War, most notably the Alaska Highway, did much the same.¹²⁴ In the early Cold War, the same could be said for the defence projects that would soon proliferate throughout Canada’s north; they were accompanied by, or subsequently attracted, European contact and involvement with aboriginal populations. The establishment of a widespread network of installations and communication systems driven by concerns about the threat from the Soviet Union and paid for by defence expenditures also facilitated the expansion of southern influence and control over large areas of the North and the Arctic.¹²⁵ The projects put in place through DCL were thus conforming to an established Canadian tradition of military undertakings that brought settlement and development in their wake.

The Army’s Home Station Development Programme

DCL’s responsibilities as part of the Accelerated Defence Programme changed from 1953 onwards. Its 1953-54 annual report noted that the bulk of the company’s

¹²³ R.G. Johnson, “The Position of the Canadian Construction Industry in 1958,” DCC in-house file “Summaries of U.S.-Canada Diplomatic Agreements Affecting DCL”.

¹²⁴ Robert Legget, *Rideau Waterway*, (Toronto: 1986); Dianne Newell and Ralph Greenhill, *Survivals: Aspects of Industrial Archaeology in Ontario*, (Erin, ON: The Boston Mills Press, 1989), 19-30; Morris Zaslow, *The Northward Expansion of Canada, 1914-1967*, (Toronto: McClelland and Stewart, 1988), 209-233; Kenneth Coates, *Canada’s Colonies: A History of the Yukon and Northwest Territories*. Toronto: James Lorimer & Company, 1985, 167-183.

¹²⁵ On the significance of such projects for contacts between indigenous populations and southern newcomers, see David Neufeld, “Commemorating the Cold War in Canada: Considering the DEW Line,” *Public Historian*, 1998 20(1): 9-19; Zaslow, *The Northward Expansion of Canada*, 323-331, 351-355.

contracts for the RCAF were nearing completion, and that its major work in the near future would be for the army. The resultant projects were collectively known as the Home Station Development Programme, which was undertaken for the Army once the RCAF's most important needs had been dealt with. Even before this date, however, a considerable amount of work was put in place; between July 1950 and July 1952, over 7,000 buildings were built or renovated for the army. The Accelerated Defence Programme had sped up the Home Station Development Programme, which would still, however, require another six years to complete.¹²⁶

The expansion of Canada's armed forces in reaction to the outbreak of war in Korea and the growing perception of the Soviet threat along the Iron Curtain led to an army that had increased to more than divisional size. One of the consequences of this expansion was the need for larger training areas, especially in Eastern Canada.¹²⁷ Gagetown, New Brunswick, was designed to provide an area large enough to train brigade and larger formations. Its location near the Atlantic also suited it to use for the mobilization, final training, and embarkation of forces being sent overseas to serve with NATO. Its more than 400 square miles of terrain was similar to that in Western Europe, the anticipated battlefield should the Soviet Union attack, and the local climate permitted year-round training. Petawawa, Ontario, was the next largest home station in size.¹²⁸ Gagetown was intended to provide a base for a 5,000-strong brigade group and year-round training for a 10,000-strong division. It would be the largest training facility in the Commonwealth, and was composed of three separate areas – a townsite, a training area,

¹²⁶ Holmes, *History of the Canadian Military Engineers*, 266-267.

¹²⁷ "Canadian Force Base Gagetown – History of Camp Gagetown," http://www.army.dnd.ca/cfb_gagetown/organ/histor_e.htm, 10 June 2002.

¹²⁸ "This News Spells \$100 Millions."

and a permanent unit accommodation area. The federal government announced the establishment of a permanent base and training area in New Brunswick in the summer of 1952, and work began the following year. Other home stations DCL worked on included Valcartier, Quebec, Petawawa, and London, Ontario (Wolseley Barracks), Winnipeg, Manitoba, (Fort Osborne Barracks), and Edmonton (Griesbach Barracks) and Calgary, Alberta (Camp Sarcee).¹²⁹

Camp Gagetown was the largest of the Army bases constructed at this time, and work there was on a large scale and not without its difficulties. Ultimately, some 55,000 acres were cleared from the 288,000 acres forming the overall camp, and at the peak of the construction effort at Gagetown, some 7,000 tons of gravel were required daily. By 1954, the return of troops from Korea increased the urgency of work at this location, but heavy rains throughout the summer caused construction problems and increased costs.¹³⁰ In order to speed up construction, and presumably to help lower design costs, standardized building designs were used, and their construction contracts were subdivided into some eleven contracts in the one to two million dollar range. It was hoped that these smaller contract sizes would encourage Atlantic Canadian construction firms to place bids that could compete with their larger counterparts from elsewhere in the country. Contract packages began to be awarded in September of 1954, and eighty buildings had been contracted within the first year.¹³¹ This division of work into “packages” points to the use of military infrastructure work – performed through the

¹²⁹ Holmes, *History of the Canadian Military Engineers*, 273; “Canadian Force Base Gagetown – History of Camp Gagetown”; JHP Scullion, “A Compended History of Defence Construction (1951) Limited, also known as Defence Construction Canada (DCC),” June 1988; “History, Responsibilities & Operations,” June 1957, 3.

¹³⁰ “An Introduction to Defence Construction (1951) Limited,” 6; R.G. Johnson to C.D. Howe, “Re: Atlas Construction Company Contract, Camp Gagetown, NB,” 2 November 1954; C.D. Howe to Walter Harris, 2 November 1954, DCC in-house file, “Atlas Construction”.

¹³¹ Holmes, *History of the Canadian Military Engineers*, 273.

agencies of DCL – as a means of regional economic “pump priming”. At much the same time, the government had also sought to use the Pinetree Line gap fillers along the Labrador coast for similar ends, suggesting that contracts be awarded to Maritime firms if at all possible.¹³²

The 1954-55 DCL annual report noted that some 40,000 acres at Gagetown were scheduled for clearing, 42% of which had been completed by the end of the fiscal year. By that time, 49 construction contracts had been awarded, with a total value of over \$29 million, but some 25 to 30 contracts with an approximate value of 24 to 25 million remained to be awarded. Of the roughly 100 military buildings required for the station, contracts had been awarded for 43, while about 80% of the ground services, including water and sewer systems, roads, and general grading, had been completed, and 22% of the electrical and mechanical work, including electrical and water distribution systems, had also been finished.¹³³ Although construction was by no means complete, by this time the base was already in use. The 3rd Canadian Infantry Brigade underwent six weeks of training in the summer of 1954, while the following summer, 1st Canadian Division used the camp for the first complete formation exercise, using all the elements of the division, carried out in Canada.¹³⁴

In early 1955, total estimated costs for construction of the base at Gagetown were approximately \$45 million, with more than half of that amount already awarded in 45 contracts. In addition to DCL’s involvement, CMHC was also present and was responsible for the construction of more than 1,400 housing units, three schools, and the necessary supporting services. In measures that corresponded with the use of

¹³² Cabinet Conclusions, 6 May 1955, 4, LAC, RG2, series A-5-a, vol. 2657.

¹³³ DCL, *Annual Report*, 1954-55, 3.

¹³⁴ “Canadian Force Base Gagetown – History of Camp Gagetown.”

standardized building designs, planning for construction involved the establishment of common facilities for all contractors, including a central mixing plant for concrete and central camp facilities. Also centralized was the station's hot water heating system, which at the time was the largest in Canada. The Auditor General's report for 1955-56 noted that DCL was providing DND with design and engineering personnel, maintenance crews and personnel for fire protection and similar purposes at Gagetown, with the costs being reimbursed by DND.¹³⁵ While most, if not all, of these workers were probably contracted for by DCL rather than being actual DCL employees, the corporation was demonstrating its flexibility in providing services for its client, and this expedient use of DCL's capabilities would be repeated in the future.

Together with the work on the Mid-Canada Line, which will be discussed in Chapter Three, the Gagetown contracts contributed to an increase in the value of contracts awarded by DCL in 1955-56, an increase of 34% over the previous fiscal year.¹³⁶ Expenditures on the project during this time amounted to \$26.5 million, and clearing of 30,000 acres was near completion, as was the installation of water and sewer services, and the installation of electrical and mechanical equipment. Winter work had facilitated progress, with the work force remaining above 1,600 for the entire season.¹³⁷ In 1956-57, \$16.9 million was spent on work at Gagetown, with an additional \$26.2 million spent on the Home Stations at Valcartier, London, Petawawa, Winnipeg, Edmonton, and Calgary.¹³⁸ Over one third of the 102 buildings at the camp had been

¹³⁵ "This News Spells \$100 Millions"; *1956 Report of the Auditor General*, paragraph 101, page 32.

¹³⁶ DCL, *Annual Report*, 1955-56, 5.

¹³⁷ *Ibid.* 7. The broader issue of DCL's involvement in winter work is discussed in Chapter Five.

¹³⁸ DCL, *Annual Report*, 1956-57, 6.

taken over by the Army by the end of the year, and most of the remaining buildings were 90% complete.¹³⁹

In 1957-58, most of the construction work put in place through DCL for the army was devoted to the completion of the Home Station Development Programme, which was substantially completed by the end of the year. At Gagetown, 110 buildings had been taken over by the end of the fiscal year, and the cumulative costs had reached \$57.5 million. An additional bridge and five more buildings were scheduled for construction in the summer of 1958, but the base was largely completed. Seventeen miles of road connected the barracks, messes, administrative and service buildings in the building area, and five and a half miles of tunnels had been built to house the distribution systems for the various services, including a central heating plant. Some 55,000 acres were cleared for the various training areas, which were linked by fifty miles of road, two thirds of which was new construction, with the remaining third being older roads which had been rebuilt. By summer 1958 construction was essentially complete and on 1 July of that year the camp was officially opened. In the end, total costs for Gagetown were some \$67 million; \$13 million had been required for the acquisition of land, including the compensation for residents displaced by the project, \$37 million had been spent on camp infrastructure, and \$17 million on married quarters.¹⁴⁰ The end result was an installation that served the needs of the Canadian army for training and for Canada's broader NATO commitments to the reinforcing of Europe in the event of war. DCL had obviously helped through the tendering of contracts and supervision of construction, and its provision of services to the military before the base was complete presaged later work in this field.

¹³⁹ "Defense 1957-58 Costs Drop as Major Projects Near End," *Financial Post*, 02 November 1957, 21.

¹⁴⁰ DCL, *Annual Report*, 1957-58, 10; Holmes, *History of the Canadian Military Engineers*, 273.

The subdivision of large contracts into smaller units in order to facilitate the involvement of Maritime contractors was also noteworthy; here, the government was explicitly using defence expenditures as a means of regional economic “pump priming,” with Defence Construction Limited serving as the instrument for implementing such plans.

The Royal Canadian Navy

In contrast with the army and air force, the Royal Canadian Navy (RCN) enjoyed relatively few major infrastructure programmes as part of the Accelerated Defence Programme. The early focus of rearmament undertaken by the navy involved an increase in the number of ships in commission, the provision of improved equipment and support facilities for those ships, increases in personnel strengths, the installation of permanent harbour defences, the preparation of industry for rapid wartime production, and improving the infrastructure for rapid mobilization.¹⁴¹ During the early 1950s, the RCN had no major shore-based infrastructure project to compare with Cold Lake or Gagetown, and definitely had no programmes to compare with the infrastructure demands of continental radar networks, Operation Bulldozer, or the Home Station Development Programme. On the West Coast, new supply and dockyard facilities were built at Esquimalt, BC, new accommodations provided at Royal Roads, and ammunition depots provided at Rocky Point and Kamloops. New and expanded ammunition facilities were also provided in the east, along with a maritime warfare school and facilities to support the training and operation of carrier aircraft, while barracks and married quarters were provided on both coasts. The installation of seaward defences against enemy attack did

¹⁴¹ Milner, *Canada's Navy*, 205; Holmes, *History of the Canadian Military Engineers*, 45-46; Memorandum, DM/DND to CNS, CGS, CAS, CDRB, “Acceleration of Defence Program,” 20 July 1950, DHH 73/1223, series 3, box 65, file 1324.

require construction projects, however, and DCL's 1957-58 annual report noted that the two Seaward Defence Bases in Sydney, NS, and Esquimalt, BC, had been completed during this year.¹⁴²

Among the contracts awarded in the early 1950s were barracks and a maintenance garage at HMCS *Shearwater* in Dartmouth, Nova Scotia. The latter held the distinction of being one of DCL's first design-build contracts as well as the dubious honour of having one-third of the building collapse shortly after its handover to the navy.¹⁴³ Design-build contracts involved a contractor who both furnished the design for the work and did the construction, as opposed to the more usual approach where contractors worked according to designs provided by the Department of National Defence through DCL. While the reasons for the failure are not elucidated in DCL files, this incident appears to have left a lasting mark on the Department of National Defence and the corporation; not until the end of the 1960s would DCL award and administer another such contract.¹⁴⁴ Other, smaller-scale projects were carried out for the RCN as part of the ADP, but they do not seem to have attracted as much attention in reports or DCL files as the larger undertakings for the RCAF and the Army.

¹⁴² *Ibid.*; Holmes, *History of the Canadian Military Engineers*, 46; DCL, *Annual Report*, 1957-58, 10. R.G. Johnson to Crawford Gordon Jr., Co-Ordinator of Production, DDP, "Re: Submissions to Council," 6 April 1951. Crawford Gordon would later go on to head up A.V. Roe Canada, but at this time was defence production co-ordinator (a position he held from March to November 1951) and a member of the DCL Board of Directors. R.G. Johnson to M.W. Mackenzie, DM/DDP, 1 November 1951, DCC in-house file, unlabelled folder; Greig Stewart, *Arrow Through the Heart: The Life and Times of Crawford Gordon and the Avro Arrow*, (Toronto: McGraw Hill Ryerson, 1998), 69-81.

¹⁴³ "Notes prepared for FORUM – CCA Standard Practices Committee – CCA Convention 1973," DCC in-house file "Bland Speeches".

¹⁴⁴ "Notes prepared for FORUM"; DCL, *Annual Report*, 1970-71, 11-12.

Problems and Challenges of Construction

While the collapse of a building like the garage at Shearwater was an obvious failure of the construction process, other problems and challenges were not so necessarily clear-cut. At Camp Gagetown, for instance, DDP and DCL had to confront the possibility of one of the major contractors – Atlas Construction, responsible for the roads and ground services – being unable to complete the contract due to its increased costs from adverse weather and the unfavourable settlement of an earlier contract dispute with the city of Montreal. The situation appears to have been resolved through the amendment of the contract at the instigation of C.D. Howe, who used a report from DCL president R.G. Johnson to justify the additional payment to Atlas. Drawing parallels with RCAF Station Cold Lake, Johnson argued for expediency, noting that contractors had to be paid to cover overtime for workers in order to attract labour to a relatively isolated location and complete the station in an acceptable time for the RCAF.¹⁴⁵ Construction problems, however, did not always manifest themselves immediately, as was evidenced by heating systems installed at RCAF bases and elsewhere. Some thirty locations received underground steam distribution systems as part of the modernization programme, but unfortunately neither planners nor contractors had experience with the insulation material that was selected. In the following six years, repairs had to be made at fourteen locations. RCAF Station Chatham incurred the greatest costs, where by early 1956 repairs and

¹⁴⁵ C.D. Howe to Walter Harris, 2 November 1954; Memorandum from R.G. Johnson, "Re: Atlas Construction Co. Ltd., - Contract for Ground Services – Camp Gagetown, N.B.," attached to C.D. Howe to Walter Harris, 2 November 1954, DCC in-house file, "Atlas Construction".

replacements came close to the original costs. Estimated repair costs for the fourteen locations reached \$1.2 million on work with original costs of some \$6 million.¹⁴⁶

This boom in defence construction entailed large-scale expenditures and employment across the country, and not surprisingly these activities attracted the interest of people who saw an opportunity to benefit from the government's activities. Among these individuals were those who sought work on defence contracts through patronage. Shortly after DCL's inception, Prime Minister St. Laurent received a request from Senator Adélar Godbout for the employment of a particular civil engineer ("un excellent travailleur, un parfait honnête homme d'une loyauté qui ne s'est jamais démentie") on public works or national defence projects. St. Laurent took up the matter with Minister of National Defence Brooke Claxton, who recommended that the request be forwarded to C.D. Howe, since the latter was responsible for DDP and DCL, which were in a position to supply such work. The matter was subsequently taken up with R.G. Johnson by one of Howe's staffers, who was advised that although "most of the engineering services utilized by that Company [DCL] are those of Central Mortgage and Housing Corporation.... Mr. Johnson has promised to keep the name of Mr. Clerk in mind, in the event that he must employ other engineers for the Company."¹⁴⁷ Following subsequent correspondence from another of Howe's staff, the matter was taken up with R.H. Winters, the Minister of Resources and Development, who was responsible for CMHC, "in the hope that Central Mortgage and Housing may be able to make use of his services

¹⁴⁶ Canada, Auditor General of Canada, *1956 Report of the Auditor General to the House of Commons*, (Ottawa: Queen's Printer, 1956), paragraph 57, page 18.

¹⁴⁷ A. Saint-Denis, Assistant Private Secretary to Minister of Defence Production to W.R. Martin, Secretary to the Prime Minister, 17 July 1951, LAC, MG26 L, file D-24-4-C.

through Defence Construction Limited.”¹⁴⁸ The engineer was ultimately interviewed by a CMHC official to determine his interests in work for the corporation, and Winters’ private secretary had “no doubt that if a requirement develops, consideration will be given by the Corporation to the retention of Mr. Clerk’s services as an engineering consultant.”¹⁴⁹ While it remains unknown whether Mr. Clerk ever benefited from this attention, this exchange serves as a useful reminder of the potential that existed for abuse and of the significance of these projects for the construction industry and its related services.¹⁵⁰

Steel, Construction, and Dissatisfaction in the Military

In addition to building collapses, cost overruns, and patronage seekers, defence construction faced another significant challenge – a chronic shortage of steel – during the early Cold War. In the years following the Second World War, the issue of steel production, and the federal government’s role in its control, proved to be a troublesome issue for government-business relations. Steel remained under government control following the end of the war due to a shortage of domestic supply. As Cold War tensions grew, the importance of steel for military preparedness was recognized by journalists, government, and industry. Following a hesitancy of both government and business to

¹⁴⁸ Memorandum, Pierre Asselin, Private Secretary to the Prime Minister, to R.L. Winters, Private Secretary to R.H. Winters, Minister of Resources and Development, 3 August 1951, LAC, MG26 L, file D-24-4-C.

¹⁴⁹ R.L. Elliott, Private Secretary to R.H. Winters, Minister of Resources and Development, to Pierre Asselin, Private Secretary to the Prime Minister, 10 September 1951, LAC, MG26 L, file D-24-4-C.

¹⁵⁰ While many of the projects undertaken by DCL were large in comparison with individual civilian projects, in the broader context of the Canadian construction industry the corporation’s work at this time (anticipated in 1951 to be some \$100 million) was relatively small in terms of the overall dollar value of construction carried out in Canada at this time – some \$3 billion annually. R.G. Johnson, “Operation of Defence Construction Limited,” *Proceedings of the Annual General Meeting of the Canadian Construction Association, 1951*, 15.

underwrite the large-scale expansion of the steel industry in Canada, by the end of the 1940s production capacity had increased to the point where the government was considering the elimination of steel controls. Much of this growth had been accomplished through the agency of C.D. Howe, who was responsible for the controls, but industrialists like Sir James Dunn, owner of Algoma Steel and a friend of Howe's, also played a significant role in providing increased production capacity.¹⁵¹

The outbreak of war in Korea only served to aggravate the strained steel supply situation. A significant challenge for Canada's rearmament programme, and an under-appreciated problem associated with defence construction in the early 1950s was the chronic shortage of structural and reinforcing steel for defence projects and related activities.¹⁵² Once again the exigencies of military mobilization prompted the federal government to directly intervene in the economy. In this instance, the relationship between the controlled material – structural steel – and the military goal – defence construction – was direct and clear-cut, although steel control was judged essential for other defence-related activities that were not so explicitly military in nature.¹⁵³

The Essential Materials (Defence) Act, introduced in the fall of 1950, enabled the government to impose controls on "essential materials," which by November included steel. Beginning late in that year, Defence Construction Limited had to contend with the

¹⁵¹ Bothwell and Kilbourn, *C.D. Howe*, 237; Duncan McDowall, *Steel at the Sault: Francis H. Clergue, Sir James Dunn, and the Algoma Steel Corporation, 1901-1956*, (Toronto: University of Toronto Press, 1984), 230-235.

¹⁵² When explaining the introduction of steel controls through the Essential Materials (Defence) Act, Howe explained that "the controls that are now in effect, and that may be forthcoming in the near future, are not solely and primarily for the purpose of assuring steel supplies for the fulfillment of defence contracts. In fact, defence contracts by themselves do not require a particularly large portion of available steel supplies. The impact comes rather from the defence-supporting projects, such as the building of railway cars, locomotives and ore carriers to move essential materials and supplies. While technically not defence orders, these are no less essential at the present time than the production of guns." House of Commons, *Debates*, 8 February 1951, 181.

¹⁵³ McDowall, *Steel at the Sault*, 235-238.

Korean War-related shortage of steel, and worked on plans in conjunction with DND and other departments to try to deal with the situation. By calling for long-term planning and listing of project requirements, Johnson believed that delivery of steel for various projects could be streamlined and expedited.¹⁵⁴ At this point, the government had already been curtailing its use of steel, including the materials required for the construction of new government buildings in Ottawa. In a March 1951 letter to the Minister of Public Works, Howe emphasized the severity of the situation when he noted that “this country has never been faced with a steel shortage as acute as the one we are now facing. Whether there will be much easing of the situation within the next two years, I am not sure.”¹⁵⁵ The following month, a CMHC memorandum about DCL and its construction programmes noted that “the major deficiency lies in our inability to supply contractors with steel,” while a few months later C.D. Howe acknowledged in Parliament that the current defence construction programme was “making heavy demands on critically short materials, particularly reinforcing steel” and that “in recent months the requirements of steel for defence projects have increased sharply, and we are now faced with a critical situation with respect to supplies of reinforcing steel, plates and structural steel. It has, in fact, been necessary to direct Canadian mills to defer shipments of less urgent projects.”¹⁵⁶

These steel shortages had consequences outside of the government and military. Steel is a vital material for a modern industrial economy, including the construction industry, so it was not surprising that the Canadian Construction Association discussed

¹⁵⁴ McDowall, *Steel at the Sault*, 236; House of Commons, *Debates*, 8 February 1951, 181; R.G. Johnson to C.M. Drury, DM/DND, 21 December 1950. DCC in-house file, unlabelled folder.

¹⁵⁵ C.D. Howe to Minister of Public Works, 3 March 1951, NAC, RG49, vol.48, file 122-4-5. For additional correspondence on this matter from February 1951 onwards, see *ibid.*

¹⁵⁶ CMHC Memorandum, “CMHC – DCL Arrangements,” 7 April 1951, DCC In-house file H-11, “Organization – Old Company”; House of Commons, *Debates*, 14 June 1951, 4072, 4075.

the issue at the May 1951 meeting of its Management Committee. In addition to committee members from across the country, two representatives from DDP's Steel Division attended the meeting to answer questions about the steel controls they administered.¹⁵⁷ Despite restrictions on steel for certain sorts of construction, the DDP officials argued, some 30% more steel had been delivered to the industry in the first quarter of the year than in 1950, although much of this was earmarked for defence or "defence supporting" projects with a relatively high steel content. Coupled with the increase in the volume of contracts awarded, there was a resultant acute shortage of steel. While imports and domestic production had increased in comparison with the previous year, mid-1951 would probably see the end of imports of US steel without US government priority approvals, while European imports would probably soon decline as well. Canada had limited stockpiles of reinforcing steel, and any stores of structural steel that had existed at the beginning of 1951 had by May been essentially used up.¹⁵⁸

The various regulations governing the use of steel on construction sites were discussed, at this meeting and the minutes record the impressions of a number of CCA executive committee members. They were concerned that the steel regulations would cause disruptions in the construction industry, leading to unemployment that even the new defence contracts could not alleviate; that other sectors, most notably the automobile

¹⁵⁷ Canadian Construction Industry, Minutes of Third Meeting – 1951 Management Committee, Ancaster, Ontario, 15 May 1951, LAC, RG 49, vol.50, file 122-5-13. These meetings were also attended on at least one occasion by R.G. Johnson, who addressed the association on the "Defence Construction Program," but the minutes for that meeting have unfortunately not survived in the DDP files. Agenda for 4th Meeting of Management Committee, 23, 25 June 1951, LAC RG 49, vol.50, file 122-5-13, "Steel Division – Committees and Conferences – Canadian Construction Association".

¹⁵⁸ Canadian Construction Industry, Minutes of Third Meeting – 1951 Management Committee; R.G. Johnson to K. Harris, Director, Steel Division, DDP, 6 April 1951, LAC, RG49, vol. 50, file 122-5-13. By way of comparison, steel use by the American military was not as high at this time as it had been during the Second World War (fifteen to twenty per cent rather than over fifty per cent during the war), but the American economy in the early 1950s was also not subject to Second World War-type controls. Friedman, *Fifty Year War*, 157-158.

industry, were not affected by such controls; that the focus in construction had changed to heavy projects which used relatively less labour and additional construction materials than did smaller projects; and that smaller contractors who collectively employed the greatest number of building trades workers were at a disadvantage as a result of steel controls.¹⁵⁹

J.J. Piggott, a prominent Hamilton construction contractor, voiced many of these concerns. Piggott had been president of the Canadian Construction Association in the 1920s and later president of Wartime Housing Limited; he remained a significant figure in the construction industry. Piggott suggested that these concerns should be passed to the government, along with suggestions for the provision of small quantities of steel to “worthwhile” projects, either from a relaxation of regulations or, if necessary, from other industries “on the principle that any necessary unemployment burden should be shared as equitably as possible.”¹⁶⁰ A motion to this effect was passed and a letter was shortly sent to C.D. Howe by the president of the Canadian Construction Association containing the industry’s concerns and suggestions.

The letter reflected these arguments and concerns, but also made some suggestions for mitigating measures. The CCA’s long-standing concerns about unemployment were brought to the fore, with the letter noting that “deep concern was expressed that the effects of Minister’s Order No. 3 restricting the end use of steel materials in the construction industry would, unless alleviated, bring about serious

¹⁵⁹ Canadian Construction Industry, Minutes of Third Meeting – 1951 Management Committee.

¹⁶⁰ *Ibid.* Piggott had been president of the CCA from 1923-1924, and was a very successful construction contractor; his firm was responsible for a number of significant buildings in Ontario and Quebec, including the Royal Ontario Museum, the head offices of Crown Life, Bell Telephone, and Imperial Oil, the Bank of Canada in Ottawa, the Queen Elizabeth Hotel in Montreal, and the Basilica of Christ the King in Hamilton. *The Canadian Who’s Who, Volume X: 1964-1966*, (Toronto: Trans-Canada Press, 1966), 878.

unemployment among those ordinarily engaged in the types of building construction curtailed by the Order.”¹⁶¹ Part of the CCA’s grievance was that construction was the only industry in Canada subject to direct government steel restrictions, in contrast with the United States where a number of industries were so affected. Pointing to unidentified important but “non-essential” projects almost completed and to US regulations that permitted the purchase of steel for such projects under some extenuating circumstances such as public health, welfare, and safety, or the alleviation of community hardship, the CCA asked for similar consideration.¹⁶² In a number of ways, this position bears resemblance to the CCA’s advocacy of public housing projects during and before the Second World War as a means of providing employment and other benefits to the industry, and was certainly a case of CCA advocacy and lobbying.¹⁶³

By mid-August of 1951, Defence Production believed that the situation had become sufficiently serious to warrant drastic intervention on behalf of the projects being supervised by DCL. The department sent telegrams to every manufacturer of reinforcing steel in Canada ordering the diversion of *all* of their production to DCL projects for some period of time – the initial estimate was until the end of September. “Therefore,” the companies were ordered, “arrange immediately to discontinue rolling any reinforcing steel other than for Defence Construction Limited projects. Any further specifications or details needed to take up displaced tonnage will be provided by Defence Construction Limited or their engineers and general contractors through Steel Division.”¹⁶⁴

¹⁶¹ R. Drummond, President, Canadian Construction Association, to C.D. Howe, Minister of Defence Production, 26 May 1951, LAC, RG49, vol.48, file 122-4-5.

¹⁶² *Ibid.*

¹⁶³ John C. Bacher, *Keeping to the Marketplace: The Evolution of Canadian Housing Policy*, (Montreal & Kingston: McGill-Queen’s University Press, 1993), *passim*, but especially 134-135.

¹⁶⁴ Telegram, DDP to DOSCO, STELCO, Burlington Steel Co. Ltd., Manitoba Rolling Mills Co. Ltd., Vancouver Rolling Mills Co. Ltd., Enamel & Heating Products Ltd., Algoma Steel, 16 August 1951, LAC,

The Canadian military was also deeply concerned by the consequences of the steel shortage. In July of 1951, the Chiefs of Staff Committee discussed the 1951-52 service programmes, and both the Acting Chief of the Air Staff and the Chief of the General Staff attributed the delays in their programmes to the shortage of steel – for the RCAF alone, this was estimated at some 20,000 tons. The ACAS stated that the situation “was jeopardizing the implementation of the vital expansion programme of the continental radar system which had been undertaken by the RCAF as an international commitment on the understanding that the necessary building materials and other equipment would be made available on schedule.”¹⁶⁵ Shortly afterwards, in August of 1951, the Principal Supply Officers Committee drew up a memorandum discussing the defence construction programme. Renewing objections that had been raised at the time of DCL’s creation in 1950, they made recommendations for sweeping modifications that encompassed more than steel controls and allocations. While arguing that DCL should continue to be responsible for awarding contracts and obtaining better representation on the staff of the Steel Controller, the committee’s most significant recommendation was “that the Services re-assume their old responsibility for supervision and inspection of construction, utilizing outside civilian organizations to assist them in this programme as necessary.”¹⁶⁶ The newly created corporation, in other words, was to be relieved of its primary *raison d’être*.

RG 49, vol.48, file 122-4-5, “Steel Division – Programming of Industries – Construction Industry Programme”.

¹⁶⁵ Chiefs of Staff Committee. Minutes of 501st Meeting, 18 July 1951, 7, DHH 73/1223, box 61, file 1306C. Comparable problems were affecting the construction of American radar installations; in addition to delays in the delivery of radar equipment, shortages of building materials had interfered with site construction and equipment installation. Schaffel, *The Emerging Shield*, 137-138, 143

¹⁶⁶ Minutes of the 18th meeting of the Vice Chiefs of Staff Committee, 17 September 1951, 5-6, DHH 72/1223, series 3, box 64, file 1312.

This memorandum was discussed at a meeting of the Vice Chiefs of Staff Committee in mid-September, where members expressed their concerns about the problems facing the construction programme and their dissatisfaction with the current arrangements, including the use of DCL. In discussing the corporation their arguments echoed the objections raised within the Chiefs of Staff Committee in November of 1950. At this meeting, the chairman of the Principal Supply Officers Committee argued that "one of the major difficulties being encountered was due to the fact that the Services were no longer responsible for the supervision and inspection of construction, having been relieved of this responsibility when Defence Construction Limited came into being."¹⁶⁷ DCL's use of CMHC, while an expedient solution to the problem of obtaining personnel for the corporation, was criticized because the latter "were principally concerned with house building programmes, [and] did not possess staff with experience in the type of construction being undertaken by the Services."¹⁶⁸ The solution, he argued, was for the services to again assume responsibility for the supervision and inspection of construction, using civilian firms with the necessary experience to act on the military's behalf. The RCAF had earlier expressed concerns about the effects of the steel shortage on the Pinetree Line and its other projects, and not surprisingly the Vice Chief of the Air Staff "recommended strongly that action be taken to correct the most unsatisfactory situation which existed, and to bring this matter to the attention of the Minister and Deputy Minister."¹⁶⁹ Following further discussion, the Vice Chiefs of Staff Committee agreed that more information would be needed before this could be done, but that once it

¹⁶⁷ *Ibid.*, 6.

¹⁶⁸ *Ibid.*

¹⁶⁹ *Ibid.*

was gathered the Deputy Minister would be approached in order to obtain his views on how to best solve the problem.¹⁷⁰

The resultant meeting of the Deputy Minister, the Chairman of the Vice Chiefs of Staff Committee, and the Chairman of the Principal Supply Officers Committee revealed that while progress had been made on the issue of steel – DCL had obtained better representation in the decision-making process, the Steel Controller had better information about allocations for defence projects, and some supply issues had been addressed – the role of DCL remained contentious. It was noted that there were precedents for DCL to arrange for supervision by civilian engineering firms in some instances, “and the Deputy Minister said that he was prepared to back up any reasonable requests by the Services to ensure that Defence Construction Limited comply with this procedure.”¹⁷¹ The Deputy Minister also noted, however, that the services already had the right to inspect and object to work being put in place through DCL, and that even if they were to assume the duties of inspecting and supervising construction using civilian contractors,

Defence Construction Limited would still be the agency through which these firms would be obtained. As DCL can already be asked to obtain civilian engineers, when necessary, there would be no advantage in a change of procedure. With regard to supervision the Deputy Minister questioned the ability of the Services to assume this additional responsibility when they had only been able to deliver a portion of the specifications, etc., for work to be completed in this fiscal year.¹⁷²

The military’s arguments against the use of DCL, it would appear, were not carrying much weight with the Deputy Minister, especially when at least part of the blame could be attributed to the services’ own limitations. DCL president R.G. Johnson, as will be

¹⁷⁰ *ibid.*, 6-7.

¹⁷¹ “State of Construction Programme – Item VII,” Appendix “A” to Minutes of the 18th meeting of the Vice Chiefs of Staff Committee, 17 September 1951, DHH 72/1223, series 3, box 64, file 1312.

¹⁷² *Ibid.* Emphasis added.

seen below, would make much the same observation in response to a repetition of these criticisms by DND.¹⁷³ The military representatives at this meeting clearly understood that they had been rebuffed. "In view of these facts," the summary of the discussion stated, "the Chairman of the Principal Supply Officers Committee stated that he was prepared to suspend further recommendations until it could be seen whether the changes that had recently occurred would bring about an improvement in expediting the construction programme."¹⁷⁴

Following this meeting, the military continued its efforts to change the working arrangements for the building of defence infrastructure in Canada. In December 1951, Minister of National Defence Brooke Claxton wrote to C.D. Howe about the working arrangements that affected DCL, CMHC, and DND. Claxton's suggestions for changes to these arrangements included the removal of either DCL or CMHC from the process, the provision of a closer relationship between DND engineering personnel and the consultants performing design work, the simplification of procedures for change orders (changes in the value of contracts), and faster notification of failures to meet specifications. In his comments on this letter, Johnson noted that the problems were largely related to supervision, made some suggestions for addressing DND's concerns, and summarized Claxton's letter by suggesting that that "DND's problem appears to be that its engineering design staff feel too far removed from the job."¹⁷⁵ Johnson also dealt with more specific complaints from DND, and while acknowledging that one or two might have some justification, made some criticisms of his own in response. Most

¹⁷³ "Introductory Points in Mr. Claxton's Letter of Dec. 18th." attached to R.G. Johnson to C.D. Howe, 8 January 1952, DCC in-house holding, unlabelled folder.

¹⁷⁴ "State of Construction Programme – Item VII."

¹⁷⁵ *Ibid.* The original letter from Claxton does not appear to have survived in DCL files.

tellingly, he argued that one of the causes for delays was that “due, it seems to me, to a lack of recognition of the time required for planning and engineering defence projects, DND continues to be over-optimistic as to the rate of spending. Plans and specifications do not come forward for tender in time to meet targets for physical completions and dollar expenditure.”¹⁷⁶ The Deputy Minister of National Defence had made similar comments the previous fall when complaints about DCL’s role in the defence construction programme had been brought to his attention. In summary, Johnson concluded “I do not think there is anything basically wrong in the DCL-CMHC concept, - the problem would rather appear to be one of making the channels of communication function in a co-operative manner with DND.”¹⁷⁷

Johnson’s comments, and specifically his comment that DND engineering design staff felt too removed from the job, point to another underlying cause for the continuing complaints about DCL’s involvement in the defence construction programme. The shortage of steel definitely contributed to delays in construction, as did problems in communication and the haste with which these projects were undertaken, and the military had some legitimate grounds for complaints about these matters. The comments by senior officers who sought the return of responsibility for defence construction to the services, however, are even more telling. The military, it would appear, was concerned that it was losing control and influence over the construction process. While a straightforward matter at one level – the services were, after all, accountable for the implementation of the programmes – at another level, control and influence was also a matter of power and pride. At a time when it was undertaking its largest ever peacetime buildup, the military

¹⁷⁶ “Introductory Points in Mr. Claxton’s Letter of Dec. 18th,” attached to Johnson to Howe, 8 January 1952. Emphasis added

¹⁷⁷ Johnson to Howe, 8 January 1952.

felt that it was being excluded from one of its areas of responsibility. This may have been particularly acute for the RCAF, whose construction requirements represented the largest element of the Accelerated Defence Programme; such an argument was subsequently made with respect to the Mid-Canada Line discussed in the following chapter.¹⁷⁸

Ultimately, these complaints seem to have fallen by the wayside, since they do not feature strongly, if at all, after the early 1950s. While there are no explicit discussions of why this change took place, the improvement of steel supply, the end of the initial rush of defence construction, and the termination of the DCL-CMHC management contract may all have played a role. Improvements in communications and coordination between the agencies involved in construction, both as a result of experience and of conscious efforts at change, must also have helped ameliorate the situation.

In the meantime, work had continued through 1951 on means of accommodating steel requirements for construction and other war-related production, including the imposition of “end-use” rationing of steel in November. The following month, new procedures were created at DDP within the Priorities and Steel Divisions to request assistance with steel procurement, equipment and other material procurement for construction projects. The procedures, intended to streamline the handling of applications, included automatic approval for projects for DCL, an explicit acknowledgment of the importance assigned to the corporation’s activities by DDP.¹⁷⁹ By

¹⁷⁸ This observation is made by Alex Lester, the former head of Bell Canada’s Special Contract Division, which played a central role in the construction of the Mid-Canada Line. The RCAF’s Construction Engineering section, Lester argues in his memoirs, was eager to carry out the full job of planning and building the Mid-Canada Line themselves, but the government had decided otherwise, which meant that “they were in the frustrating position of being on the sidelines of this, the biggest post war construction job the Air Force had tackled.” Lester, *Special Contract*, 5.

¹⁷⁹ McDowall, *Steel at the Sault*, 236; Inter-Office Memo, D.C. Beam (Construction Advisor, Steel Division) to K.S. Harris, DDP, re “Construction Projects – Applications for Priority Assistance,” 5 December 1951, LAC, RG49, vol.48, file 122-4-5. The head of the Projects Section, Priorities Division,

January of 1952, Johnson had acknowledged that the steel situation had improved, although the shortages persisted into the first three quarters of 1952, if not longer; part of DCL paperwork at the time consisted of DCL 67 forms, which were bi-weekly reports on steel deliveries for defence construction projects.¹⁸⁰

As Johnson would point out in his 1953 testimony before the Special Committee on Defence Expenditure,

the steel problem in the Spring and Summer of 1951 was an extremely serious problem, and . . . the impact of the Defence Construction program on the suppliers of reinforcing steel was most unusual. The demand for our program was approximately 25 per cent of the total reinforcing steel supplied in Canada, and we did have serious difficulties in trying to supply – or rather there were serious difficulties among the general contractors in their endeavours to get reinforcing steel at the times they would like to have it for their projects. We endeavoured to assist them through the steel section of Defence Construction Limited and through the steel division of the Department of Defence Production.¹⁸¹

Johnson would also note that “the difficulties with regard to steel were general at that time due to the tremendous volume of construction being carried out in Canada, which was such that delays in delivery of steel were common to construction projects generally.”¹⁸² Fortunately for the construction industry, DCL, and the defence projects they had to manage, steel supply for construction was, by the mid-1950s, no longer the pressing issue it had been a few years earlier, in large part because of the dramatic increase in production capacity over the first part of the decade.¹⁸³ The various measures

Harold Warren, had been brought in from the Foundation Company – another example of the close relationship between government and industry at this time. *Ibid.*

¹⁸⁰ “Introductory Points in Mr. Claxton’s Letter of Dec. 18th,” attached to Johnson to Howe, 8 January 1952, DCC in-house holding, unlabelled folder. An entire volume of DCL documents at the National Archives in Ottawa consists of DCL 67 forms from the first three quarters of 1952. LAC, RG 83, vol.66.

¹⁸¹ Canada, House of Commons. Special Committee on Defence Expenditure, *Minutes of Proceedings and Evidence, No. 18: Tuesday, March 31, 1953*, (Ottawa: Queen’s Printer, 1953), 537. For a brief explanation of the procedures used to procure steel from the United States through DDP, see Canada, Dominion Bureau of Statistics, *The Canada Year Book, 1954*, (Ottawa: Queen’s Printer, 1954), 1205.

¹⁸² Special Committee on Defence Expenditure. *Minutes of Proceedings and Evidence, No. 19*, 544.

¹⁸³ McDowall, *Steel at the Sault*, 236-238.

that had been introduced to guarantee the availability of steel for defence work were progressively removed during 1953, with the final controls being retired in October of that year.¹⁸⁴ By helping to control access to steel and facilitating its delivery to contractors building defence projects, DCL had fulfilled two important functions. The first and most obvious was the timely completion of undertakings considered necessary to national defence. The second, less obvious function was serving as an instrument of government policy in implementing its broader controls on steel. As such, DCL's actions in conjunction with DDP served as an example of the use of state intervention to mould economic allocation in a modern mixed economy.

Construction and Committees

The construction projects of the Accelerated Defence Programme brought with them more than simply opportunities for construction contractors and their suppliers. As noted above, they attracted the attention of those seeking patronage appointments, and undertakings on so large a scale also brought with them the potential for abuse and corruption. Most famously, irregularities at Camp Petawawa prompted an investigation and report to the House of Commons, commonly known as the "Currie Report" after its author, George S. Currie, a former Deputy Minister of National Defence. The infamous "horses on the payroll" highlighted the problems at Petawawa where, Currie concluded, there had been a general breakdown in administration, supervision and accounting. In

¹⁸⁴ DBS, *Canada Year Book*, 1954, 1205.

making his recommendations, Currie acknowledged that a major contributing factor had been the expansion of activities brought about by the Accelerated Defence Programme.¹⁸⁵

Currie, however, had only been appointed to examine the Army Works Service, but complaints subsequently emerged about the RCAF as well. Calls in the House of Commons to investigate irregularities in construction at Penhold and Namao, Alberta, led to the decision in January 1953 to have the matter investigated by the House of Commons committee on defence expenditures, which had been created the year before.¹⁸⁶ Not surprisingly, among those called to testify before the committee was DCL president R.G. Johnson, who was extensively questioned about events at Penhold, where a number of problems, including bad weather, steel shortages, and insufficient labour had delayed the completion of construction and the start of flying training. Committee members, especially those from the opposition who sought political ammunition for use against the Liberal government, were particularly interested in contracting procedures and the use of cost plus fixed fee, or "cost plus" contracts, which Johnson explained were used for projects in remote areas and those "of a security nature," an apparent reference to the Pinetree Line.¹⁸⁷ Johnson came under attack from E.D. Fulton for a series of these "cost plus" contracts awarded for work at Goose Bay and on which no tenders had been called due to the remote location of the site. Fulton argued that DCL had no way of knowing

¹⁸⁵ Holmes, *History of the Canadian Military Engineers*, 268; Eayrs, *In Defence of Canada, Volume III*, 26-28

¹⁸⁶ "Let Committee Answer Criticisms, Winters Decides," *Globe and Mail*, 17 January 1953, 2; "Mr. Croll's Chance," *Globe and Mail*, 28 January 1953, 6; George Bain, "Penhold More Than Two Years Old Before First Air Trainees Begin," *Globe and Mail*, 27 March 1953, 11.

¹⁸⁷ Johnson's testimony included his comments about steel shortages quoted above. Bain, "Penhold More Than Two Years Old"; Canada, House of Commons, Special Committee on Defence Expenditure, *Minutes of Proceedings and Evidence, Tuesday, March 24, 1953*, (Ottawa: Queen's Printer, 1953), 462-463. Johnson argued that the "fixed fee" was not entirely profit, since it included head office overhead costs; the "cost" part of the contract was based entirely on construction site costs. The fixed fee was calculated based on the estimated cost, and was five per cent of the first two million dollars. If the estimate was larger, for the amount between two and three million, it was reduced to four per cent, and for the amount over three million, it was reduced to three per cent. *Ibid.*, 464-465.

whether the work had been performed as inexpensively as possible, since tenders had not been called. In reply, Johnson argued that “he had 13 years’ experience in the construction industry, and that in his opinion the job could not have been done for less money by calling tenders,” while in response to another question he claimed that “calling of tenders might have delayed start of construction by a year and build-up of defences at Goose was ‘very definitely’ urgent.”¹⁸⁸ In what would become a recurring theme in the building of continental defence projects, costs and deadlines were in competition. With the perceptions of a growing Soviet aerial threat driving defence measures, urgency often won out over economy.

After defeating an attempt to have Currie carry out an investigation of construction work at Penhold, the committee released its report in early May, arguing, according to the *Globe and Mail*, that “in effect there was nowhere a dollar could have been saved on the defense program,” argued that “the construction program in the face of a number of difficulties has been well conceived and carefully supervised and the public has received good value for its money.”¹⁸⁹ As with its previous year’s report, the committee made no recommendations. The Conservative Party issued a dissenting judgment, describing factors which in their opinion had limited the inquiry, calling for a broader examination of the issues, and criticizing the limited extent of the examination of construction contracts, which, they argued, had with the exception of Currie, consisted entirely of witnesses from government departments, although the available evidence

¹⁸⁸ With respect to the suggestion that another contractor could have done the work more cheaply, Johnson further argued that “the only way to find out definitely would have been to build two similar projects on the same site and compare the costs.” “Non-Tender Contracts Under Fire at Ottawa,” *The Montreal Gazette*, 10 April 1953.

¹⁸⁹ George Bain, “PC’s Reject Finding No Arms Dollar Lost: Couldn’t Save Dollar, Liberals’ Arms Report,” *Globe and Mail*, 6 May 1953, 2.

“indicated a free-and-easy spending attitude, cost-plus contracts, costly extras, among other things.”¹⁹⁰ Not surprisingly in an election year, the report became fodder for argument and debate in the House of Commons during the consideration of estimates for the Department of Defence Production, with accusations that Alexander Construction, which had been responsible for work at Penhold, had benefited from “friends at court” when the contract took too long to implement, since it had previously been owned by Minister of Mines George Prudham. Prudham vigorously denied the charges, arguing that he had sold the firm before the outbreak of the Korean War and that it had not received any preferential treatment.¹⁹¹

Such accusations, of course, were difficult to substantiate at the time and are even more difficult to investigate some fifty years later, although as will be seen in the following chapter, others intimately involved with defence construction projects would argue that some large construction firms had particular political influence in Ottawa.¹⁹² As Neil Lawrie discusses in his study of the Canadian Construction Association, politicians and Cabinet ministers – among them C.D. Howe – had close relationships with the industry as a whole. Public works and their construction have long been a fertile ground for patronage, and Howe was certainly no stranger to the intricacies of either process. By his time, however, the practice was no longer a matter of bribery in order to obtain contracts, but had instead become a requirement that payment be made after the

¹⁹⁰ *Ibid.* The *Globe and Mail* had criticized such “costly extras” as swimming pools and air conditioning in an earlier editorial, arguing that the trouble was “at the top.” “After Eighteen Years,” *Globe and Mail*, 4 March 1953, 6.

¹⁹¹ “Whitewashing of Facts Charged to Liberals In Arms Cost Report,” *Globe and Mail*, 8 May 1953, 12.

¹⁹² Lester, *Special Contract*, 77-78.

award of a contract. Cost-plus contracts, of course, could offer fertile ground for such activities, especially when bidding was restricted to “qualified” firms.¹⁹³

DCL’s contract procedures were more open than comparable undertakings in departments such as Public Works, in large part because of R.G. Johnson’s previous position with the Canadian Construction Association. Lawrie argues that DCL was “the object of very little pressure” for “favours” and “special treatment” in comparison with Public Works, but even though DCL contracting processes were more open and accountable than their counterparts in Public Works, the *post facto* nature of patronage by the time of St. Laurent is by its very nature harder for historians to discern than its predecessors.¹⁹⁴ As always, absence of evidence is not necessarily evidence of absence. Questions and accusations about defence procurement and construction did not, however, end in 1953. Johnson and other officials would testify before subsequent committees examining defence expenditures, but the questions and accusations of misconduct would never again be so direct. Coupled with the investigation of defence expenditures, such claims point to a more problematic aspect of defence construction work – when large expenditures are being made on high-priority projects, the process and its products leave themselves open to question and criticism.

¹⁹³ Neil John Lawrie, “The Canadian Construction Association: An Interest-Group and its Environment,” (PhD. dissertation, University of Toronto, 1975), 251; Bothwell and Kilbourn, *C.D. Howe*, 71-75; 85-91; Michael Bliss, *Northern Enterprise: Five Centuries of Canadian Business*, (Toronto: McClelland and Stewart, 1987), 470-472; Jeffrey Simpson, *Spoils of Power: The Politics of Patronage*, (Toronto: Harper & Collins, 1989), 139-140.

¹⁹⁴ Lawrie argues that DCL’s procedures were the most in keeping with CCA recommendations for contract tendering reforms; among these were disclosing the values of all bids on a contract rather than simply the lowest bid, as was the practice with Public Works. Lawrie, “The Canadian Construction Association,” 248-249.

Capital Assistance and Building Maintenance

In yet another demonstration of its versatility and instrumentality as a tool in moulding the economy to help meet the needs of the Department of Defence Production's programme goals, DCL was also used as part of that department's capital assistance programme, which involved government investments in plant and equipment in order to provide manufacturing facilities for government defence production orders. DCL's involvement consisted of the administration of the construction elements of the programme. In a related area, the corporation also provided tender call services for Canadian Arsenals Limited, a Crown corporation which held in trust and was responsible for operating government-owned plants that manufactured munitions and scientific instruments for military use. As part of these tasks, during the 1952-53 fiscal year, DCL took over a number of such contracts from DDP. The takeover of building maintenance contracts was an additional function for DCL. As part of a consolidation effort for DDP's construction programme, and with the authorization of C.D. Howe, responsibility for maintenance was handed over from the Building Maintenance Section of DDP's General Purchasing Branch at the outset of June 1952. Building maintenance contracts worth \$26,330,000 and capital assistance contracts worth \$58,195,000 were taken over and completed by the end of the 1954-55 fiscal year.¹⁹⁵ Through these varied undertakings for DDP, DCL demonstrated the continuing utility of an organization that could tender construction contracts, supervise the work, and help ensure that the end product met requirements. The ability to put infrastructure in place to attain government policy objectives in a variety of areas made DCL a dextrous instrument of government policy.

¹⁹⁵ "History, Responsibilities & Operations," 4; DCL, *Annual Report*, 1952-53, 1; DCL, *Annual Report*, 1954-55, 1.

By the mid-1950s, therefore, Defence Construction (1951) Limited had completed or was well on the way to completing the first series of major defence infrastructure programmes in postwar Canada. A start had been made on the construction of an integrated continental radar network, integrated not only in the ways by which its elements were tied together, but also in the way it brought Canada and the United States together in the construction of a significant continental defence project. Bases for air force, army, and navy operations had also been built or were well underway. Although C.D. Howe's initial vision had been of a corporation that would, in the words of its second president, "enlist key people from industry, get into operation quickly, and disband when the crash program had been accomplished," Howe had not foreseen the further "crash" programmes that would emerge in the mid-1950s, nor had he probably fully understood the utility of an entity like DCL as an instrument of government policy.¹⁹⁶ As subsequent years and subsequent projects would demonstrate, DCL would nimbly prove its worth in both these fields.

Defence Construction Limited's staff and direct responsibilities had grown with the end of the management contract with the Central Mortgage and Housing Corporation in 1954. No longer would DCL – and the minister for which it worked, C.D. Howe – have to resort to administrative legerdemain to implement an expedient solution to the challenges of Cold War defence construction. The corporation's personnel strength reflected these responsibilities as well as the end of the management contract with CMHC; by mid-1956 it would reach 746 but the slow downturn in defence construction that began shortly thereafter led to a decrease in the number of employees to just over

¹⁹⁶ This description was used by A.G. Bland in April of 1965. A.G. Bland, Speech to ACEC, 27 April 1965, 2, DCC in-house holding, "Bland Speeches (historical file)".

600 one year later.¹⁹⁷ The two predominant projects that would consume DCL's greatest attention and greatest efforts in these years were the Mid-Canada and the Distant Early Warning Lines, two radar networks intended to provide early warning of Soviet bomber attack. Both undertakings were a product of and enmeshed in a web of assumptions and interests about continental defence and the ways it touched on the Canada-US relationship, especially in the field of military measures, national sovereignty, and economic development. Defence Construction (1951) Limited would play an instrumental role in both of these major projects.

¹⁹⁷ "Statistics," appended to "History, Responsibilities, and Operations."

Chapter 3

“A List of Good Intentions”: Building the Mid-Canada Line, 1953-1957

As noted, I consider the Management Contractor's implementation plan to be a list of good intentions...with very little detail to show the actual course of action which is contemplated to get the work going.

Memo to DCL President R.G. Johnson, 3 May 1955¹

As Cold War tensions mounted in the early 1950s, a series of significant events and developments placed ever greater emphasis on the aerial defence of North America. The testing of the Soviet Union's first atomic bomb in 1949 had already given considerable impetus to efforts in this field. Coupled with the victory of communist forces in China later that same year and the outbreak of war in Korea in mid-1950, Soviet possession of “the bomb” drove urgent and ambitious Western military rearmament. In Canada, the Accelerated Defence Programme was a central element of national military mobilization, and Defence Construction (1951) Limited served a vital role as an instrument of government policy in helping to provide defence infrastructure as part of that undertaking. The corporation would continue to perform similar tasks as Canada and the United States expanded and reinforced continental defences throughout the 1950s.

Concerns about continental defence during those years were reinforced by the race between the superpowers to develop the vastly more destructive hydrogen bomb as well as the increasing Soviet capability to launch an aerial attack on North America. Prompted by interpretations – fed in part by the war in Korea – of the Soviet Union and its allies that emphasized hostile communist expansionism, these factors led to significant concerns in both the United States and Canada about the threat to the continent and the state of its defences. Sensational media coverage, sometimes fed by Washington insiders,

¹ Memorandum to R.G. Johnson, possibly from J.P. Stirling, 3 May 1955, DCC in-house file 122-7-12-T6.

contributed to the development of a crisis atmosphere, and was an additional element driving defence planners, the military, and politicians on both sides of the Canada-US border to propose and accept increasingly ambitious plans for the aerial defence of North America in the early part of the 1950s.²

The joint Canadian-American Pinetree Line and its extensions discussed in the previous chapter, as well as the many of the new and upgraded RCAF bases built across the country, were an initial reaction to this threat as it was perceived at the very end of the 1940s and the start of the 1950s. At that time the Soviet Union possessed both the atomic bomb and a bomber force that was believed to be capable of attacking the North American continent with these weapons.³ In addition to these installations, both Canada and the United States also fielded new weapons for continental defence. Among them was Avro Canada's CF-100 all-weather interceptor, the product of an ambitious effort to

² The debate at this time has been examined by a number of authors. See, amongst others, Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Air Force History Support Office, 1991), *passim*, but especially Chapter 5, "Broadening Dimensions: Air Defense as a Public Issue," also 173-174 on the Alsop brothers and continental defence reporting; Andrew Richter, *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950-63*, (Vancouver: UBC Press, 2002), 37-47; James Eayrs, *In Defence of Canada, Volume III: Peacemaking and Deterrence*, (Toronto: University of Toronto Press, 1972), 356-372; Eayrs, *In Defence of Canada, Volume IV: Growing Up Allied*, (Toronto: University of Toronto Press, 1980), 275-283; Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987), 40-78, *passim*; B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defense from Zeppelins to Star Wars*, (New York: Simon & Schuster, 1988), 73-89; Norman Friedman, *The Fifty Year War: Conflict and Strategy in the Cold War*, (Annapolis: Naval Institute Press, 2000), 144-148, 198-207.

³ While the Soviet Union had tested its first atomic bomb in August 1949 and had a growing number of Tu-4 bombers – reverse-engineered from the American B-29 – in service, the number of nuclear weapons available to Soviet forces was extremely limited, and the Tu-4 was less reliable and capable than the B-29 original. Most importantly, the Tu-4 had about half the range of the B-29, which greatly reduced the number of targets within its reach. These limitations were not readily apparent to Western intelligence agencies, which credited the Tu-4 with performance comparable to the B-29. The Soviet capability to deliver a nuclear attack against North America in the early 1950s, therefore, was extremely limited, but this was not immediately apparent to the West. Steve Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 5-18; Schaffel, *The Emerging Shield*, 181; Friedman, *The Fifty Year War*, 199-201.

develop a full-fledged domestic aircraft industry in Canada.⁴ Even while the Pinetree Line was under construction, however, defence planners, especially in the United States, were driven by concerns of expanding Soviet capabilities in intercontinental attack. The prospect of long-range jet bombers armed with the far more destructive hydrogen bomb led to recommendations for the expansion of continental defences further north into Canadian territory, both to provide more warning time of an attack and to increase the effectiveness of existing and proposed defences. Invoking existing military concepts, these plans were often characterized as offering “defence in depth”; in other words providing a series of radar lines to maximize warning time and the effectiveness of defences.

The ambitious Air Warning and Air Interceptor plan had proposed a radar network across the Canadian and American arctic as early as 1946-47, but had been dismissed as expensive, impractical, and unjustified given the profoundly limited Soviet threat to the continent at that time.⁵ The emerging belief in a credible Soviet threat, however, coupled with the fear that Soviet capabilities would only continue to grow, revived interest in plans to push air defence further north into Canada. On the surface, the calculus for such decisions was simple. Canada, and especially northern Canada, lay astride many of the most obvious approach routes for aircraft flying from the Soviet Union to targets in southern Canada and the United States. The farther north that early warning radars could be placed, the greater the warning time that could be given.

⁴ Schaffel, *The Emerging Shield*, 122-127, 224-239; Robert Bothwell and William Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland, 1979), 266-267; Graham D. Taylor and Peter Baskerville, *A Concise History of Business in Canada*, (Toronto: Oxford University Press, 1994), 403, 406-409. On the CF-100 specifically, see Larry Milberry, *The Avro CF-100*, (Toronto: CANAV Books, 1981); Greig Stewart, *Shutting Down the National Dream: A.V. Roe and the Tragedy of the Avro Arrow*, (Toronto: McGraw-Hill Ryerson, 1997).

⁵ Jockel, *No Boundaries Upstairs*, 17-20; Schaffel, *The Emerging Shield*, 130; Zaloga, *The Kremlin's Nuclear Sword*, 12-16.

Increased warning time was beneficial to defences in the more southerly part of the continent. Active air defences, which included interceptors and the Pinetree Line radars which helped guide them, anti-aircraft artillery, and, ultimately, surface-to-air missiles, would benefit from additional time to prepare for action. Passive defences, which included air raid alerts and other civil defence measures, could also take advantage of the increased warning time.⁶ Finally, and, as the 1950s progressed, most importantly, the air bases of the United States Air Force's Strategic Air Command, which housed many of the bombers that were the primary means of delivering the United States' nuclear arsenal, would also benefit from increased warning in order to get their aircraft in the air before a Soviet attack destroyed them on the ground. Canada, in the words of one subsequent commentator, would become the "northern glacis" for continental defence.⁷

These factors, coupled with Canada's close wartime and postwar defence cooperation with the US, made it virtually certain that Canada would be directly involved in the further expansion of North American air defences. Among the most significant components of these expanded defences were the three major radar networks that were

⁶ For a variety of reasons both financial and ideological, substantial government civil defence programmes never came to be in either Canada or the United States. American civil defence, or lack thereof, appears to be rather better addressed by the available literature than its Canadian counterpart. For the period under discussion in this chapter and later years, see Bruce-Briggs, *The Shield of Faith*, 69-74, 114-126, 129-133; Laura McEnaney, *Civil Defense Begins at Home: Militarization Meets Everyday Life in the Fifties*, (Princeton, NJ: Princeton University Press, 2000); Andrew D. Grossman, *Neither Dead nor Red: Civil Defense and American Political Development during the Early Cold War*, (New York: Routledge, 2001).

⁷ In the early 1950s, SAC made extensive use of overseas bases for its medium-range bombers, but its bases in the United States were also quite significant, and grew in importance as the decade progressed and the overseas bases became increasingly vulnerable to Soviet attack or political objections on the part of the host countries. The general assumption in discussions surrounding northern early warning systems was that Strategic Air Command (SAC) would be using the time provided by an alert to prepare and launch a retaliatory strike. Debate still surrounds the plans for SAC's use, however, including the question of whether the United States would have fought a preventive nuclear war or attempted to pre-empt a Soviet attack had warning been obtained in time to strike Soviet bombers while they were still at their bases. Strategic Air Command, Directorate of Information, History and Research Division, *History of the Canadian Refueling Base Program*, (SAC Historical Study No. 87, 1962), 1-2; Bruce-Briggs, *The Shield of Faith*, 75-79. The "northern glacis" reference comes from *ibid*, 73.

built in part or in whole on Canadian territory in the 1950s. The first, already discussed, was the Pinetree Line of the early 1950s, running roughly along the 49th parallel and then along the Labrador coast to Baffin Island. The second was the Distant Early Warning, or DEW Line. DEW pushed early warning radar coverage into the far north and ran roughly along the Arctic coastline of North America, with extensions along the Aleutian Islands in the west and across the Greenland ice cap in the east. Along with a number of related projects, the DEW Line will be discussed in the following chapter.

The third major radar system built during the 1950s was the Mid-Canada Line, built between 1954 and 1957. Although initially planned in conjunction with the United States, the MCL, for reasons including concerns about sovereignty, technological development, and defence expenditures, was an entirely Canadian-designed and built system stretching roughly along the 55th parallel. The line's use of equipment designed and manufactured in Canada, which stands in notable contrast with the majority of other continental defence projects built on Canadian territory during the 1950s and early 1960s, also means that it can be held up as a success story in Ottawa's drive to use Canadian equipment for such undertakings. Unlike the other two networks, the MCL was based on a simple principle of an electronic "fence" or "tripwire" that used the Doppler effect to indicate the passage of an aircraft. Since the equipment had originally been developed at the outset of the 1950s as a joint product of research involving McGill University, the Defence Research Board (DRB), and the RCAF the system was sometimes called the "McGill Fence" This "fence" differed in principle from more conventional radar systems,

Figure 4: Map of Radar Defence Lines in Canada

● Pinetree/CADIN

▲ Mid-Canada Line

■ Distant Early Warning Line (intermediate sites omitted for clarity)

Source Map: Natural Resources Canada; Maps, DCC in-house holding: <http://www.lswilson.ca/dewline.htm>.

which by this point in their development were capable of determining a contact's location, course, speed and altitude with considerable certainty.⁸

With the system developed at McGill, the speed and direction of the contact could be determined in a number of ways, depending on the equipment that was used, but the other data that conventional radar systems delivered could not. Despite these limitations, this new technology none the less offered the prospect of aircraft detection with a high degree of accuracy at a lower cost than was required for conventional radar equipment. In particular, its automation permitted effective operation with far fewer personnel than were required for conventional radar systems. Due to its limitations, a radar line using this equipment would not have been feasible in an area with heavy air traffic. At 55° North, however, there were far fewer flights than in the more southerly areas of Canada.⁹ Ironically, the same isolation that made the MCL practicable would prove to be one of the most significant challenges faced during its construction effort.

Given these technical characteristics and limitations, the primary purpose of the MCL was the provision of tactical early warning so that air defence forces could be

⁸ The Doppler detection system used the differences in frequency between the signals sent directly from one transmitter to another and those that were reflected from a contact passing between those two stations to detect the contact's passage. James Rennie Whitehead, a scientist at McGill who worked on the development of the equipment, later described the principle as follows: "When you receive broadcast TV and an aircraft flies across the line between the TV transmitter and your receiver, the signal fades in and out in a regular way. This is due to the waves reflected from the moving aircraft having a slightly different frequency from those that go directly, because of the Doppler effect. At the receiver the waves reflected from the aircraft interfere with the direct waves to produce the pulsation that you see. The McGill fence used a refined version of this phenomenon in which the circuits were designed to enhance this effect rather than the transmitted data. Conventional Doppler radars have the transmitter and receiver in the same location. Ours was called 'double' because the transmitter and receiver were at opposite ends of each link." James Rennie Whitehead, *Radar to the Future*, Chapter 7, <http://www3.sympatico.ca/drrennie/chap7.html>, 17 May 2002.

⁹ The "McGill Fence" moniker seems to have been in use by 1951. A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, Canada, Department of National Defence, Directorate of History and Heritage (hereafter DHH), 78/512, 50; DND, "History of the Mid-Canada Line," 1959, 2, DHH 181.009 (D266); Bruce-Briggs, *The Shield of Faith*, 75. Despite its "tripwire" nature, however, the MCL included – or at least was originally intended to include – facilities for the identification and control of interceptor aircraft. Minutes of the 580th meeting of the Chiefs of Staff Committee, 30 May 1955, 3, DHH 73/1223, series 3, box 62, file 1308A.

deployed. While minimizing the potential for interference from civilian flights was a consideration in planning the MCL's position, its location was also the result of calculations that were intended to allow defending aircraft, warned by the line, to intercept unknown incoming aircraft at the outer northern edges of the radar coverage and ground control provided by the Pinetree-Permanent system in Canada and the United States. The warning provided by the Mid-Canada Line therefore increased the effectiveness of existing defences and allowed interception to take place as far north – and as far from potential targets – as possible. The MCL would serve this role in Canada, while its American counterparts consisted of offshore warning radars carried on picket ships and airborne early warning aircraft operating off the country's east and west coasts.¹⁰ All, of course, were intended as parts of an integrated system of "defence in depth."

In addition to forming part of the plans for continental "defence in depth," the Mid-Canada Line was the largest all-Canadian air defence project ever undertaken, but it was also the most difficult and troublesome. Built between 1954 and 1957, the line operated for seven short years until 1964-65, when it was closed down, abandoned in place, and soon faded from the national consciousness. The Pinetree Line to its south and the Distant Early Warning Line to its north received more attention from the public than did the MCL, even when it was being built. When examined by contemporary journalists or popular historians the Mid-Canada Line is usually seen – if at all – as an illuminating

¹⁰ "Report by the External Affairs Observer on the Canada-United States Military Study Group," 4 June 1954, annex to memorandum from A/USSEA to SSEA, "Continental Defence – Recommendations of the Military Study Group (MSG)," 4 June 1954, in Canada, Department of Foreign Affairs and International Trade, *Documents on Canadian External Relations: Volume 20, 1954*, (hereafter DCER) Greg Donaghy, ed., (Ottawa: Department of Foreign Affairs and International Trade, 1997), 978-989; Schaffel, *The Emerging Shield*, 209-234.

or interesting example of Canadian engineering and construction, and a success story for Canadian technology and engineering confronting a harsh northern land, although this is often tempered by concerns about the project's delays and cost overruns.¹¹ While a recent spate of works on North American air defence and its significance for Canadian-American relations has shed light and focused attention on the broader political context of the construction of the line, there is another aspect that deserves attention – the construction of the MCL and the problems and controversy that surrounded it.¹²

The Mid-Canada Line is also perhaps the best-documented project undertaken by Defence Construction (1951) Limited between 1950 and 1965. The majority of the corporation's records held by Library and Archives Canada deal with the construction of the line, and a considerable amount of useful information on the MCL is also held by the Department of National Defence's Directorate of History and Heritage. The account written in the 1970s by Alex Lester, former head of Bell's Special Contract Division, one of the central organizations in the construction of the MCL, is also tremendously useful, while a few published secondary sources on Canadian telecommunications also discuss the project, albeit with varying degrees of accuracy.¹³ The continuing influence of

¹¹ See, for instance, D.H. Thorne, "The Mid-Canada Line, 1958-1965," *Communications and Electronics Newsletter*, 1982/1, 39-52; NBC Group, *A History of the Air Defence of Canada, 1948-1997*, (Ottawa: 71 Film Canada, 1997), 35-38; Larry Milberry, *Sixty Years: The RCAF and CF Air Command, 1924-1984*, (Toronto: CANAV Books, 1984), 294-299.

¹² Jockel, *No Boundaries Upstairs*; NBC Group, *A History of the Air Defence of Canada, 1948-1997*, (Ottawa: 71 Film Canada, 1997); Richter, *Avoiding Armageddon*.

¹³ A considerable portion of the DCL records at Library and Archives Canada (RG83) cover the construction of the MCL; more, in fact, than is suggested by the various finding aids. At DHH, the logical starting point is the Raymond Fonds (DHH 73/1223), especially the Chiefs of Staff Committee and Cabinet Defence Committee records, but there are also a number of useful RCAF and army files available. Lester's memoirs are also held at DHH. Lester, *Special Contract*; Lester, "Taped Recollections," DHH 77/493. DRB scientist A.G. Chapman's extensive papers, also held by DHH, cover much of the early development of the technology for the MCL, along with its later use, but were not consulted for this chapter. Some histories of the telephone companies in Canada also briefly discuss Bell's role in the MCL. See, for instance, Robert Collins, *A Voice From Afar: The History of Telecommunications in Canada*, (Toronto: McGraw-Hill Ryerson, 1977); Jean-Guy Rens, *The Invisible Empire: A History of the Telecommunications*

Lester's account, as well as the interviews he provided, is clear in such sources. Jean-Guy Rens' *The Invisible Empire: A History of the Telecommunications Industry in Canada*, for instance, provides an interesting and useful account of the emergence of a "military-telephone complex," but unfortunately the book's discussion of the Mid-Canada Line is, to say the least, inaccurate. Incorrect dates – including that for the beginning of construction – are provided, DCL is described as a crown corporation created solely for the construction of the MCL and given responsibility for supplies, while the Department of Defence Production, which *was* the agency responsible for supplies and other procurement functions, is completely absent.¹⁴ While Robert Collins' earlier *A Voice From Afar: The History of Telecommunications in Canada* does not provide as much background on Bell's involvement with the Canadian military, his account of the building of the MCL and the reactions to the problems encountered along the way is much more accurate and useful. Taken in their entirety, despite their inaccuracies and often misplaced focus, these sources permit a more thorough and extensive examination of the Mid-Canada Line than is possible for many of the other projects with which Defence Construction was involved. Coupled with the need for considerable context, much of which will also set the stage for the discussion of the Distant Early Warning Line in the next chapter, the resulting chapter is the longest in this dissertation. In accord with such attention to the Mid-Canada Line, this analysis will thereby elevate the MCL to a more significant place in the historiography of Canada's response to the Cold War and at the

Industry in Canada, 1846-1956, trans. Käthe Roth, (Montreal & Kingston: McGill-Queen's University Press, 2001).

¹⁴ The sources for these assertions are unclear; no notes are provided for most of the discussion of the project, and there is a discrepancy between the text and the other notes in the section. *Ibid.*, 227-233.

same time emphasize the role of DCL, as an instrument of government policy, in making such a response possible.

As with previous continental defence undertakings, Defence Construction Limited was involved in the construction of the MCL. For a number of reasons, including the heavy volume of work on other projects being carried out through DCL and government concerns about the RCAF's ability to adequately organize and undertake the project on its own, DCL's involvement in the construction of the Mid-Canada Line was different and less direct than it had been with other projects.¹⁵ The introduction of the Trans Canada Telephone System (TCTS) as a management contractor for the construction of the line, responsible for supervision and co-ordination of the contract, meant that DCL's role in tendering and supervising contracts differed from its previous involvements like the Pinetree Line or the Home Station Development Programme.¹⁶ While DCL's involvement in and supervision of this project may have been less direct than that of earlier undertakings, the company still played a significant leveraging role in the building of the MCL. Its senior personnel, for instance, appear to have noticed sooner than the other agencies involved in the project that the projected costs of the line and the deadline for its completion were unrealistic and perhaps unattainable. DCL thus appears to have played the role of the state's watchdog and bellwether in this pioneering venture in air

¹⁵ These projects included the later stages of the Pinetree Line, the RCAF's Project Bulldozer, and the Army's Home Station Development Programme – all discussed in the previous chapter – as well as the building of the Distant Early Warning Line that will be discussed in the subsequent chapter.

¹⁶ The Trans Canada Telephone System was made up of all of the major provincial and commercial telephone companies in the country, and had been created with the chief purpose of permitting the creation of an integrated and reliable transcontinental telephone system. The Bell Telephone Company of Canada, one of the members of the TCTS, acted as the System's project agent for the MCL. Rens notes that the TCTS was "a juridical form unique to Canada. It wasn't a company or a cooperative, but an organization not constituted as a legal entity, which meant that it had no capital, property, or staff. The TCTS functioned with people borrowed from and paid for by its members. Of course, Bell played an essential role, with all presidents of the TCTS until 1971 coming from the ranks of its top executives." Rens, *The Invisible Empire*, 208-209.

defence technology. Unfortunately, these warnings do not appear to have had any significant influence on the course of events and decision-making until quite late in the day. If the timeliness of the warnings is an illustration of the competency of DCL's staff, their limited and delayed impact on the project as a whole implies limits on the corporation's ability influence the events shaping the Mid-Canada Line.

This limited effect of warnings from DCL staffers is at least in part attributable to the complexity of the project and the organization put in place to build it. While the operating principles of the "McGill Fence" that formed the basis of the Mid-Canada Line were simple, its implementation was considerably more involved. The project's planning and systems engineering proved to be a complex undertaking. Given the haste and urgency of the MCL, its planning and the technical development of its equipment became interdependent, which led to major revisions in plans for the line's layout and equipment. These changes naturally had significant consequences for the construction effort and contributed to the growth of its final costs. Furthermore, the sheer scale of the MCL itself was daunting. When completed, it consisted of 102 sites, 7 of them major bases, running roughly along the 55th parallel from the British Columbia-Alberta border to the Labrador coast. It required 264 permanent buildings ranging from small service structures to large hangars, two major and 10 minor airstrips, 370 towers, including some more than 350 feet high, for its detection and communication equipment 16 large tropospheric scatter dishes for rearwards communications, 322 diesel-alternator units, and the electronic equipment necessary to make the line work. All of this represented some 200,000 tons of materials and equipment that had to be transported into Canada's North via rail, tractor train, sea, and air. While the construction effort began in June of 1954 with planning and

Figure 5: Map of Mid-Canada Line as Built

- Sector Control Stations: 1 – Dawson Creek; 2 – Stoney Mountain; 3 – Cranberry Portage; 4 – Bird; 5 – Winisk;
6 – Great Whale River; 7 – Knob Lake; 8 – Hopedale
- Doppler Detection Stations

Source Map: Natural Resources Canada. Source Data: Map, DCC in-house holding; <http://www.lswilson.ca/mcl.htm>.

site determination, all of the actual construction of installations was completed in two years of field work, finishing in August of 1957.¹⁷ As with other continental defence projects, deadlines and prompt completion of projects conflicted with budgetary constraints. At a time when the Soviet threat, bolstered by the hydrogen bomb, was seen as acute and growing, having defences put in place as soon as possible was generally more important than having them put in place as cost-effectively as possible. The conflict between these two principles would grow stronger as the MCL neared completion, and the various agencies involved in its construction, including DCL, had to confront a project that was both increasingly delayed *and* increasingly over budget.

These missed deadlines and rising costs plagued the Mid-Canada Line. The initial estimate for the system as authorized by Cabinet in June of 1954 was \$120 million, but the first estimate produced by the management contractor once a general plan for the line was available was for some \$169 million, with operation scheduled to begin in January of 1957. This deadline was not met, and by May of 1957 the expenditure of almost double that amount that had been authorized, with the final cost coming in at around \$230 million once the line was operational at the end of 1957.¹⁸ In part, this apparently huge cost overrun was the result of changing specifications and the rather sketchy nature of initial cost estimates; the June 1954 figure, for instance, was based on very limited information and optimistic assumptions about the technology that would ultimately be used. While a number of other factors, including difficult terrain, significant

¹⁷ SEG, "A Digest on the Building of the Mid-Canada Line," 1959, 1-2, DHH 181.009 (D266).

¹⁸ The precise costs of the MCL are difficult to determine. The figures used here are from an undated history of the MCL, Bell's initial 1955 estimate formulated with the definitive operational requirements and from a 1960 statement by Minister of Defence Production Raymond O'Hurley. DND, "History of the Mid-Canada Line," 6-7; House of Commons, *Debates*, 8 July 1959, 5697; Minutes of 105th meeting of the Cabinet Defence Committee Decision, 7 June 1955, 3-4, DHH 73/1223, series 3, box 65, file 1329; R.A. Cline to CAS, 1, 9 May 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1); House of Commons, *Debates*, 28 March 1960, 2541-2543.

transportation problems and unfavourable weather, contributed to the increased costs and the delays, the most significant problem with the construction effort was organizational. The large number of government and private agencies involved in the planning and construction of the MCL, many of which appeared to hold conflicting priorities and indulged in various forms of bureaucratic infighting, became an ongoing and significant problem. While this mixed-venture use of a Crown corporation, other government agencies, and the services of the private sector may have been an expedient solution to the dilemma of building the MCL, the history of the effort demonstrates that such an approach also had its drawbacks.

For this major undertaking along the 55th parallel, site accessibility and the transportation of people, fuel, and materials posed significant obstacles. Some time was required to determine the precise route of the MCL, partly because adequate maps for the area under consideration did not yet exist, which required a tremendous effort to provide aerial photographic surveys and their translation into topographic maps. Furthermore, problems with the development of a more advanced type of the detection equipment that had initially been proposed for use on the line led to a reversion to an earlier model. Since the disposition of the detection sites depended on the type of equipment, the initial site selection process was abandoned and new sites had to be chosen.¹⁹ While it therefore took some time to determine the precise route of the MCL, planners understood from the outset that the system would stretch across Canada on a line running roughly along the 55th parallel. In the west were mountains along the coast followed by woodlands and

¹⁹ The primary limitation for the MCL's detection equipment was that the transmitting and receiving equipment had to operate on a direct line of sight between installations. In order to ensure this line of sight, accurate topographical maps were needed to begin planning tentative site locations, which were later confirmed by ground survey parties, but the relevant information to create such maps was not available. The survey and mapping problem is discussed later in this chapter.

muskeg stretching eastward to the shores of the Hudson and James Bays, which presented an obstacle to the establishment of radar coverage, but which also provided access for transportation by sea. To the east and stretching to the Atlantic coast were the mountains of northern Quebec and Labrador.²⁰ With respect to transportation, accessibility, and construction techniques, building the MCL was therefore arguably more challenging than the construction of the Distant Early Warning, or DEW Line along the Arctic coast. A 1959 DND report, for instance, concluded that “there was probably more information on the Arctic as such than there was on the general construction and logistics problems connected with the difficult muskeg and rocky terrain of central Canada and northern Quebec.”²¹

Planners had realized from the outset that construction would have to take place across difficult territory, and therefore relied heavily on aircraft and helicopters for much of the survey and construction work.²² For the first time, helicopters were used on a large scale for transportation and construction work in Canada, which required some co-operation with the United States Air Force (USAF) as well as the pooling of the resources of Canada’s armed services. Civilian helicopter operators, such as Okanagan Helicopters also became involved, especially in the contracts for the operation and maintenance of the line following its completion. Wintertime tractor trains and sea delivery were also used to

²⁰ Roy J. Fletcher, “Military Radar Defence Lines of Northern North America: An Historical Geography,” October 1989, available online at <http://www.pinetree-line.org/resartg.html>.

²¹ DND, “History of the Mid-Canada Line,” 8.

²² In March of 1954, for instance, General Foulkes, Chairman of the Chiefs of Staff Committee, pointed out in a meeting with senior American officials that the MCL “was not, as some people tended to regard it, a southern line but one which bordered on the sub-Arctic.” “Report of Meeting of Consultation Between Representatives of Canadian and United States Governments,” enclosure with Ambassador in US to SSEA, “U.S. – Canada Meeting of Consultation of March 4,” Despatch 440, 9 March 1954, in *DCER*, vol. 20, 1080-1082.

supply the construction sites.²³ The terrain and the isolation of the construction sites would not prove to be the largest problem, however. The planning, organization, and building of the Line was a process that all too often became bogged down in conflict and acrimony. An unclear and confused division of authorities and responsibilities, problems with organizational cultures, and the urgency of a Cold War deadline all contributed to strained relations, delays, and the project's cost overruns. Defence Construction Limited found itself in the midst of this administrative battleground, and senior DCL personnel, who had been involved in the project from an early stage, soon recognized the potential for problems and were alarmed as they saw them develop. Such concerns prompted one DCL official to describe the telephone company's plans and schedules for completion as "a list of good intentions," an opinion shared by a number of his colleagues.²⁴ Towards the end of the construction effort, DCL's role as an instrument of government policy and contracting and supervisory agency for the Department of National Defence meant that much of its energies were directed towards completing the line in as timely and cost-effective a manner as possible.

First Plans, First Decisions

The construction of the Mid-Canada Line was the direct outcome of continental air defence debates and planning in the early 1950s. At that time, the discussion of early warning radars and continental air defence in depth already dated back a number of years to the inception of the long-range bomber threat. A re-evaluation of these concepts was

²³ On the significance of the Mid-Canada Line for Canadian helicopter operations, both military and civilian, see Larry Milberry, *Air Transport in Canada, Volume 1*, (Toronto: CANAV Books, 1997), 346-358.

²⁴ Memorandum to R.G. Johnson, possibly from J.P. Stirling(?), 3 May 1955, DCC in-house file 122-7-12-T6, "MCL".

forcibly introduced to the air defence debate by a number of American studies and reports in the early 1950s, beginning with the Valley Committee, which had been created to evaluate air defence systems following the first Soviet nuclear test in August of 1949. It was followed by Project Charles, which had been created largely to determine the need for an institution for the research of air defence problems. Although the project's August 1951 report underlined the value of early warning radar, it argued that northern radar lines were not feasible, but provided little explanation or justification for its rationale. Some of its other recommendations, however, led to air defence developments that would have a direct effect on air defence and Defence Construction Limited, most notably the automation of air defence systems as part of SAGE (Semi-Automatic Ground Environment), discussed in Chapter Six. The major recommendation of the report, however, was its support of plans for the creation of an air defence research institution, the Lincoln Laboratory, which was established in late 1951.²⁵ Lincoln Labs, as it was sometimes called, was one of the earlier defence think-tanks created by the Cold War, and was closely associated with MIT. While Lincoln Labs had been preceded by a few organizations like RAND (1946), the early 1950s would witness a rapid proliferation of this military-academic industry.²⁶

Subsequent studies of continental defence requirements drew somewhat different conclusions from Project Charles. In the spring of 1952, Project East River argued that effective air defence was needed, with an outer warning network some 2,000 miles from

²⁵ The Valley Committee was created in December of 1949. Bruce-Briggs, *The Shield of Faith*, 52-56; Jockel, *No Boundaries Upstairs*, 61-62; Schaffel, *The Emerging Shield*, 144-145, 197-198.

²⁶ Bruce-Briggs, *The Shield of Faith*, 48, 79-80.

the continental limits of the United States.²⁷ The controversy surrounding this project led to the formation of the Lincoln Laboratory Summer Study Group, composed largely of scientists and engineers, in the summer of 1952. Among this group's conclusions was the estimate that a successful Soviet attack on North America could inflict up to twenty million deaths.²⁸ "To stave off such a disaster," notes historian Joseph Jockel, "there was only one possible course of action. Echoing East River, the group called for the improvement of the national air defence system 'to the point where it can exact almost complete attrition against a very heavy attack.... *We believe that such a defense can be created.*' Essential to such an effort was early warning."²⁹

While the Summer Study Group had focused on the creation of a Distant Early Warning Line in the far north, the pressures for an early warning line in the arctic were similar to many of the military arguments that would be mustered in favour of the Mid-Canada Line, and many of the plans that resulted from these arguments envisaged the construction of both lines. Opposition to the Summer Study Group report, however, was strong within the American military and government. Foremost among the criticisms were accusations that the recommendations would lead to the creation of a "Maginot Line" mentality at the expense of what many senior officers believed was the USAF's

²⁷ The National Security Resources Board had been established to advise the President on co-ordinating military, industrial, and civilian mobilization. Jockel, *No Boundaries Upstairs*, 63-64; Schaffel, *The Emerging Shield*, 172-174.

²⁸ *Ibid.*, 174-177; Jockel, *No Boundaries Upstairs*, 64-65. Jockel notes that "it appears now, in the light of research done since 1952 on the effects of atomic weapons, that the summer Study Group may have underestimated the effects of such a nuclear strike. Twenty million deaths now seems a small figure, if such a thing can be said about such an unparalleled catastrophe, in comparison with current estimations that a full-scale thermonuclear exchange could today [1987] take the lives of 100 to 150 million North Americans as a result of increases in the number and destructiveness of Soviet weapons. In 1952 the figures were newly appalling. The group struggled to put it all into perspective by pointing out that U.S. military losses during the First World War had been 126,000 and in the Second World War 300,000." *ibid.*, 65.

²⁹ *ibid.*, 65. Emphasis in original.

central offensive role.³⁰ Despite such resistance, the reports generated by East River and the Summer Study Group would ultimately contribute to the establishment of the Distant Early Warning Line and the Mid-Canada Line.

American plans for continental defence, however, were not always congruent with Canadian interests. Andrew Richter has recently drawn attention to Defence Research Board scientist George Lindsey's September 1952 analysis of the Summer Study Group's report. In addition to the obvious problems and costs associated with the establishment of a Distant Early Warning Line and its supporting defences, Lindsey discussed the implications of "defence in depth" for Canada in some detail. According to Richter,

Lindsey noted that, as it involved waves of defences gradually claiming greater and greater attrition of attacking aircraft, the best-protected part of the system would be at the southern end – that is, the United States. "If defence in depth is necessary, and is successful," Lindsey noted, "then the place to live is deep down in the system." However, if the enemy believed this to be the case, it would probably concentrate attention on the "outer surface" of the network, which it could attack "without paying an extortionate price." While not specifically identified, the outer surface of the North American network was obviously Canada.

The implications of this finding were left unstated, but were nonetheless quite clear. Lindsey had recognized that Canada's geographic location in the northern half of the North American continent presented difficult defence challenges. He essentially warned that, in the event of a major Soviet air attack, defence in depth would involve considerable devastation over Canadian areas, with lesser damage as one went further south. To avoid such an outcome, Lindsey suggested, the entire orientation of the North American air defence network would have to be

³⁰ Air defence historian Kenneth Schaffel has argued, however, that the USAF opposition to the northward expansion of continental defence was not necessarily as monolithic or extreme as contemporary media accounts and some historians have claimed. The USAF, he argues, supported the development and upgrading of "inner" defences within the continental United States and Alaska before any far northern warning line would be built, and its leaders acknowledged such a line's utility for air defence and for alerting SAC. The USAF also questioned the motives of the Summer Study Group's scientists, most notably physicist J. Robert Oppenheimer. His advocacy of improved air defence, of the use of atomic weapons on the battlefield in addition to their use as strategic weapons against targets in the Soviet Union, and opposition to the creation of a second nuclear weapons development laboratory to help with the development of the hydrogen bomb all served to annoy senior USAF personnel, who actively spoke out against Oppenheimer during the 1954 hearings that stripped him of his security clearance. *ibid.*, 67-68; Schaffel, *The Emerging Shield*, 176-184; Bruce-Briggs, *The Shield of Faith*, 83-85.

pushed further north, perhaps to the Arctic Circle and even into Soviet territory. Not only would such a network be prohibitively expensive, but the technical challenges would probably prove insurmountable. The report reveals a distinctive Canadian approach to the air defence problem, and a recognition that Canada's interests were not always synonymous with those of its neighbour.³¹

By January of 1953 the United States was pressing ahead with its plans for northern early warning systems, making a formal request for the use of Canadian territory as part of experimental operations for what would ultimately become the DEW Line. As a condition of its acceptance in February, Ottawa insisted that a Canada-US Military Study Group, (MSG), be created to study North American air defence, especially the proposed DEW Line. After receiving briefs from Canadian and American air defence commanders about the importance of an early warning line along the 55th parallel, the undertaking that would ultimately become the Mid-Canada Line, the MSG asked the Canada-US Scientific Advisory Team (CUSSAT) to carry out a study of the value of such a line. CUSSAT concluded that it would be a valuable undertaking.³² In late September of 1953, the Canadian government was expecting a tentative report on radar lines from the Canadian section of the MSG within a month. It was also worried that US President Dwight D. Eisenhower's address on defence scheduled for 4 October might prove embarrassing should it mention issues involving defence issues requiring Canadian consent, and sought details on this issue prior to the address.³³

Eisenhower's speech, which was replaced by "Operation Candor," a series of public statements made at previously arranged speaking engagements, had been

³¹ Lindsey was at the time a member of DRB's Operational Research Group. Richter, *Avoiding Armageddon*, 41.

³² Jockel, *No Boundaries Upstairs*, 70-71; Lester, *Special Contract*, 50; DND, "History of the Mid Canada Line," 1-2. The motives for American support for the MCL were perhaps more complicated than might appear on the surface; for details, see Jockel, *No Boundaries Upstairs*, 73-76, 80-84.

³³ SSEA to Ambassador in the US, "Continental Defence," 28 September 1953, in Donald Barry, ed, *Documents on Canadian External Relations: Volume 19, 1953*, (Ottawa: External Affairs and International Trade Canada), 1076-1077.

prompted by a worrying development in the race for the H-bomb.³⁴ In August of 1953 the Soviet Union tested a new and powerful nuclear device, which they claimed was a hydrogen bomb capable of being delivered by an aircraft. At first, Western analysts were unclear about the nature of the Soviet weapon, although they soon determined from the analysis of airborne fallout that it was a “boosted” atomic bomb rather than a true hydrogen bomb that had been tested.³⁵ While the “boosted” device was much more powerful than earlier Soviet atomic bombs, its maximum explosive yield was ultimately limited by nuclear physics. The initial concern in the West was therefore that the Soviet Union had beaten the US to the creation of a hydrogen bomb in practical weapon form.³⁶

Despite the true nature of the August 1953 test, the impact of the announcement on the public was considerable, and as Kenneth Schaffel notes, “just as four years earlier when the Soviet Union first exploded an atomic device, a public cry immediately arose for better continental air defenses.”³⁷ The hydrogen bomb coupled with worries about the development of new Soviet long-range bombers represented a dramatically increased threat to North America. Given the vastly increased destructive power of the weapon and

³⁴ Eayrs, *In Defence of Canada, Volume III*, 366-369; “Gen. Eisenhower on World Peace: Need for Military Preparedness,” *The Times*, 7 October 1953, 6.

³⁵ A “boosted” device depends on nuclear fission (the principle of the atomic bomb), with the yield of the device boosted by nuclear fusion (the basic principle for the hydrogen bomb). In comparison, a true hydrogen bomb uses the detonation of an atomic bomb to generate a much larger fusion reaction. There is also a subsequent fission reaction caused by the fusion reaction and involving the outer jacket of the device, which produces a substantial portion of its yield, but this is more a matter of the details of thermonuclear weapons design than of underlying principles. The important difference is that for the “boosted” device, fusion supplies a *much* smaller portion of the total yield than for a true hydrogen bomb, and that physics places a much lower limit on the maximum possible yield of a “boosted” device than it does for a hydrogen bomb. The Soviet Union, for instance, once tested a de-rated version of a 100-150 megaton hydrogen bomb design, which produced a yield of some fifty megatons. Friedman, *The Fifty Year War*, 146; Zaloga, *The Kremlin’s Nuclear Sword*, 31-35, 71-72. On early US efforts to monitor Soviet nuclear testing, see Charles A. Ziegler and David Jacobson, *Spying Without Spies: Origins of America’s Secret Nuclear Surveillance System*, (Westport, CT: Praeger, 1995).

³⁶ While the United States had tested a hydrogen bomb in 1952, this had been an experimental device completely unsuited to weapon use; not until 1954 would the Americans develop and test a “deliverable” H-bomb, and its first Soviet counterpart would not be tested until late 1955. Zaloga, *The Kremlin’s Nuclear Sword*, 35.

³⁷ Schaffel, *The Emerging Shield*, 192-193.

the greater speed of the bomber that carried it, continental defences would not only have to be more effective, but warning time would be reduced and defending forces would have to be more capable if air defence was to be successful in protecting the continent or, at the least, limiting the damage of a Soviet attack.³⁸

The drive to improve continental air defence was sustained by two more American studies of the issue, both of which also assigned top priority to the building of the MCL as part of North American defences. In the tense atmosphere produced by the Soviet test in August, the second of these reports – the Bull report, named after the study group chairman, Harold R. Bull, one of Eisenhower's staff officers from the Second World War – was soon amended and endorsed as US National Security Council policy paper 159/4 on 24 September. Among its recommendations was the prompt construction of what it called the "Southern Canadian Line," which would later become the Mid-Canada Line. This document was crucial to American and Canadian continental air defence efforts.³⁹ For Canada, its emphasis on the construction of the MCL would lead to more substantial discussions of the project with the United States, and undoubtedly gave

³⁸ Memorandum, DL(1), "The Air Defence of North America," enclosure to Memorandum, USSEA to SSEA, DEA/50209/40, 8 December 1954, *DCER*, vol. 20, 1055-1056; Ambassador in United States to SSEA, Despatch 1723, "Meeting of Consultation with United States Officials on September 24, 1954," *ibid.*, 1100.

³⁹ The earlier of the two reports was the Kelly Report, named after the chair of the study group, Mervin J. Kelly, President of Bell Telephone Laboratories – an institution with strong ties to air defence systems. Schaffel, *The Emerging Shield*, 185-191. Jockel gives the date for approval of NSC 159/4 as 24 September. Jockel, *No Boundaries Upstairs*, 75; Schaffel, *The Emerging Shield*, 193. Schaffel incorrectly implies that the formation of the Military Study Group and CUSSAT was an outcome of NSC 159/4. He observes, however, that NSC 159/4 was important because it was "the first postwar air defense directive approved at every level of military command – at the presidential, at the Office of the Secretary of Defense, and at the JCS [Joint Chiefs of Staff] levels. The Air Force could at last proceed to build a modern air defense system knowing it had the complete backing of *all* elements in the national command structure." *Ibid.*

the project added support within Ottawa, which was already well aware of American sentiment in this area.⁴⁰

At the same time that pressure was growing for improvements in continental defence and Eisenhower was taking the issue of the new Soviet bomb to the American people, the Cabinet Defence Committee in Ottawa was facing the issue of American interests and intentions with respect to continental radar networks. At a meeting on 6 October 1953, the committee recognized that both American journalists and American officials were pressing on this issue.⁴¹ Canadian sovereignty, it was feared, could all too easily become a casualty of continental defence. Accordingly, the Cabinet Defence Committee decided that "U.S. authorities should continue to be reminded of the vital concern of Canada in all continental defence plans and of the necessity for consultation of Canada at an early stage in the development of the plans."⁴² Shortly thereafter, the Military Study Group reached some conclusions on the issue of continental defence, recommending on 8 October "that there be established at the earliest practicable date an Early Warning Line located generally along the 55th parallel between Alaska and

⁴⁰ See, for instance, Ambassador in United States to Secretary of State for External Affairs, Telegram WA-2012, "Article by General Bradley in the *Saturday Evening Post*," 28 August 1953, *DCER*, vol.19, 1066-1068. Bradley's "A Soldier's Farewell" was published in the 29 August 1953 issue of the *Saturday Evening Post*.

⁴¹ While newspaper articles discussing the subject were dismissed as inaccurate or sensationalist, the concerns and ambitions of US planners and politicians were taken more seriously, since "the increased interest of the United States in continental defence would raise new political problems for Canada," including the possibility of demands for additional airfield facilities that would bring even more US service personnel into the country. Minutes of 95th meeting of the Cabinet Defence Committee, 6 October 1953, 1-2, DHH 73/1223, series 3, box 65, file 1330. Subsequent correspondence between Minister of Defence Production C.D. Howe and Minister of National Defence Brooke Claxton, however, revealed some concerns about security, particularly in one article that had disclosed information about the "McGill Fence." On the Howe-Claxton discussion of security leaks, see correspondence from October 1953 in C.D. Howe Papers, LAC, MG 27 III B20, vol.195, file SD-10, "Radar Division." The two articles that concerned Howe were Marquis Childs' "Canada Looks to Northern Air Ring" on 11 September and "Arctic Defense is Joint Undertaking" on 12 September, both in the *Washington Post*.

⁴² Minutes of 95th meeting of the Cabinet Defence Committee, 6 October 1953, 1-2.

Newfoundland.”⁴³ The arguments and pressures supporting the construction of the Mid-Canada Line had grown once again.

Just under a month later, the Cabinet Defence Committee agreed that such a line should be established. Furthermore, it directed that the Canadian section of the MSG should complete the selection and specifications for equipment for the line, and that the RCAF in conjunction with the USAF should carry out a detailed survey of the proposed route of the line and the possible sites for its detection equipment. Canada, the CDC recommended, should undertake the planning and construction of such a line, without prejudice to any later decision about the division of costs for the Distant Early Warning Line. This last point reflected ongoing Canadian concerns about the potential expense if the country were to share the costs of building what would become the Distant Early Warning Line in the arctic. During the meeting, the committee noted that while “it was too early to make any reliable estimate on the cost of the line, and the problems of northern construction would likely make the final charges very high; *nevertheless, the cost of Canadian construction would probably be substantially lower than of U.S. construction.*”⁴⁴ The Mid-Canada Line, therefore, could serve yet another purpose for the Canadian government. As subsequent discussions would show, Canadian assumption of this responsibility in the continental defence effort could be used to avoid having to share the costs of what was anticipated would be a vastly more expensive Distant Early Warning Line.

The Cabinet Defence Committee decision to proceed with the establishment of the MCL had not yet received the sanction of Cabinet, but it unleashed a wave of activity.

⁴³ Lester, *Special Contract*, 50.

⁴⁴ *ibid.*, 51; Minutes of 96th meeting of the Cabinet Defence Committee, 3 November 1953, 1-2, DHH 73/1223, series 3, box 65, file 1330. Emphasis added.

Pressure in the United States to improve defences against the increasing Soviet threat continued to increase and provided a significant impetus to the planning and construction of the Mid-Canada Line as part of the continent's defences. In Ottawa, these concerns were recognized by the Department of External Affairs and shared by the Canadian military.⁴⁵ Given Canada's close links with the United States on issues of continental defence, the Mid-Canada Line promised to be useful on a number of fronts. On the surface, it was arguably an essential part of a network of radar lines that offered improved defences, and as such had been endorsed by both American and Canadian officials. The MCL also served other purposes for Ottawa and its bureaucrats. As a project that would be planned by Canadians, and built using Canadian equipment, it also helped address a number of concerns raised by continental defence co-operation with the United States. As a radar warning line that would be operated entirely by Canadians, it dealt with concerns about sovereignty by avoiding another influx of American personnel as had happened with the US radar stations in the Pinetree Line. As a Canadian designed and built project, it guaranteed that Canadian contractors would be awarded the construction work. Furthermore, as C.D. Howe pointed out to Brooke Claxton, the MCL also addressed concerns about Canadian technological development by providing a market for advanced technology designed and manufactured in Canada.⁴⁶ Finally, as a Canadian-financed project the MCL helped limit Canada's financial commitments to continental defence. By undertaking this project, Canada could present itself as a partner in continental defence while limiting its financial liabilities.⁴⁷ Although the MCL represented the single largest defence construction programme undertaken for the Canadian military, these plans did

⁴⁵ Eayrs, *In Defence of Canada, Volume III*, 364.

⁴⁶ *Ibid.*, 370.

⁴⁷ *Ibid.*, 369-370; Minutes of 96th meeting of the Cabinet Defence Committee, 3 November 1953, 1-2.

not, at first, include any significant involvement on the part of Defence Construction Limited. The corporation, it was felt, was too busy with existing commitments to handle this trans-continental effort.⁴⁸ A year later, however, in November of 1954, the corporation would find itself drawn into the gathering storm that surrounded the planning and building of the Mid-Canada Line.

Enter Ma Bell: An Alternate Approach to Defence Construction?

By any standards, building the MCL would be a substantial task whose planning and construction would require considerable resources, organizational ability, and administrative skills to sort out the various options and pursue the most effective path to implementation. Shortly after the 3 November 1953 Cabinet Defence Committee meeting that endorsed the construction of an early warning line along the 55th parallel, the Defence Research Board produced a report proposing a version of the line that could be built at an estimated cost of some \$69.7 million. The RCAF, however, had already estimated that another version would cost some \$85 million.⁴⁹ Given the differences between the two estimates for the cost of the line, as well as previous decisions about planning the MCL, a special projects directorate was established to deal with site and route selection and proving for the line, as well as determining the most feasible means of access and construction along the selected route. Its report was to be completed by 1 June 1954.⁵⁰

⁴⁸ Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 9, DHH 181.009 (D266). This draft memorandum appears to have formed the basis for statements in Parliament by the Minister of Defence Production in 1959, and as noted elsewhere in this chapter, ignores or glosses over significant criticisms of DDP's actions during the construction of the MCL.

⁴⁹ DND, "History of the Mid-Canada Line," 2.

⁵⁰ *ibid.*, 2-3.

In the interim, resources were mustered to the planning effort. On 30 November 1953, the Associate Minister of National Defence directed the other services to assist the RCAF with its new undertaking.⁵¹ One of the consequences of the scale of this project was that the standard approach for the construction of defence infrastructure, which involved DCL acting in its established role as a contracting and supervisory authority for DND, was not automatically implemented. Instead, the Department of Defence Production turned to a management contractor, which would assume responsibility for the overall supervision and coordination of the programme. In 1959, DDP would defend its decision by arguing that neither the RCAF, nor DCL, nor the department itself had sufficient staff available for the task.⁵²

The unprecedented demands being placed on government and industry, it was felt, necessitated new partners and new approaches. In December of 1953 C.D. Howe first held discussions with T.C. Eadie, the President of Bell Telephone, about his intention of approaching the major telephone companies in Canada in early January to ask them to undertake the engineering and construction of the MCL through the Trans Canada Telephone System (TCTS). According to Howe, the alternatives to such an approach were that the RCAF could do the work itself or a Crown corporation could be formed for the purpose, but either case would require a considerable number of personnel from the telephone companies and would interfere with their operations.⁵³ The suggestion of a

⁵¹ The RCAF approached the Army with requests for assistance through representation on the Steering Committee and Coordinating Staff, the provision of photographic interpretation services, route selection on the ground, map production, and the provision of certain equipment. "Report on Army Participation in RCAF Project 'MONGOOSE' (to 31 May 54)," DHH 143.004 (D3).

⁵² Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 9.

⁵³ Canada. House of Commons. *House of Commons Debates*, 8 July 1959, 5698; Lester, *Special Contract*, 51-52; Lester, "Taped Recollections," 24-25. Rens makes the worthwhile observation that at this point, construction of POLE VAULT was not yet finished, and construction of the trans-Canada microwave

special-purpose Crown corporation also reflects Howe's proclivities for such organizations; he had earlier suggested this as a possible approach for the POLE VAULT communications system along the Labrador coast, and would subsequently adopt it as a means of completing the Trans-Canada Pipeline. This approach stands as a good example of Howe's famous expediency – going with the party, either public or private, which promised the surest and quickest result.

The Trans Canada Telephone System, with Bell Canada acting as its project agent, was chosen over a normal “bricks and mortar” construction firm or the Air Force's Construction Engineering establishment.⁵⁴ Experience in basic planning and systems engineering was essential, and the local knowledge that could be furnished by the various provincial telephone companies that composed the TCTS was considered important. Various organizations had been considered – the telephone companies, and the communication divisions of the railway companies, but with one exception they were found lacking. The Trans Canada Telephone System was considered to be the best organization for the task, in part because of its national scope, but also because the Bell Telephone Company was one of its members. Bell acted as the TCTS's project agent during the creation of the MCL, drawing on the personnel and experience of its Special Contract Division, which was already responsible for POLE VAULT, discussed briefly in the previous chapter. In addition to its own experience with communications, operations,

telecommunications network was just beginning, so heavy demands were being placed on the telephone industry at the time it took on its role in building the MCL. Rens, *The Invisible Empire*, 233.

⁵⁴ Lester, *Special Contract*, 52. As noted above, TCTS was made up of all of the major provincial and commercial telephone companies in the country, and had been created with the chief purpose of permitting the creation of an integrated and reliable transcontinental telephone system. The Bell Telephone Company of Canada was one of the members of the TCTS. Rens, *The Invisible Empire*, 208-209.

and industrial relations, Bell also offered access to the Bell Telephone Laboratories in the United States and their extensive experience with defence communications technology.⁵⁵

An interdepartmental steering committee had been established in December 1953 to provide overall policy direction to planning. At its first meetings on the 21st and 22nd of the month, representatives of the Treasury Board, the Defence Research Board, the Army, the RCAF, and the Department of Defence Production were present, as was DCL President R.G. Johnson. At this time the first attempt to appoint a management contractor (MC), responsible for overall supervision and co-ordination of the programme, was made by DDP. This proposal was resisted by the RCAF, which eventually agreed to allow such participation but only for the first phase of construction.⁵⁶ At a subsequent meeting of Bell representatives with RCAF officers in Ottawa on the 30th, Air Commodore Max Hendrick, the RCAF's Chief of Telecommunications, and his staff outlined the project – a detection and communication line across Canada.⁵⁷ Major issues and problem areas identified at this largely exploratory meeting were the detection apparatus and problems with the displaying of its information; the communications system; structures including towers, buildings, and air strips; power supplies for stations that would operate unattended for up to thirty days; maintenance; and logistical support for construction and operation.⁵⁸ In order to organize and plan for the project, as well as to deal with design and engineering concerns, the RCAF proposed that a Systems Engineering Group (SEG)

⁵⁵ *ibid.*, 52-53; Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 2-3, DHH 181.009 (D266); *House of Commons Debates*, 28 March 1960, 2541. As noted in Chapter Two, the railways and Bell had been competing for defence communications business in 1950, but had subsequently agreed to adopt a more co-operative and co-ordinated approach to the subject. LAC, RG30, vol. 13170, file V7345-1-1, "Canadian Overseas Telecommunications Corporation, Formation Of – Radar – Micro-Wave," 1949-1950; A.G. Lester, "Taped Recollections," 7-8.

⁵⁶ *ibid.*, 56; Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 1, DHH 181.009 (D266); DND, "History of the Mid-Canada Line," 2-3.

⁵⁷ Lester, *Special Contract*, 49-50.

⁵⁸ *Ibid.*, 54.

be established within the Air Force, with members from industry working alongside service personnel as required. The SEG would also let contracts for specific engineering studies.⁵⁹ The decision to adopt the SEG for the MCL, Bell's Alex Lester would later argue, was part of a move to keep full responsibility for the basic design, as well as the authority to monitor its construction, within the Air Force.⁶⁰ Such efforts would become a recurring theme as work progressed on the Mid-Canada Line.

Bell's representatives, however, had concerns and interests of their own. They argued that the use of a systems engineering group would not allow the RCAF to benefit from the complete capabilities of the telecommunications industry. Representatives from various firms would only bring their own knowledge to the SEG, rather than the broader expertise of their companies as a whole. Bell preferred a prime contractor approach, with the company assuming full responsibility for meeting the RCAF's operational requirements. As with POLE VAULT, Bell would be responsible for development, engineering, and construction.⁶¹ By the end of this meeting, Bell's representatives made a counter-proposal offering the services of Bell and the other six members of the TCTS as prime contractor. Personnel from the members of the TCTS and the electronic and construction industries would thereby form a special group to perform the task, and Bell would remain responsible for overall co-ordination of the programme even though it was intended that sub-contractors would be widely used.⁶² This arrangement was apparently

⁵⁹ *Ibid.*

⁶⁰ *Ibid.*, 56. The ad-hoc nature of SEG's creation led to some organizational problems. Due to problems with other units in Air Force Headquarters not formally recognizing its existence, the group's existence was formalized at the end of August 1955, with the order made retroactively effective until the end of the year. While at first SEG reported to the Air Member for Technical Staff (AMTS) through the Chief of Construction Engineering (CCE), in September of 1955 it was ordered to report directly to AMTS. DND, "History of the Mid-Canada Line," 3.

⁶¹ Lester, *Special Contract*, 55.

⁶² *Ibid.*, 55.

acceptable to the RCAF, although no formal agreement on the matter was reached at this time and there is some disagreement among various sources about the RCAF's willingness to accept it.⁶³

While agreeing to the use of Bell as a prime contractor, the RCAF also retained the SEG, which would grow to thirty people, some of them senior engineers from the electronics industry, by April of 1954. RCAF officers made up most of the remainder of the group, although early in the process a number of their USAF counterparts participated in the planning efforts. The group's initial task was to determine the project's requirements and costs, as well as planning the steps that had to be taken prior to its implementation. Completion of this phase was delayed by the late date at which a number of the participants became available. Since the Mid-Canada Line was to form part of an integrated continental air defence system, the RCAF consulted with its American counterpart on the operational requirements for the line, as well as its end points and the path it would take across the country. RCAF representatives also visited experimental radar facilities in the United States in order to gain more information about technical approaches that could be used for the MCL.⁶⁴

The first name assigned to this project was TAMARACK, but it would be changed in early 1954 to MONGOOSE after lax security compromised the original

⁶³ According to some accounts, by March of 1954, the RCAF was apparently eager to have a management contractor appointed to the project as soon as possible. This contrasts strangely with a DND summary from early 1959 that notes that DDP had pressed for the appointment of an MC, something the RCAF was "reluctant to accept...two attempts were made to avoid the decision being forced on them." In any event, the deputy ministers of National Defence and Defence Production were discussing the appointment of the TCTS as Management Contractor by May of 1954. "Progress Report No. 2 – Project Mongoose, Period from 10 March to 30 April 1954," 6, DHH 143.004 (D3); DND, "History of the Mid-Canada Line," 3; C.M. Drury, DM/DND to R.M. Brophy, DM/DND, 22 June 1954, DHH 181.009 (D266).

⁶⁴ Lester, *Special Contract*, 56; "Progress Report No. 2 – Project Mongoose, Period from 10 March to 30 April 1954," 1, 6-7, DHH 143.004 (D3). The progress report refers to visits to experimental facilities for the DEW Line in the United States, as well as to MIT's Lincoln Laboratory.

name.⁶⁵ By October of that year, MONGOOSE was itself abandoned and replaced by the more descriptive title of "Mid-Canada Line project."⁶⁶ The undertaking was to proceed in two phases: Phase I, including a technical study and report, and a cost estimate for the project, and Phase II, also known as the implementation phase, which would involve the creation of the system, and included engineering work, procurement, transportation, construction, and installation of the electronic equipment.⁶⁷

The third interim report from the Military Study Group in May 1954 prompted a series of Canadian government decisions leading to the construction of the MCL. On 25 June, the Cabinet Defence Committee recommended

that an aircraft warning line in the vicinity of the 55th parallel of latitude from Hopedale in Labrador to the mountains on the B.C.-Alberta border be constructed by Canada at a cost estimated to be of the order of \$120 million, the money to be provided from current appropriations for the Department of National Defence and the appropriations now contemplated for the next few years; it being understood that the construction of the section of the line from the B.C.-Alberta border to the Pacific Ocean would be considered at a later meeting following further studies.⁶⁸

The memorandum submitted to the committee by the Minister of National Defence also laid out a schedule for construction that would see the line operational by the end of 1957 – a date well worth keeping in mind given how planning and construction actually

⁶⁵ CAS to AOC, Tactical Air Command, Edmonton, 8 February 1954, "Electronic Fence – Code Word," DHH 181.002 (D294), formerly RCAF file S.704-9-1, "Operations – Project Taramack".

⁶⁶ CAS to Air Officer Commanding, 1 Tactical Air Command, Edmonton, 29 October 1954, "Mid-Canada Early Warning Line," DHH 181.002 (D294). The project names for the electronic, logistic, and construction engineering studies were BACK LOG, BACK UP, and BACK LASH, respectively. CAS to AOC, Tactical Air Command, Edmonton, 19 February 1954, "Nickname," DHH 181.002 (D294).

⁶⁷ In light of the final costs of the line, the \$77,000 price tag for Bell's work in Phase I seems minuscule. Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 1-2; C.M. Drury, DM/DND to R.M. Brophy, DM/DDP, 22 June 1954, DHH 181.009 (D266).

⁶⁸ Minutes of 100th meeting of the Cabinet Defence Committee, 25 June 1954, 5, DHH 73/1223, series 3, box 65, file 1330. The minutes of the COSC meeting that agreed to the submission of this plan to the CDC were amended prior to the approval of the CDC recommendation by Cabinet. Minutes of the 563rd meeting of the Chiefs of Staff Committee, 17 June 1954, 1-2; Minutes of the 564th meeting of the Chiefs of Staff Committee, 28 June 1954, 1-2, DHH 73/1223, series 3, box 61, file 1307B.

unfolded. The CDC's recommendation made its way to Cabinet on the 30th.⁶⁹ In presenting this recommendation, Minister of National Defence Brooke Claxton played on concerns of sovereignty and costs when he argued that

it would be desirable for Canada to construct the mid-continent line alone because with American participation there would be less Canadian control, costs would almost certainly be greater and the delays would likely be considerable. Furthermore, by undertaking the project alone and quickly Canada could demonstrate to the United States its active participation in continental defence.⁷⁰

For the Canadian government, one of the advantages to the Mid-Canada Line was that it would use Canadian technology and would be entirely Canadian operated, which helped avoid problems with construction, supply and sovereignty. The contentious issue of the nationality of contractors was also avoided – as a Canadian project on Canadian soil, the contractors and suppliers would naturally be Canadian.

Opinions within the government on this issue were not unanimous, however; while an all-Canadian MCL offered these advantages, officials at the Department of External Affairs were concerned that the DEW Line, also under discussion at this time, might become an exclusively American undertaking, with significant consequences for Canadian arctic sovereignty and domestic political sensitivities. The RCAF and C.D. Howe in his role as Minister of Defence Production were apparently less concerned about such issues, and these differences of opinion formed part of a larger debate between the Department of External Affairs and the Department of National Defence about Canada's role in continental defence. Andrew Richter's recent study of Canadian military strategy

⁶⁹ Memorandum, MND to CDC, "Continental Defence – Mid-Canada Warning Line," 18 June 1954, enclosure with Memorandum, A/USSEA to SSEA, "100th Meeting of Cabinet Defence Committee to be held on Friday, June 25, 1954," 23 June 1954, DCER, vol.20, 994-994; Cabinet Conclusions, 30 June 1954, 2-4, RG2, series A-5-a, vol.2655. The tentative programme developed by SEG in June 1954 also proposed completion of the line by the end of 1957. Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 6, DHH 181.009 (D266).

⁷⁰ Cabinet Conclusions, 30 June 1954, 3, LAC, RG2, series A-5-a, vol. 2655.

and nuclear weapons during this period, *Avoiding Armageddon*, observes that while both departments were “generally sensitive” to American demands and kept Canadian defence and security interests foremost in their discussions, they defined their country’s interests rather differently. External Affairs, according to Richter, focused on the protection of political interests, while National Defence was more concerned with the two countries’ shared interests in air defence.⁷¹ Unlike many other continental defence projects, however, the Mid-Canada Line was able to negotiate many of these tensions by offering the advantages of Canadian construction, supply, and operation while at the same time allowing Ottawa to demonstrate its commitment to continental defence to both Canadians and Americans. That an all-Canadian MCL also allowed Ottawa to limit its financial obligations in comparison with a jointly-built Distant Early Warning Line was a further advantage, even if it did little to assuage concerns about the implications of a largely American DEW Line that could be built on Canadian territory.⁷² These arguments, coupled with the opportunity the MCL presented for Canadian technology and early, optimistic cost estimates, led Cabinet to agree “that an aircraft warning line in the vicinity of the 55th parallel of latitude from Hopedale, Labrador, to the mountains near the British

⁷¹ “Report by the External Affairs Observer on the Canada-United States Military Study Group,” 4 June 1954, annex to memorandum from A/USSEA to SSEA, “Continental Defence – Recommendations of the Military Study Group (MSG),” 4 June 1954, *DCER*, vol.20, 987-989; Memorandum, A/USSEA to SSEA, “100th Meeting of Cabinet Defence Committee to be held on Friday, June 25, 1954,” 23 June 1954, *DCER*, vol.20, 992-993; Memorandum, A/USSEA to SSEA, “Distant Early Warning (DEW) – 3rd Interim Report of Military Study Group – Discussion at Permanent Joint Board on Defence,” 17 July 1954, *DCER*, vol.20, 1000-1001; Richter, *Avoiding Armageddon*, 37. There was by no means a monolithic military viewpoint on this issue; in addition to DEA, General Foulkes, Chairman of the Chiefs of Staff Committee, also articulated concerns that an entirely Canadian MCL and entirely American DEW Line would give the impression that “the U.S. was assuming responsibility for, and control of the Canadian Arctic.” Memorandum, A/USSEA to USSEA, “Briefing on November 5 by Chairman of Chiefs of Staff on Proposed Radar Chains,” 6 November 1954, *DCER*, vol.20, 1029-1030.

⁷² As James Eayrs has further explained, “keeping the project under Canadian control would enable the Government to avoid the inflated and excessive expenses which, as the wartime experience of the Alaska Highway and Northwest Staging Route had shown, was the inescapable consequence of joint participation with the United States.” Eayrs, *In Defence of Canada, Volume III*, 370.

Columbia-Alberta boundary be constructed by Canada at a cost estimated to be on the order of \$120 million.”⁷³ While the line would be built, the ultimate cost would be far higher.

In the meantime, the contract demand for Phase I of the MCL had been issued on 22 June. A letter of intent was sent to the TCTS three days later, and was acknowledged on 2 July. Just over two months later the Letter of Intent was replaced by a purchase order, which became a binding legal contract that, amongst other things, set out the responsibilities of the management contractor and the government agencies involved with the MCL. The SEG was designated the design authority, while the management contractor had to provide SEG with an acceptable implementation plan for the project and also had to develop an overall schedule, perform surveys, determine site locations, and make the necessary tests of equipment, structures, or systems when required.⁷⁴ Initially, at least, the intent was to have Bell assume responsibility for planning, purchasing, scheduling, and supervision. One of the upshots of the creation of the Systems Engineering Group, however, was that for the construction of the MCL, the RCAF ultimately assumed considerable responsibility for the planning and supervision of the line’s construction, in contrast with the American approach on the DEW Line, where the civilian prime contractor had been assigned these responsibilities.⁷⁵ Given the RCAF’s initial opposition to Bell’s involvement as a management contractor, the assumption of these roles by the military was arguably an effort to regain as much control

⁷³ Cabinet Conclusions, 30 June 1954, 4.

⁷⁴ Draft Memorandum, “The Mid-Canada Early Warning Line,” 1959, 6, DHH 181.009 (D266), 3-4.

⁷⁵ C. Maxwell to R.G. Johnson, “Mid-Canada Line,” 6 January 1955, LAC, RG83, vol.4, file 122-7-12-T6-0; Minutes of the 580th meeting of the Chiefs of Staff Committee, 30 May 1955, 3.

of the undertaking as possible; Bell's Alex Lester certainly made such an argument in his account of the line's construction.⁷⁶

As part of the organizational structure to build the Line, an Executive Committee was eventually created in November 1954 to represent the deputy ministers of the departments directly concerned with the undertaking.⁷⁷ At about this time, DND raised a further Contract Demand to provide funds for Phase II, the actual construction of the MCL. TCTS representatives met with members of various branches of the Department of Defence Production and Department of National Defence, as well as representatives from Defence Construction in order to determine the duties and responsibilities of the various organizations. The terms and conditions for the project as a whole, including Phase II, were, according to a 1959 draft DDP memorandum, derived from these discussions. From this time until mid-June of 1955, the original purchase order was amended three times – to provide for the construction of a test line near Montreal, to incorporate Phase II, and to change and clarify some aspects of the amendment incorporating Phase II. Part of this third amendment required the TCTS to enter into a formal contract, and although one was prepared, it was not executed until June 21st, 1957, although a Memorandum of Agreement was made effective as of 5 November 1955.⁷⁸ At least some of these changes

⁷⁶ Lester, *Special Contract*, 56.

⁷⁷ Before it was finally disbanded in August of 1957, the executive committee held seventeen regular meetings in Ottawa in addition to special meetings in the capital and at MCL sites themselves. A/V/M M.M. Hendrick, Chairman, Executive Committee, Mid Canada Line Project, to A/C C.F. Johns, ADM(C&P)/DND, "Mid-Canada Early Warning Line: Dissolution of Executive Committee," 27 August 1957, DHH 181.009 (D276), vol.2; Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 5, DHH 181.009 (D266).

⁷⁸ This draft memorandum appears to be a preliminary version of the 1959 memorandum submitted to the Deputy Minister of Defence Production, briefly explaining the history of the organization, planning, and construction of the MCL. Given the acrimony generated by the poor relations between the various organizations involved in the MCL (see below), and that it was apparently drafted by DDP staff, it should, like all contemporary summaries and historical outlines, be carefully scrutinized. Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 4-5, DHH 181.009 (D266); House of Commons, *Debates*, 28 March 1960, 2542.

were made at the prompting of DCL, which was concerned about responsibilities and authorities on the construction sites and elsewhere that were laid out in the proposed agreement.⁷⁹ The failure at this stage to produce a formal contract laying out responsibilities and authorities was a fundamental flaw in the planning and construction of the Mid-Canada Line. The absence of a clear definition of each agency's role and place in the undertaking would haunt the project, and, many would later argue, contributed to the confusion, delays, and increased costs.

Also contributing to these problems was the drive to complete the line as quickly as possible. The Mid-Canada Line was an urgent project, prompted by perceptions of a growing Soviet threat to Canada and North America. In June of 1954, the Chiefs of Staff Committee noted "the need for the speedy construction of the line. Intelligence estimates indicate that by 1956 the USSR will have the capability to launch air attacks against the North American continent. Although assurance must be made that the mid-Canada line [sic] is satisfactory when completed, every effort should be made to better its completion date of 1957."⁸⁰ The growing Soviet threat was reinforced by the emerging danger of thermonuclear weapons and their consequence for North American air defence.⁸¹

Discussion of the issue by the Cabinet Defence Committee noted that "the emergence of

⁷⁹ "Mid Canada Early Warning Project – Minutes of a Meeting Held 28 March 1955 at 2:15 P.M. in Room 124 No. 2 Temporary Bldg. Ottawa," DHH 181.009 (D266). According to these minutes, earlier meetings involving SEG, DCL, and DDP had also been held on this subject.

⁸⁰ Minutes of the 564th meeting of the Chiefs of Staff Committee, 28 June 1954, 1.

⁸¹ As discussed above, in the early decision-making stages in October of 1953 the Chairman, Chiefs of Staff (Lieutenant-General Charles Foulkes), had explained to the Cabinet Defence Committee that American concerns about continental air defence were related to the recent Soviet development of thermonuclear weapons. Minutes of 96th meeting of the Cabinet Defence Committee, 3 November 1953, 1-2; Minutes of the 569th meeting of the Chiefs of Staff Committee, 2-3 November 1954, 5-6, DHH 73/1223, series 3, box 61, file 1307B; Minutes of the 101st meeting of the Cabinet Defence Committee, 12 November 1954, 12, DHH 73/1223, series 3, box 65, file 1330. Reference is made to Cabinet receiving this report, but the relevant conclusions make no specific mention of the issue, noting that "the Minister of National Defence reported on matters considered by the Cabinet Defence Committee at its meetings held on the 12th and 24th of November" before discussing other matters discussed at these CDC meetings. Cabinet Conclusions, 24 November 1954, 11, RG2, series A-5-a, vol. 2656.

this weapon meant that greatly reduced facilities would be required for a devastating attack on North America, and that, technically speaking, air defence was now an area problem rather than a simple point defence question. In this regard, the provision of the Mid-Canada and distant early warning lines were most useful.”⁸²

These concerns about the growing Soviet threat brought additional pressure to bear when they prompted the acceleration of the construction schedule. The original programme laid out by the SEG and approved by COSC in June 1954 foresaw completion by the end of 1957, but pressures to improve North American air defence led to plans for the line to be in operation by the *beginning* of 1957.⁸³ The new deadline required the revision of earlier development and construction schedules, in order to compensate for lost time, and its consequences affected every element of the project. Such was the pressure of the deadline that many of the decisions about the location of MCL sites, and the detection and communications requirements were established in the first half of 1954, although operational requirements were not formalized until early 1955.⁸⁴

⁸² Minutes of the 101st meeting of the Cabinet Defence Committee, 12 November 1954, 12.

⁸³ In early 1954, the tentative timing was “system and equipment specifications to be completed during the fall of 54, setting up test section of the line during winter and summer of 55, siting for a final line in summer of 55, deliver of construction materials in winter 55-56 for construction in spring and summer of 56, Procurement of electronics equipment for delivery in early 57 and installation by the end of 57. This will permit operation of the line by January 58.” “Progress Report #3 – Project “Mongoose,” Period From 30 April 54 to 31 May 54,” 1, DHH 143.004 (D3); Minutes of the 563rd meeting of the Chiefs of Staff Committee, 17 June 1954, 1-2; Minutes of the 564th meeting of the Chiefs of Staff Committee, 28 June 1954, 1-2; House of Commons, *Debates*, 8 July 1959, 5697.

⁸⁴ This programme for the construction of the MCL was part of ongoing plans for the expansion of North American air defence; at the time that approval was given to the final SEG report in August of 1954, the Chiefs of Staff Committee was already discussing the expansion of radar coverage to fill the gap from existing radar stations to the MCL. Some of these plans would ultimately lead to the construction of additional air defence infrastructure in Canada. Minutes of the 568th meeting of the Chiefs of Staff Committee, 21 September 1954, 5; Minutes of the 569th meeting of the Chiefs of Staff Committee, 2-3 November 1954, 5-6; Lester, *Special Contract*, 56.

By early 1954, well before final decisions on the line had been made, work was already underway on preliminary planning and investigations for the MCL. During the winter of 1953-54, RCAF planning included the investigation of logistics problems, including winter time tractor train operation, in co-operation with the Army, in western Canada. In the east, because of rugged terrain that posed a substantial but unknown obstacle to transportation and construction efforts, the studies involved photographic interpretation operations carried out under the Defence Research Board's Joint Intelligence Bureau.⁸⁵ The studies concluded that the actual construction of the MCL along the 55th parallel would be practicable.⁸⁶ Unfortunately, changes in the planning for the Line – due in part to incomplete criteria for appropriate site locations in the DRB reports – meant that much of the survey and inspection work carried out by the tractor trains was of no use for the construction of the Line. The main lessons learned, therefore, were largely restricted to the tractor train operations themselves. In any case, the necessary electronic equipment to test the suitability of sites for Doppler installations had not been ready in time.⁸⁷

The initial selection of site locations was dependent on a thorough knowledge of the terrain through which the line would pass, and the creation of maps with a sufficient degree of accuracy for the project presented a major challenge in and of itself.⁸⁸ The

⁸⁵ DND, "History of the Mid Canada Line," 4; "Report on Army Participation in RCAF Project 'Mongoose' (to 31 May 54)," 11 June 1954, 2, DHH 143.004 (D3).

⁸⁶ Lester, *Special Contract*, 57.

⁸⁷ DND, "History of the Mid Canada Line," 4; "Report on Army Participation in RCAF Project 'Mongoose'". One of the Army reports on the tractor train operations discussed rations and noted that canned meats, with the exception of finnan haddie, had been in short supply, suggesting that "more canned meats such as Spork and Klik are required." "Comments on Rations: Operation – Mongoose," 10 May 1954, DHH 143.004 (D3).

⁸⁸ According to the Army's Director of Military Survey, preliminary studies for the MCL were "seriously hampered by the lack of minimum topographical map coverage over a large part of the area. It is furthermore apparent that this lack of maps is going to hinder final surveys and construction, and, in some

minimum mapping coverage that would be required – 1/250,000 scale, with contour information – was being supplied under the Defence Mapping Programme, but with current priorities and approvals would require several years. Increasing air photography resources was not an option within the limited time available, particularly since the two major civilian companies in the field (Spartan Air Services and Photographic Survey Corporation) had fallen considerably short of completing contracts in the previous year and were already fully committed for 1954, but the re allocation of existing civilian and military survey and mapping resources offered the possibility of providing much of the necessary vertical aerial photography.⁸⁹

Surveying the Mid-Canada Line therefore stretched Canada's mapping ability to the limit and beyond, and required a redrawing of plans for national mapping programmes. Air surveys to create maps with the level of detail necessary for the project were begun by the RCAF's 408 Squadron and civilian operators in the spring of 1954. A strip up to forty miles wide and stretching from coast to coast was photographed. In addition to the entire available mapping capabilities of DND – the Army Survey Establishment – additional equipment and operators were brought in from the Department of Mines and Technical Surveys. Army and civilian cartographers required a year to create accurate contour maps for this entire strip of country based on the resultant photographic and radar contouring information. Using these maps, studies of potential

areas at least, it may impede air navigation and the resupply of the stations." Lt-Col C.H. Smith, Director of Military Survey, to Director of Special Projects, AFHQ, "Tamarack: Air Photography and Mapping," 11 February 1954, DHH 143.004 (D3). 1955 helicopter survey operations found that in some areas the lack of detail on available maps and the low altitude of helicopter operations hampered operations, while the availability of good maps in other areas proved beneficial. "Report on Operation Back Lash II, Part I: Operation Back Lash II (E)," 10, DHH 181.003 (D1217).

⁸⁹ Lt-Col C.H. Smith, Director of Military Survey, to Director of Special Projects, AFHQ, "Tamarack: Air Photography and Mapping," 11 February 1954, DHH 143.004 (D3). For a useful if arguably "buff"-oriented account of aero survey firms and aircraft in post-war Canada, see Milberry, *Air Transport in Canada*, 444-461.

sites for the Doppler detection equipment that formed the basis of the Mid-Canada Line's operational capabilities could be undertaken.⁹⁰ Accurate terrain contours were necessary because the signals for the Doppler detection equipment only operated along a direct line of sight. The transmitting and receiving equipment for each of the Doppler installations therefore had to be directly "visible" to its immediate neighbours along the "line," with no interference from intermediate terrain. While the characteristic towers for the detection equipment helped compensate for terrain and the earth's curvature, there were limits to what they could overcome. Furthermore, the taller the towers, the greater the expense and challenge would be in their construction and maintenance. The required contour maps, which would make preliminary studies and calculations of these detection sites possible, were produced by early 1955.⁹¹

The survey process was further complicated and prolonged by a new operational requirement related to the identification of aircraft crossing the line. The resultant changes in the path of the line across the country meant that in some areas the strip surveyed had to be wider than the original fifteen miles. By the end of March 1954, many

⁹⁰ Radar contour information was not required for the the James Bay-Bird section of the line, where the DDS site locations were dependent on beach ridges and firm ground rising above the surrounding muskeg. "Minutes of a conference to discuss the survey requirements in the Quebec sector of "Mongoose," held in the office of the Chief of Air Operations at 1100 hours, 25 February 1954," DHH 143.004 (D3); R.A. Cline to CAS, 9 May 1955, 4, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1); C.M. Drury, DM DND to Marc Boyer, DM DMTS, 3 June 1954, DHH 143.004 (D3); Col. G.A. Turcot, Army Member, Steering Committee, Project Mongoose to Chairman, Steering Committee, Project Mongoose, "Project Mongoose: Additional Mapping Requirements," 12 March 1954 DHH 143.004 (D3); Lester, *Special Contract*, 57; RCAF Operation Order No. 5/54, 10 February 1954; Operation Order No. 7/54, 16 February 1954, DHH 181.002 (D294). In late February 1954, the Director of Military Survey noted that "at present approximately 10 per cent. of the Army Survey Establishment is engaged on Mongoose. The assumption of the additional commitments proposed at this meeting would raise the proportion to about 90 per cent. and would effectively delay the execution of the first priority tasks now specified in the Defence Mapping Plan by one year." Lt-Col C.H. Smith, Director of Military Survey, to DMO&P. "Mongoose - Mapping Requirements," 26 February 1954, DHH 143.004 (D3).

⁹¹ DND, "History of the Mid Canada Line," 5. In December of 1953, prior to the commencement of the survey programme, the Army's Director of Military Survey had noted that "statements of intervisibility [between the sites] are little more than educated guesses." Lt-Col C.H. Smith, Director of Military Survey, to Chief of Construction Engineering, AFHQ, "Tamarack: Preliminary Report - Map Reconnaissance," 8 December 1953, DHH 143.004 (D3).

of the new areas requiring surveys had been determined, although the new course of the line west of the Alberta-Saskatchewan border had not yet been decided.⁹² Even though the MCL was a Canadian project, it was still part of joint planning for continental air defence, and as such, decisions about the route of the line were co-ordinated with the United States. In the following few months, the RCAF and the USAF continued to hold differing opinions on this matter, with the Americans preferring a more southerly route than the Canadians.⁹³

The Chiefs of Staff Committee discussed the changing plans for the MCL at its meeting on 21 September 1954. Identification radars would be installed at Waterways (Stoney Mountain), Flin Flon (Cranberry Portage), and Knob Lake, with additional radars "to assist the difficult James Bay crossing."⁹⁴ While the line could be extended westward from Dawson Creek, the use of the existing Pinetree Line radar network in this area was recommended, while the Chiefs felt that coverage along the Labrador coast from Hopedale to Cape Race was largely an American interest. Even at this date, there were already differences of opinion between the RCAF and Bell Canada concerning the method and timing for construction of the line; the Air Force favoured the commencement of stockpiling in the fall of 1954 prior to the selection of sites, while Bell wanted to wait until the details of the line had been determined and the final selection of

⁹² W/C L.V. Carver, Director of Special Projects, to Col. G.A. Turcot, Director of Military Operations & Plans, 4 May 1954, "Project 'Mongoose' – Additional Mapping Requirements," DHH 143.004 (D3).

⁹³ "Progress Report #3 – Project 'Mongoose,' Period from 30 April 54 to 31 May 54," 3, DHH 143.004 (D3). Some original plans also included a branch running along the northwest coast of Lake Superior, as well as through British Columbia and along the Queen Charlottes. See, for example, the map attached to W/C L.V. Carver, Director of Special Projects, to Col. G.A. Turcot, Director of Military Operations & Plans, 4 May 1954, "Project 'Mongoose' – Additional Mapping Requirements," DHH 143.004 (D3). At this time, Turcot was the Army member of the MCL Steering Committee. The proposed branch of the MCL from Churchill to Lake Superior was enthusiastically supported by Admiral Arthur W. Radford, Chairman, United States Joint Chiefs of Staff. "Report of Meeting of Consultation Between Representatives of Canadian and United States Governments," enclosure with Ambassador in US to SSEA, "U.S. – Canada Meeting of Consultation of March 4," Despatch 440, 9 March 1954, *DCER*, vol.20, 1080-1082.

⁹⁴ Minutes of the 568th meeting of the Chiefs of Staff Committee, 21 September 1954, 4-5.

its sites had been made. "These differences were being resolved," the minutes of a September 1954 meeting of the Chiefs of Staff Committee noted, "and in any event the line should be operative by December, 1956."⁹⁵ This optimism about co-operation with Bell and the line's operational deadline would ultimately prove to be unfounded.

While plans were being made for the route to be followed by the line, the development of its detection equipment had continued apace. During the development and testing process, four possible detection systems were evaluated, consisting either of variations on the Doppler detection equipment or combinations of the Doppler gear with other systems. As summarized in September of 1954, they were as follows:

Mark I Doppler:	Two lines with stations 35 miles apart and 2 miles apart north south.
Mark II Doppler:	A single line with stations connected in a way that gave the same results as two lines of stations, supplemented by identification radars in heavy aerial traffic areas.
Composite Line	Mark II Doppler System with radios [radars] every 120 miles
Lincoln Composite System	Single line of radars with low level cover provided by Doppler system ⁹⁶

SEG initially recommended the use of the Mark II detection equipment, and the Chiefs of Staff agreed with this recommendation in late September of 1954.⁹⁷ Problems with its development, however, meant that the Mark I equipment, an earlier version using two separate detection lines, was ultimately chosen for the MCL in January of 1955. Among the reasons for the reversion to the earlier detection system was that the Mark II

⁹⁵ *ibid.* The provision of Hopedale-Cape Race "gap filler" radar coverage was discussed in the previous chapter.

⁹⁶ Ambassador in United States to SSEA, Despatch 1723, "Meeting of Consultation with United States Officials on September 24, 1954," *DCER*, vol. 20, 1100.

⁹⁷ Minutes of the 568th meeting of the Chiefs of Staff Committee, 21 September 1954, 4-5.

equipment could not be developed and produced in time to meet a January 1957 operational date.⁹⁸ Once again, the decision to move the operational deadline forward from the end of 1957 to the beginning of the year proved to have significant consequences for the project. The resultant reversion in equipment meant that the sites that had initially been selected for use with the Mark II Doppler detection system were not suitable for the Mark I equipment, so new sites had to be chosen. Furthermore, alternate sites for the deployment of Mark I with 40 and 60 mile spacings between installations also had to be determined, since it was unclear whether or not the Doppler equipment could successfully operate over a 60 mile distance.⁹⁹ Not until May of 1955 was DRB able to confirm the separation of the detection stations at 60 miles; until that point, determining the sites for the stations with any certainty was virtually impossible – the “office selection” of sites from mapping information had been proceeding on the basis of both 40 and 60 mile spacings until early May.¹⁰⁰ This reversion to the earlier version of the equipment required substantial changes to the already massive mapping and survey plans, and contributed to the delays and rising costs of the project.

⁹⁸ *ibid.*; Lester, *Special Contract*, 57-58. A May 1954 progress report from the SEG noted that “nothing firm has yet accrued from the study on system composition. Reconciliation of the detection and communication equipments presents the greatest problem. Solution of this problem, which is basically one of propagation and siting, is mandatory before firm recommendations can be made regarding types and deployment of equipments. There are, however, several systems under study, each based on different configurations involving either scanning radars, or CW Doppler or a combination of both. Each system is being studied and developed to include the other necessary telecommunications aspects and thus provide a comparison of the relative merits of the various systems to assist in final selection of the system or systems to be used.” “Progress Report #3 – Project “Mongoose,” Period from 30 April 54 to 31 May 54,” 4, DHH 143.004 (D3); Draft Memorandum, “The Mid-Canada Early Warning Line,” 1959, 6, DHH 181.009 (D266). The Executive Committee decided to abandon the Mark II detection equipment and revert to a line using its Mark I counterpart at some point in January of 1955. R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 1, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

⁹⁹ R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 1, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹⁰⁰ Bell was informed by SEG of the DRB approval on May 27th. DND, “History of the Mid Canada Line,” 5; R.A. Cline to CAS, 4, 9 May 1955; R.A. Cline to CAS, 1, 13 June 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

These final decisions on the equipment and its deployment relied on the outcomes of full-scale evaluations. Following early “Spider Web” tests in the Ottawa valley, a subsequent project in the Montreal area known as “Lone Wolf” involved the development, planning, and testing of early production models derived from the initial trials.¹⁰¹ Since the Mark II detection equipment had been abandoned in favour of its Mark I counterpart, this test line was also used to determine whether or not a 60 mile spacing for detection stations would work or whether a 40 mile spacing would be required. Despite RCA Victor’s role in the development of the equipment, the contract went to Bell Telephone. “I was not yet familiar with the perversity that is a persistent feature of Canadian governments faced with decision,” scientist James Rennie Whitehead recalls, “so I was astounded when the contract for the system was awarded to Bell Telephones and not to RCA. When I confided this to a senior colleague in Ottawa he asked me, cynically, who I thought ran Canada, anyway.”¹⁰² Whether this switch was a result of perversity, pragmatism on the part of the government in choosing a larger corporation, or a *quid pro quo* extracted by Bell as part of its involvement in the line, remains unclear. The tests of the prototype equipment began in the summer of 1954, using a Lancaster on loan from RCAF Greenwood, and later SAC jet bombers on training flights, while

¹⁰¹ “McGill Fence,” n.d., but probably 1953, LAC, C.D. Howe Papers, MG27 III B20, vol. 195, file SD-10, Radar Division.

¹⁰² Whitehead, *Radar to the Future*; R.A. Cline, Chief Engineer, TCTS, to CAS, 9 May 1955, 8, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). “Lone Wolf” consisted of a link in the Eastern townships near Montreal using equipment and buildings – a transmitter at Powerscourt and a receiver at Rougemont – as close in design to the production stations as possible. Early reports also describe the Powerscourt location as Huntingdon. R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 1, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The Rougemont receiver site is also listed as being at Riviere des Hurons in one TCTS progress report. R.A. Cline, Chief Engineer, TCTS, to CAS, 12 April 1955, 7, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). For more details on testing, see R.A. Cline to CAS, 10, 12 July 1955; R.A. Cline, Chief Engineer, TCTS, to CAS, 15 August 1955, 11, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The information on changes in spacing is derived from R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 2, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

operations with the line modified to more closely resemble the operational equipment continued until at least the end of September 1955.¹⁰³

While early MCL proposals had suggested the creation of an advanced test line in the Flin Flon area, a final test of the line's equipment and operational concepts was subsequently undertaken in the Ottawa Valley, with stations at South Gloucester, Fitzroy Harbour, Haley Station, and Alice, Ontario.¹⁰⁴ During the summer of 1955, Bell was working on surveys, site plans and the preparation of building drawings.¹⁰⁵ The site at South Gloucester was to perform the role of a Sector Control Station (SCS), with tower, antennas, and an operations building, while the other three sites were to be used to test three different designs of Doppler Detection Station (DDS) buildings. The site at Alice used a lightweight building intended for construction in Northern Quebec where helicopter airlift would be required. While plans for the other two DDS used commercially available prefabricated panels, the lightweight aluminum and magnesium

¹⁰³ Whitehead, *Radar to the Future*; R.A. Cline, Chief Engineer, TCTS, to CAS, 12 September 1955, 11, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹⁰⁴ Memorandum, MND to CDC, "Continental Defence – Mid-Canada Warning Line," 18 June 1954, enclosure with Memorandum, A/USSEA to SSEA, "100th Meeting of Cabinet Defence Committee to be held on Friday, June 25, 1954," 23 June 1954, *DCER*, vol.20, 994-995. This test line was originally to have consisted of three stations, but the reversion from Mark II to Mark I Doppler detection equipment required the addition of a fourth station "due to the new concept of the line." R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 2, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The tower, antennas, and operations building at the South Gloucester site are still standing, albeit in private hands, and can be seen to the southwest of the corner of Mitch Owens Road and Bank Street in Ottawa. The other three sites have long since been dismantled.

¹⁰⁵ At one point a design with two towers, one for Doppler detection equipment, and one for the microwave communications network, was considered as an alternative to the single tower design that was finally chosen for the test line and the MCL as a whole. R.A. Cline, Chief Engineer, TCTS, to CAS, 9 May 1955, 5; R.A. Cline, Chief Engineer, TCTS, to CAS, 15 August 1955, 5-6, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). See LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2) for more details on the Ottawa Valley Test Line contained in TCTS progress reports.

structure for Alice required a manufacturing contract that would be tendered by Defence Construction Limited.¹⁰⁶

These test lines were an essential step in determining the final form of the Mid-Canada Line. Although the System Engineering Group had issued a preliminary system specification in November of 1954, because of the unknowns involved in the construction of the MCL – especially the version of detection equipment, which had not yet been chosen – it was by no means a comprehensive document. Following the creation of these initial plans, SEG continued to serve as Design Authority for the remainder of the MCL project. It developed the overall system specifications, worked with Bell Canada and various consultants on detailed plans, and monitored the job for the RCAF. Coupled with the urgency of completing the line, the gaps in the specifications meant that much of the detailed planning for the MCL was carried out as it was built. Not until 29 June 1956 was the final System Specification covering all the RCAF's technical and physical requirements issued, and by that time much of the construction was nearing completion. In many ways, the specifications were more a record of what had been built rather than what was required.¹⁰⁷ Much of the planning, in other words, was done “on the run,” under the pressures of the Cold War, and the decision to move the deadline for the MCL's completion ahead by a year only exacerbated the situation.

¹⁰⁶ R.A. Cline, Chief Engineer, TCTS, to CAS, 15 August 1955, 5-6; R.A. Cline, Chief Engineer, TCTS, to CAS, 12 September 1955, 4-5; R.A. Cline to CAS, 12 July 1955, 4; R.A. Cline to CAS, 13 June 1955, 4-5, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹⁰⁷ *Ibid.*; Lester, *Special Contract*, 58.

Entering the Fray: Defence Construction Limited and the Mid-Canada Line

The initial plans for the role of the Trans Canada Telephone System as Management Contractor, with the Bell Telephone Company of Canada as its project agent, had displaced DCL from its customary role as tendering and supervisory authority for DND construction projects. DCL, however, had been aware of the project since November of 1953, and had played some part in the initial evaluation of terrain and construction requirements. Following a significant revision of the responsibilities and authorities of government agencies and the TCTS in November 1954, DCL became directly involved in the undertaking. At the same time, the Department of Defence Production's Purchasing and Electronics divisions became directly involved in procurement for the MCL. Following these changes, the Management Contractor's task was to co-ordinate the engineering, construction, and installation of the system. TCTS was accountable to DDP and to DCL, and was also responsible for the field supervision of DCL construction contracts, since the crown corporation did not have the personnel to supervise all of the sites across the country.¹⁰⁸

These changes and their origins had been proposed and discussed towards the end of 1954. In late October, D.A. Golden, the Deputy Minister of Defence Production, had written to T.W. Eadie, the chairman of the Trans Canada Telephone System, to advise him that DDP and DCL might assume responsibility for procurement and construction, and asking TCTS to rework its management contract proposals accordingly. "Discussions have been on the basis of a management contract, with the management contractor in full charge of the project," Golden acknowledged, but then explained that

¹⁰⁸ C. Maxwell to R.G. Johnson, "Mid-Canada Line," 6 January 1955, LAC, RG83, vol.4, file 122-7-12-T6-0; House of Commons, *Debates*, 8 July 1959, 5696; 28 March 1960, 2541.

it is now contemplated that the Department of Defence Production and Defence Construction (1951) Limited should exercise procurement functions with regard to this contract. It would be appreciated if you would reconsider your proposals for the way in which the management contract would be handled in the light of this change in concept. I would point out that there is no change in the concept of employing a management contractor for the project but the new approach does affect the way in which the procurement of equipment, installation and construction will be handled.¹⁰⁹

An appendix to the letter laid out DCL's responsibilities:

This Company will arrange for the construction of all buildings, roads, runways, etc., incidental to the project. In the first group are included operations, transmitter and receiving buildings, hangars, garages, living quarters, food stores, boiler and pump houses. Defence Construction Limited will be responsible for the supervision of all construction contracts placed by it.¹¹⁰

What the Department of Defence Production was proposing, in other words, was a substantial revision of the arrangements that had already been proposed.

Unfortunately, Golden did not explain the basis for this decision, and the relevant Department of Defence Production records are not available, but in his memoirs, Lester addresses the questions of why DDP insisted on control of procurement, and why TCTS accepted these conditions and continued with the project. His observations provide some interesting and valuable insights into these events. While admitting he was not "privy to the inner councils of Ottawa officialdom," Lester argues that "the change must have been initiated, or at least endorsed, at the policy level in Government," and suggested three reasons for the change: political and commercial considerations, a Canadian tendency to consider that large projects should be undertaken through government or government

¹⁰⁹ D.A. Golden, DM/DDP, to T.W. Eadie, Chairman, TCTS, 29 October 1954, DCC in-house file 011-5, "Information - Historical - MCL".

¹¹⁰ *Ibid.*

agencies, and concerns that TCTS might be unable to accomplish its task without government direction.¹¹¹

Direct involvement in procurement by DDP would allow Ottawa to take political credit for the awarding of contracts to influential construction firms, and the use of government agencies may have offered the promise of greater flexibility in the awarding of contracts. Furthermore, the concerns about Canadian electronics firms articulated by C.D. Howe during the early stages of the project may also have played a role; Lester notes that Bell's purchase of "virtually all its telecommunications equipment from Northern Electric may well have influenced both the electronics manufacturers and Government towards DDP direction of contracts."¹¹² The use of DDP as a procurement agency offered Ottawa the opportunity to extract the maximum benefit of the Mid-Canada Line for Canadian electronics firms, rather than foreordaining that the work would be awarded to a single firm which also had strong corporate ties to the United States.¹¹³

Lester's second argument centers on his observation of the greater Canadian proclivity towards the use of government or government-owned agencies, such as Crown corporations, for the implementation of large projects, particularly those where a connection to government exists. "In my opinion," he argues, "our Government and civil service people, and perhaps the public generally, have much less faith than their opposite numbers in the U.S.A. in the capacity of private enterprise, and the desirability of giving

¹¹¹ Lester, *Special Contract*, 77-78.

¹¹² *Ibid*, 77.

¹¹³ On Howe's interest in maximizing the benefits of the MCL for Canadian electronics firms, see Eayrs, *In Defence of Canada*, Volume III, 370.

private industry a free rein to do a job.”¹¹⁴ Howe, he argues, had wanted the project implementation co-ordinated and pushed by the telephone companies. The unspoken implication is that the decision to revise the arrangements for the MCL was made somewhere below ministerial level. In retrospect, Lester’s comments on private industry seem somewhat disingenuous, given the monopolistic tendencies of the TCTS, its member companies, and their counterpart in the United States, the Bell System, but his observation about Canadian tendencies towards the use of government agencies, including Crown corporations, to accomplish major tasks, is worthwhile and consistent with broader observations of the issue.

Lester’s final argument was that there were concerns that Bell, acting as project agent for the TCTS, might not be able to accomplish the task without considerable government involvement.¹¹⁵ Bell, Lester notes, was seen as a telecommunications expert, but there were doubts about its construction and transportation capabilities, even though it was currently undertaking the POLE VAULT project along the Labrador coast, with its accompanying construction and transportation problems. While it may be reasonable to assert, as Lester does, that Bell’s ability in this undertaking “did not register fully” with people in Ottawa, the comparison is also strained. POLE VAULT involved the installation of additional equipment at existing Pinetree line sites along the Newfoundland and Labrador coastline. Ocean access to these sites, although often difficult and limited by the northern shipping season, made the task of establishing construction facilities and supplying and provisioning the project considerably easier than the supplying of most of the sites along the Mid-Canada Line.

¹¹⁴ Lester, *Special Contract*, 77-78.

¹¹⁵ *Ibid.*, 78.

In Lester's view, there were two reasons for the TCTS to agree to the conditions and go ahead: "the feeling that the job was vital to the national interest, and, probably persuaded by Mr. Howe's initial approach, that the telephone companies might be the only nationwide private agency capable of its implementation. As in the case of Pole Vault, there was also a strong element of duty as a Canadian corporate citizen," and pride in Bell's accomplishments and capabilities.¹¹⁶ Presumably driven by such considerations, Eadie met with Golden and Howe to discuss this issue on 2 November, and TCTS subsequently met with DDP, the RCAF, and DCL for further discussions. The telephone company was agreeable to the changes, but along with the other organizations sought clarification of these changes in responsibilities.¹¹⁷

By the end of November Golden was setting out the revised responsibilities and authorities in a letter to Eadie, and also laying out the responsibilities of the various parties, including DCL. Defence Construction was to

negotiate and award contracts for buildings and structures, calling for tenders where necessary. It has been agreed that the Management Contractor will be consulted with regard to the tender list where his experience and knowledge would be of benefit, and that he will assist Defence Construction Limited in the assessment of tenders when received, where his specialized knowledge would be useful.

Defence Construction Limited will include with their contracts, either a clause of the contract or a separate letter to the contractor, instructions that the Management Contractor shall be the agent for Defence Construction Limited with respect to field supervision of the contract. This will cover complete direction of the job in the field both as to timing, quality of workmanship and overall co-ordination to meet design and all job requirements to the satisfaction of Defence Construction Limited. It will also include the verification of progress claims of the contractors and recommending them to Defence Construction Limited for payment.

¹¹⁶ *Ibid.*, 78.

¹¹⁷ Eadie to Golden, 15 November 1954; C.M. Drury, DM/DDP to D.A. Golden, DM/DDP, 18 November 1954, DCC in-house file 011-5, "Information – Historical – MCL".

Defence Construction Limited will employ a number of field representatives of their own who will be located at a few key points along the Line and who will have access to all sites. These men will be of senior calibre and, in effect, will be the Defence Construction Limited official representatives who deal with the Management Contractor's field supervisors. They will deal in all matters with the Management Contractor's representatives and not with the general contractors on the job. All field changes in the project which involve an expenditure of money will be subject to their approval.

In addition, Defence Construction Limited will organize a group at Headquarters in Ottawa to maintain direct liaison with their field representatives on the one hand and with the Management Contractor's staff on the other."¹¹⁸

By mid-January 1955, agreement on the division of functions and responsibilities had been reached by Eadie and Golden, and DCL's role in the construction of the MCL had been assured.¹¹⁹

The corporation's responsibilities resulting from these changed arrangements were considerable. In selecting the construction contractors for the MCL, DCL had to contend with the absence of plans and specifications for the work; contractors were therefore chosen, according to a 1960 account by Minister of Defence Production Raymond O'Hurley, "on the basis of (i) past experience, (ii), knowledge of conditions in the north, (iii) availability of experienced personnel, (iv), ownership of sufficient equipment of a proper type, (v) geographical location."¹²⁰ Given its close relationship with the construction industry and intensive experience with Canadian contractors and defence construction projects since 1950, DCL was well-placed to make such decisions, but was also able to stay clear of the red tape that would ultimately afflict the Department of Defence Production's role in the building of the Mid-Canada Line. In this respect, the

¹¹⁸ "Appendix: Division of Functions and Responsibilities," Golden to Eadie, 25 November 1954, DCC in-house file 011-5, "Information – Historical – MCL".

¹¹⁹ Memo, Ruth E. Addison, DDP, to A.B. Hunt, Col. B. Lake, R.G. Johnson, W.H. Huck, D.M. Erskine, 14 January 1955, DCC in-house file 011-5, "Information – Historical – MCL"; Lester, *Special Contract*, 73.

¹²⁰ House of Commons, *Debates*, 28 March 1960, 2541-2.

corporation was able to serve as a useful instrument of state ambition. Furthermore, by helping to make possible an alternative to the use of the Trans-Canada Telephone system for the construction of the MCL, DCL provided Ottawa with the ability to better pursue its policy goals, even if, as Lester argues, these were pursued partly for political and ideological reasons rather than for pragmatic considerations.

Rising Costs, Growing Uncertainties: Building the Mid-Canada Line

If reaching an agreement for the implementation of the Mid-Canada Line was challenging, its actual construction was a problematic undertaking fraught with challenges that included climate and terrain, organizational problems, and conflicts between the agencies involved. As a result of these problems, costs increased above initial estimates and the ability of the project to meet its deadline of January 1957 became increasingly doubtful. Construction work for the Mid-Canada Line was in some ways more difficult than work in the far north because of variable weather and surface conditions, especially muskeg, that posed considerable obstacles to summertime surface transportation. Spring thaws and autumn freeze-ups also prevented surface transportation for a couple of months every year, and at this point, Canadians did not yet possess the experience or equipment for such work.¹²¹ Building the Mid-Canada Line, however, would provide valuable lessons in these fields. In later years, R.G. Johnson, the president of DCL, talked about how the company was responsible for some groundbreaking work on winter ground transport, and noted how a considerable amount of the work was put in place between November and April. He gave credit to the Canadian construction industry

¹²¹ Collins, *A Voice From Afar*, 243.

for “growing mastery of an uncompromising climate.”¹²² A 1958 position paper Johnson prepared on the Canadian construction industry made similar claims, arguing that the

industry generally is in a much better position to take on large projects than ever before in its history. In 1950 the construction industry had not had much experience in the north and was struggling to cope with the work it already had in hand. In 1958 the industry has the benefit of its seven years of growth and experience, *particularly in the north with projects such as Pinetree, Mid-Canada Line and DEW Line all performed by Canadian contractors.*¹²³

In its role as an instrument of government policy for the provision of defence infrastructure, Defence Construction Limited had helped the Canadian construction industry gain this valuable experience. As an agency with an established relationship with the construction industry, DCL also sought to protect the industry’s interests in the negotiations surrounding the Pinetree and DEW Lines. The all-Canadian nature of the MCL, however, meant that DCL did not have to exercise that particular function during its construction.

While it did not have to involve itself with the negotiation and implementation of construction provisions like those for the Pinetree and DEW Lines, DCL found that other aspects of the Mid-Canada Line fully occupied the energies of its personnel participating in the project. Following the initial surveys and experimental operations, the Mid-Canada Line construction effort began in earnest in 1955. DCL’s annual report for the 1954-55 fiscal year noted that “the most important project to be administered by Defence Construction (1951) Limited during the coming year will be the Mid-Canada Line, on which a valuable start had been made at the end of the fiscal year.”¹²⁴ At the outset,

¹²² R.G. Johnson, “Nostalgia,” speech delivered to DCL’s 25th anniversary reunion party, 14 November 1975.

¹²³ R.G. Johnson, “The Position of the Canadian Construction Industry in 1958,” 1-2, DCC in-house file “Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL”. Emphasis added.

¹²⁴ DCL, *Annual Report*, 1954-55, 3.

DCL's activities were limited to contracts for tractor train operations, building materials, and fuel storage tanks.¹²⁵ The decision in January 1955 to revert from Mark II to Mark I Doppler equipment led to changes in the sites of all the DDS in the western section and brought about considerable modifications to tractor train activity, which had already been scheduled to deliver construction materials to the initial DDS sites.¹²⁶

Together with the work on Camp Gagetown, the MCL contracts contributed to an increase in the value of contracts awarded by DCL in 1955-56, an increase of 34% over the previous fiscal year.¹²⁷ In that year, the MCL was the largest project administered by DCL. The annual report briefly described the project, noting that

transportation of men, materials and equipment presented a difficult problem. Most of the winter transportation was provided by tractor trains, operating on a scale never before undertaken in Canada. These were supplemented by helicopters and fixed wing aircraft. The results were satisfactory and work has been progressing faster than was estimated a year ago. About one third of the required construction has been put in place. It is estimated that construction work will be sufficiently advanced to permit operation of the communication system when required.¹²⁸

By early 1955, construction had begun on a runway at Great Whale River to serve the Sector Control Station and the local construction effort, while airlift and tractor train

¹²⁵ Memo, Ruth E. Addison, DDP, to A.B. Hunt, Col. B. Lake, R.G. Johnson, W.H. Huck, and D.M. Erskine, 14 January 1955, DCC in-house file 011-5, "Information - Historical - MCL"; J.D. McIlveen to C. Maxwell, DCL Inter-Office memo, "Re: Mid-Canada E.W. Line Progress Reports," 22 February 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The SEG construction digest noted that while the RCAF and DCL had some control over the transportation effort, the Management Contractor was responsible for its overall planning, implementation, and its results. Royal Canadian Air Force, Systems Engineering Group, (SEG) "A Digest on the Building of the Mid-Canada Line," n.d. but mid-November 1957 or later, 20, DHH 181.009 (D266).

¹²⁶ The Patricia Transportation Company, for instance, was ordered to reassign its efforts from providing transportation services between marshalling points and DDS locations to a feasibility exercise for tractor train transportation between Gillam and Cape Henrietta Maria. J.D. McIlveen, MCL Project Manager, DCL, to G/C E.C. Poole, "Re: Mid-Canada E.W. Line - Monthly Report," 5 January 1955; J.D. McIlveen, MCL Project Manager, DCL, to G/C E.C. Poole, "Re: Mid-Canada E.W. Line - Monthly Report," 8 February 1955; J.D. McIlveen, MCL Project Manager, DCL, to G/C E.C. Poole, "Re: Mid-Canada E.W. Line - Monthly Report," 2 March 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹²⁷ DCL, *Annual Report*, 1955-56, 5.

¹²⁸ *Ibid.*, 7.

operations began to lay down caches of fuel in Labrador, Quebec, Ontario, and Manitoba.¹²⁹ Sites for all of the Sector Control Stations were chosen by June, but the change in detection equipment required a new survey and selection effort for the Doppler Detection Station locations that wound up taking rather longer. A series of aerial operations during the year used RCAF and USAF helicopters to survey site locations along the line.¹³⁰ Valuable experience in helicopter operations that would stand the RCAF and commercial helicopter operators in good stead in upcoming years was gained during these operations. This had, in fact, been one of their intended functions. The operations were largely successful and with the exception of one crash were completed largely without serious mishaps.¹³¹ In years to come, firms like Okanagan Helicopters would benefit from the continued need for helicopters during the Mid-Canada Line's

¹²⁹ K.J. Holmes, *The History of the Canadian Military Engineers: Volume III, to 1971*. ed. J.R. Newell, (Toronto: Military Engineering Institute of Canada, 1997), 126.

¹³⁰ Operations Back Lash II and Back Lash III in the summer of 1955 used Canadian and American H-19 helicopters as well as some support aircraft from 408 Squadron to survey site locations and to transport Bell technicians and their Doppler propagation testing equipment to various proposed sites. Operation Right Flash in the fall of 1955 used USAF helicopters and their crews to survey and mark sites for proposed Doppler detection sites between Flin Flon, Manitoba, and Lesser Slave Lake, Alberta. R.A. Cline to CAS, 12 July 1955, 3, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1); Holmes, *History of the Canadian Military Engineers*, 127; "Report on Operation Back Lash II," DHH 181.003 (D1217); "Report on Operation Back Lash III," DHH 181.003 (D1294); "Report on Operation Right Flash," DHH 181.003 (D1216). According to the official report, Back Lash III was undertaken in order to "test certain Doppler paths between sites selected on Operation Back Lash II. To test these paths the MC [Management Contractor] (Bell Canada) had to install Doppler transmitting and receiving stations on certain sites on the Mid-Canada Line. The purpose of this operation was to provide airlift support for the civilian personnel to carry out these tests." *Ibid.*, 2. The testing had to be undertaken due to topographical obstructions between sites. R.A. Cline to CAS, 12 July 1955, 4, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). Back Lash II was intended to prove (on construction and line-of-sight signals requirements) and survey (for technical and legal requirements) the tentatively selected sites for the MCL. "Report on Operation Back Lash II," 2, DHH 181.003 (D1217). Operation Right Flash, relying entirely on American helicopters, had been intended to determine and mark sites for the Doppler detection equipment along the planned route of the MCL from Flin Flon, Manitoba, to Lesser Slave Lake, Alberta. "Report on Operation Right Flash," DHH 181.003 (D1216).

¹³¹ "Report on Operation Back Lash II," 2, DHH 181.003 (D1217). During Back Lash II, one RCAF helicopter "became temporarily misplaced for a period of approximately fifteen hours," while one USAF helicopter crashed. As a result of this crash, "it was decided to repaint remaining five helicopters yellow. The present green camouflage was considered dangerous from search point of view." Two USAF airmen were also sent home for becoming involved with "Treaty Indian girls who were also underage." "Report on Operation Back Lash II, Part I: Back Lash II (E)," 8; "Report on Operation Back Lash II, Part II: Operation Back Lash II (W)," 11, DHH 181.003 (D1217). See also Milberry, *Air Transport in Canada*, 346-351.

operation and maintenance, and experience gained in these fields would be applied to other undertakings.

By the end of April 1955, contracts let by DCL for feasibility trials of tractor train operations had been completed, although the initial ambitious plans for these operations had had to be scaled back due to their late start and slower than expected progress. Building materials and fuel oil storage tanks for DDS installations in the western section of the line had also been delivered and stockpiled, and the selection of contractors – a task undertaken jointly by DCL and Bell – for the SCS from Winisk eastwards and for the DDS in Quebec and Labrador had been made. DCL's monthly status report for April also noted that while agreement had been reached on the division of responsibilities between agencies involved in construction of the MCL and on contract procedures between DCL and Bell, "some of the smaller details of the relationships and procedures between D.C.L. and the Management Contractor remain to be settled."¹³² As events would prove, the division of responsibilities and authorities had by no means been satisfactorily established.

As part of the terms of the contract, the Trans-Canada Telephone System was required to provide quarterly forecasts of expenditures. The first was submitted to the Executive Committee on 4 May 1955, and laid out an overall estimated cost of some \$169 million, of which \$16.7 million would be required for project management. This revised estimate was the product of more detailed studies that were made possible by

¹³² DND, "History of the Mid-Canada Line," 5; R.J. Balfour, Project Supervisor, DCL, to G/C E.G. Poole, "Re: Mid-Canada E.W. Line Monthly Report," 1 April 1955; R.J. Balfour, Project Supervisor, DCL, to G/C E.G. Poole, "Re: Mid-Canada E.W. Line Monthly Report," 3 May 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The challenges faced by the tractor train operations in the Winisk area and elsewhere – including a fatal helicopter crash – are documented in a number of DCL field reports in this file. See, for instance, H.J. Hickson to W.E. Woods, "Progress Report, Exercise Feasibility," 26 March 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

more specific knowledge about increased requirements for the line, including additional Doppler Detection Stations, taller towers, increased power requirements, larger helicopters, and additional building space. This estimate was to remain unchanged until August 1956, when it would be increased to some \$179 million.¹³³

In addition to marking the beginning of significant DCL involvement in the construction of the Mid-Canada Line, early 1955 was also the point at which some of the corporation's personnel would recognize significant problems developing within the project and bring them to the attention of senior management. Shortly after being notified that DCL would be involved with the construction of the MCL, the company's Assistant Chief Engineer, Claude Maxwell, formally expressed his concerns about inter-agency co-operation and meeting the target date for the MCL. In a confidential letter to the company's president, Maxwell explained that he had expressed these concerns on several earlier occasions, and was now putting them on paper for the record. Maxwell criticized the management contractor's (*i.e.* Bell's) plans for implementing the construction programme as unrealistic – practically all construction along the line was scheduled for the summer of 1956 – and claimed that liaison between the various organizations was ineffective, with “a tendency to delegate too much work to various committees, rather than have the parties vitally concerned meet every few days to discuss problems as they arise.” He concluded his letter by arguing that

as matters are proceeding now, it is our firm conviction that the project will not be completed by the Target Date, and we would respectfully recommend that an emergency meeting be called, at which would be present representatives of the Management Contractor of S.E.G., of D.D.P. and of D.C.L.. Outstanding problems could be thoroughly thrashed out there and, unless it can be agreed by

¹³³ House of Commons, *Debates*, 8 July 1959, 5697; Minutes of 105th meeting of the Cabinet Defence Committee Decision, 105th meeting, 7 June 1955, 3-4; R.A. Cline to CAS, 1, 9 May 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

all concerned that, by means of close liaison and perfect co-operation, the project can be carried through by the Target Date...then the Higher Authorities should be so advised.¹³⁴

In March 1955, perhaps as a result of this letter, Maxwell was moved to TCTS' Montreal office to facilitate the co-ordination of work on the contract.¹³⁵

Doubts about Bell's ability to meet estimates and deadlines were repeated in May of 1955, when DCL personnel again expressed concern about increasing costs and unrealistic implementation plans. A memo to Johnson noted that if deadlines were to be met, additional expenditures would be required to provide contingency time – more workers, equipment, and materials would be needed in case of delays due to design problems, site problems, and weather, although the work could be done more economically and efficiently if it were stretched over a longer period of time. TCTS' implementation plan was bluntly described as *"a list of good intentions...with very little detail to show the actual course of action which is contemplated to get the work going."*¹³⁶ Meetings with Bell, and the general contractor for each section of the implementation plan were suggested in order to approve the plans in principle to the satisfaction of DCL and to make decisions about the transportation problems inherent in

¹³⁴ C. Maxwell to R.G. Johnson, "Mid-Canada Line," 6 January 1955, 2-3, LAC, RG83, vol.4, file 122-7-12-T6-0. It is not entirely clear from the letter who the other people in the "we" were; this is possibly a reference to other DCL engineers involved in the initial stages of work on the MCL.

¹³⁵ R.J. Balfour, Project Supervisor, DCL, to G/C E.G. Poole, "Re: Mid-Canada E.W. Line Monthly Report," 1 April 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹³⁶ Memo to R.G. Johnson (possibly from J.P. Stirling, DCL Chief Engineer), "Re: Mid-Canada Line," 3 May 1955, DCC in-house file 122-7-12-T6, "Mid-Canada Line". Similar concerns among DCL employees about the schedule for completion of the line continues to emerge in the surviving files from the fall of 1955. Some problems centered largely on the provision of towers and prefabricated buildings, although there were more fundamental problems with the availability of the requisite plans and specifications to the various prime contractors hired by Bell, which, not surprisingly, led to problems with the production of accurate estimates and schedules by the contractors. See, for instance, C.A. Wheatley to J.P. Stirling, "Mid-Canada Line Schedule," 16 September 1955, LAC, RG83, vol.2, file 122-7-12-T6-0-10; C. Maxwell to J.P. Stirling, "REPORT – Week Ending September 23, 1955: Mid-Canada Line," 23 September 1955; C. Maxwell, "Montreal Office Report for Week Ending July 29/55: Mid-Canada Line," LAC, RG83, vol.2, file 122-7-12-T6-0-8A.

the Mid-Canada Line project. The threat of increased costs had also been raised at a Cabinet Defence Committee meeting in early March of 1955; during a discussion on construction of the Canadian section of the Distant Early Warning Line,

reference was made to progress on the Mid-Canada Line and it was pointed out that there were considerable delays, largely due to selection of certain equipment, and the fact that it had taken considerable time to reach final decision on this aspect of the project. The delays would involve increased costs on a large scale if it was felt necessary to meet the deadline originally set for completion of this line.¹³⁷

These comments set out clearly the emerging conflicts between costs and deadlines. On the Mid-Canada Line, this situation would only worsen, and in the end neither costs nor deadlines would win out.

These concerns were the symptoms of underlying problems. By the start of June 1955, deteriorating relations between the various agencies involved in the project prompted a meeting between Bell and DDP, to which neither the RCAF nor DCL were invited. According to the SEG report,

*it was considered by DDP that the difficulties promoting such a meeting arose through the varied interpretations by government agencies, particularly the RCAF, of the MC's contract, which was with DDP. The issue therefore was not deemed to be the concern of the RCAF or DCL although they were responsible for carrying out the work.*¹³⁸

While the meeting produced a revised description of the role of Bell as Management Contractor, the results were never officially promulgated, nor were the purchase order or contract document amended during the construction phase of the MCL to reflect these changes.¹³⁹ While Alex Lester, head of Bell's Special Contract division, had prepared and

¹³⁷ Minutes of the 104th meeting of the Cabinet Defence Committee, 3 March 1955, 7, DHH 73/1223, series 3, box 65, file 1329.

¹³⁸ Emphasis in the original. SEG, "A Digest on the Building of the Mid-Canada Line," 6-7.

¹³⁹ As discussed above, the purchase order was being used as a contract document at that time. Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 4-5, DHH 181.009 (D266). Interestingly, the

circulated among his staff a memorandum explaining the new arrangements, the Assistant Deputy Minister of Defence Production, W.H. Huck, did not, despite Lester's request, circulate copies to the government agencies involved in the MCL. Huck's department, the RCAF would later argue, considered that too much had been conceded to the air force by Bell, and that in any event matters in the field had improved to the extent that the best approach would be to carry on without any official notification of changes in project control.¹⁴⁰ The construction of the Mid-Canada Line had already begun to experience significant problems due to the confused and unclear division of authorities and responsibilities. DDP's questionable decision not to promulgate information about the revised agreements only served to aggravate the situation and undoubtedly contributed to the project's delays and cost overruns.

Work on the Mid-Canada Line continued to ramp up in 1956, and the line remained the largest defence construction contract under DCL's administration in the 1956-57 fiscal year. The corporation's annual report noted that "work continued at all Mid-Canada Line sites throughout the year and was supplemented by large scale transportation by sea, land and air."¹⁴¹ The air transport requirements were truly substantial. Fifty chartered fixed-wing aircraft and forty-three helicopters from the Canadian and US military and from civilian operators were supporting operations during

draft memorandum prepared for the Deputy Minister of Defence Production in 1959 discusses amendments to the purchase order/contract document in mid-June 1955 that were presumably a result from the meeting mentioned above, and mentions that the amendment "was acceptable to all agencies concerned and left no doubt as to their duties and responsibilities." There is no mention of the June 1st meeting or of the RCAF's or DCL's absence therefrom. Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 4-5.

¹⁴⁰ The construction digest noted that Bell and DDP had agreed that Bell had the responsibility and authority of the "Engineer" for the project, and should act for DCL in supervising the construction contractors. Bell's role was to co-ordinate the efforts of the RCAF, DCL, and the general contractors, but authority for the planning and direction of the complete construction task was no longer to be the sole responsibility of Bell, which was instead to direct construction by co-ordinating the views of the RCAF, DCL, and DDP in areas where those government agencies were involved. SEG, "A Digest on the Building of the Mid-Canada Line," 7-11

¹⁴¹ DCL, *Annual Report*, 1956-57, 6.

that year.¹⁴² Surface transportation requirements were also significant. The 1956 tractor train operation was apparently the largest undertaken to date. These operations supported construction of the stretch of the MCL to the west of Hudson Bay, leaving from railway-served marshalling areas at Moosonee and Gillam; to the east of the bay, the terrain was unsuitable for such operations. The Systems Engineering Group noted that although ultimately successful, the operation

was headed for failure before it even got started, due to an impasse on the method of control and the type of tractors to be used between the MC and DCL.

The Systems Engineering Group had to intervene between the Management Contractor and DCL and force a decision from them, although under the terms of the Management Contractor's Contract such action by SEG should not have been permitted. SEG intervention was only accepted because it was agreed by all concerned that "someone had to do something".¹⁴³

This marks one of the few cases of overt criticism of DCL uncovered during the researching of this chapter, but more importantly demonstrates the emergence of problems with the division of responsibilities and the development of bureaucratic logjams that were to characterize and plague the construction of the Mid-Canada Line. Furthermore, Bell and DCL were not at loggerheads over trivia; these tractor train operations were important; SEG's report emphasized the significance of transportation to the MCL when it concluded that "as work progressed on the line, success in relation to the meeting of target dates became more and more a function of transportation."¹⁴⁴

As the disagreement over tractor train operations demonstrated, despite earlier revisions to the division of responsibilities between DCL and the other agencies involved in the construction effort, confusion and conflict over these matters persisted. In January

¹⁴² Roy J. Fletcher, "Military Radar Defence Lines of Northern North America."

¹⁴³ SEG, "A Digest on the Building of the Mid-Canada Line," 17-20, 25.

¹⁴⁴ *ibid*, 25.

of 1956, DCL was asked by DDP's Electronics Branch to review a copy of the proposed management contract to determine whether Defence Construction's duties and responsibilities as laid out in the contract agreed with the company's understanding of the arrangements that had been made. Marginal notes on DCL's office copy of the draft agreement reveal that confusion about duties and responsibilities still existed. Even though it was already a year into its active involvement in the construction of the Mid-Canada Line, DCL's senior management was still not entirely certain about the division of authorities and responsibilities between the various agencies involved in the project.¹⁴⁵ Such uncertainties, when accompanied by disagreements such as those surrounding tractor train operations, did not bode well for the timely and efficient completion of the MCL.

Other developments gave further reasons for concern. DCL employees had warned about the potential for delays and cost overruns in the construction effort during 1955. Events in 1956 gave them reasons for further anxiety. A suggestion in mid-January 1956 that winter construction work could be slowed in order to reduce overall costs fostered concern amongst DCL employees. They strongly opposed a proposal that a slowdown in winter construction could be compensated by an accelerated summer schedule, and DCL personnel expressed their concern about *any* slowing of the construction programme. Ironically, given the ultimate delays and cost overruns of the project, one of the arguments used to support the slowing of winter work was that

¹⁴⁵ The description of the responsibilities for designs, drawings and specifications, for example, which were shared by Bell and the RCAF, drew the comment from Johnson that "the actual arrangements are not as simple as this. R.C.A.F. is preparing much of the detailed design but the division is confusing to me." Despite this and other concerns, however, Johnson soon notified DDP that "the duties and responsibilities of Defence Construction (1951) Limited are in accordance with my understanding of the arrangements that have been made." Marginal comments by R.G. Johnson (or possibly J.D. Jennison) on draft management contract. W.H. Huck, Acting Director, Electronics Branch, Mid-Canada Project, DDP to R.G. Johnson, 5 January 1956; R.G. Johnson to W.H. Huck, 9 January 1956, DCC in-house file 122-7-12-T6, MCL.

construction might be completed before the electronics were ready, which would bring criticism from auditors that the work had been performed as part of a high cost “crash” programme.¹⁴⁶ Such conflict between costs and deadlines was a significant factor in undertakings like the Mid-Canada Line. Budgetary constraints were pitted against the urgency of continental defence projects that were intended to be ready as soon as possible to meet existing or emerging threats.

Throughout 1956, DCL and DND personnel were becoming increasingly concerned about the project’s ability to meet such deadlines and cost targets. Claude Maxwell’s fears, first expressed in January of 1955, were repeated in another memorandum a little over a year later. At the end of January 1956 Maxwell again wrote to DCL president R.G. Johnson, noting that his earlier message had

expressed grave fears that unless there were radical changes in the procedure of the MC, the project would not be completed on time. I feel that the time has now come to bring to your attention certain factors which confirm my previous convictions and also to emphasize to you that, under the present organization, the cost of the work may possibly rise beyond any figure that could be justified.¹⁴⁷

Maxwell noted that Bell’s policy seemed to be to slow down work in order to reduce costs and because the buildings would be ready before the electronics – concerns that Maxwell did not support. He pointed to delays in the transportation of materials to the construction sites which he attributed in part to Bell’s ignoring expert advice – a reference, perhaps, to the dispute over tractor train operations mentioned above – and criticized Bell’s failure to use the “know how” of the prime contractors. Maxwell concluded by arguing that

¹⁴⁶ DCL Inter-Office Memorandum, G.W. Lancaster to C. Maxwell, 23 January 1956; C. Maxwell to F.C. Bradley, Co-Ordinator, MCL, RCAF(SEG), 25 January 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

¹⁴⁷ C. Maxwell to R.G. Johnson, 31 January 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

we feel that there is an attitude of complacency on the part of the MC and a tendency to over-exaggerate the amount of progress that has been made just because the shells of several buildings have been erected. They seem to consider this a finished product. Actually the major part of the work is in the interior and this is far behind, although, in our opinion, the work accomplished to date falls far short of what we consider should have been accomplished and costs on all sites are mounting. It has also been brought to our attention that the staff maintained by the MC on practically all sites is far in excess of any organization which DCL would have provided, and the salaries being paid, taking into consideration overtime and allowances, appear to us to be very high.¹⁴⁸

The Systems Engineering Group dealt with similar concerns and criticisms.

Concerns within its offices on Victoria Island about growing costs had begun in January during the process of paying one of the prime contractors. From that point onwards, a consistent watch was kept on information received from DCL Zone engineers, and by April sufficient information about construction costs was available to suggest that some contracts were not running efficiently. In late April and again in early May, this situation was brought to the attention of DCL's Chief Engineer, J.P. Stirling by C.A. Wheatley, DCL's representative at SEG. Company president R.G. Johnson was similarly alerted by DND's Assistant Deputy Minister for Construction and Properties, who asked Johnson to have DCL investigate the matter. In this instance, DND was turning to DCL as a source of knowledge and expertise that would help protect the department's interests. Among the concerns expressed by Wheatley in late April was that a proper system for cost supervision was not in place on the construction sites, even though DCL, Bell, and Cost Inspection and Audit personnel were located at each of the major sites. In part, this was due to divided responsibilities – each of the three was responsible for a certain area, but

¹⁴⁸ *ibid.*

there was no overall coordination of cost accounting.¹⁴⁹ This lack of coordination in cost accounting and control was yet another consequence of the confused and ambiguous division of authorities and responsibilities and the poor communications that plagued the MCL construction effort.

Further substantial concerns about the schedule were raised within DCL in early May 1956, when Wheatley's comments on Bell's revised 4 May schedule concluded that "the schedule is possible, but will need energy and efficiency in areas where it appears to have been lacking to date."¹⁵⁰ Bell's schedule does not seem to have worked and criticism of the company's planning was repeated in September of 1956 in another internal memorandum from Wheatley arguing that

it has always been the opinion of the writer that the Management Contractor's construction and equipment schedule is unrealistic. My remarks on the first issue dated December 1st, 1955 were to the effect that the scheduling was based on perfect timing without allowing for any contingencies in design, transportation or co-ordination of labour forces and material. This original schedule and the subsequent revised version of May 4th, 1956, did not work out, although no changes were made in the completion date. This latest schedule continues to present the same optimistic picture where all programming and timing appear to be reckoned from the target date by reshuffling and condensing the work to fit into the time still available.

It is the belief of the DCL Zone Engineers and such SEG field representatives who are in close touch with actual on-site activities that the Line will not be operational on December 31st or anywhere close to that date. I am not referring to isolated cases where some of the links will no doubt be completed especially in the Western section, or to the completion of non-essential buildings after that date.

*It seems to me that the time is long past for the Management Contractor to give out with a realistic completion date or a reasonable facsimile thereof.*¹⁵¹

¹⁴⁹ C.A. Wheatley to J.P. Stirling, "Mid-Canada Line – Costs," 25 April 1956; C.A. Wheatley to J.P. Stirling, "Mid-Canada Line Costs," 9 May 1956; A/C C.F. Johns, ADM(C&P)/DND, "Re: Mid-Canada Line Costs," 4 May 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

¹⁵⁰ DCL Inter-Office Memo, C.A. Wheatley to C. Maxwell, "Re: Mid-Canada Line – MC's Schedule of 4 May," 10 May 1956, LAC, RG83, vol.2, file 122-7-12-T6-0-10.

¹⁵¹ DCL Inter-Office Memo, G.W. Lancaster to C. Maxwell, "Re: Comments on Construction and Equipment Schedule," 11 September 1956, LAC, RG83, vol.2, file 122-7-12-T6-0-10. Emphasis added.

Maxwell, the recipient of this memorandum, in a memorandum to DCL president Johnson sent at the same time, also expressed the opinion that the “master time schedule has never been realistic.”¹⁵²

If completion deadlines for the Mid-Canada Line were threatened, so were its budgetary limits. By July of 1956 it was becoming increasingly apparent to DCL personnel that additional funds would be required for construction work on the MCL, and senior engineers began to pressure the RCAF to expedite arrangements for these funds.¹⁵³ DCL president Johnson was notified in mid-August that additional funds would be required, and he passed this information on to the Executive Committee, which was responsible for representing departmental interests, shortly thereafter. Johnson pointed out that while DCL was proposing a substantial increase to the available funds, including a 10% contingency, Bell wanted to consider the issue further, because they felt that this might be considerably more than would finally be required.¹⁵⁴ SEG had apparently expressed similar concerns to Bell, but suggested that it would not be worthwhile

Lester claimed in late 1957 that Bell had twice officially suggested a target date later than 1 January 1957. A.G. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum B: Comments on General Criticism made by D.D.P. Officials at September 16, 1957 Meeting,” n.d, but possibly 29 November 1957, 2, DHH 181.009 (D276), vol.2. Bell’s July 1955 progress report to the RCAF contains a tentative work schedule that has the MCL entering operation in stages ranging from mid-August 1956 to the start of April 1957, but it is unclear whether or not this is one of the suggestions to which Lester refers. R.A. Cline, Chief Engineer, TCTS, to CAS, 15 August 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

¹⁵² C. Maxwell to R.G. Johnson, Personal & Confidential, “Report on Special Contract Dept., Bell Telephone Co., H.W. Britton to D.B. Mundy,” 10 September 1956, LAC, RG83, vol.1., file 122-7-12-T6-0-4.

¹⁵³ Since this was a process that would take some time and would require the submission of information from the Management Contractor to the Executive Committee, it was suggested that Bell’s forthcoming financial statement could be used for this purpose. C. Maxwell to W/C L.V. Carver, “Re: Additional Funds – Mid-Canada Line,” 10 July 1956; C.A. Wheatley to C. Maxwell, “Mid-Canada Line – Funds,” 24 July 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

¹⁵⁴ C. Maxwell to R.G. Johnson, “Financial Status – Mid-Canada Line,” 26 August 1956; R.G. Johnson to A/V/M M.M. Hendrick, 21 August 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

bringing the issue to the attention of the Executive Committee before Bell's revised estimates were ready.¹⁵⁵

By September, concern was even more serious within DCL that completing the MCL would soon require additional funds. Wheatley, the corporation's representative with the SEG, underlined the gravity of the situation when he noted that at that point "only fifty-six cents remain available in the F.E. [financial encumbrance]."¹⁵⁶ By early October, Johnson was again being alerted to the impending crisis. Pointing to DCL estimates that had been consistently higher and more realistic than their TCTS counterparts, Maxwell's memorandum noted that

we have maintained that our estimates were as accurate as possible under the circumstances, and invariably the M.C. has ultimately accepted that his estimates have been low and he has had to come up to the figures which we provided. The fact that the DCL Engineers have been able to produce more accurate estimates than the M.C. who has a vast staff available, reflects considerable credit upon our men.

The estimates and the rate of expenditure have been closely watched at Head Office so that adequate warning could be given should funds be running out. Thus, on 24th July, I was informed that the FE [financial encumbrance] was practically all committed, and that an increase would be required. I informed the M.C. and Mr. Wheatley informed the Air Force.

Despite these early warnings, the M.C.'s quarterly forecast of September 6th was grossly inadequate, for example, this forecast quoted a Winisk estimate of \$13,500,000.00 whereas we are now told by the M.C. that the cost at Winisk will be \$18,000,000.00.

Only now, at this late date is the M.C. producing realistic figures to the format requested by the Air Force in August, but in the meantime the expenditures at Dawson Creek and Stoney Mountain have crept up, and, in both cases a claim causing the total to exceed the present contract will be presented to Treasury [Board] on about October 19th.

¹⁵⁵ G/C E.C. Poole, DSEG, to AMTS (through CCE), "Cost Estimate - Mid-Canada Line Project," 29 August 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

¹⁵⁶ C.A. Wheatley to F.T. Shearns, "Mid-Canada Line - Financial Status," 19 September 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

It has so far been impossible to call an Executive Committee meeting to approve a Treasury Board submission requesting an increase in the FE as the M.C.'s estimates were not available (and will not be completely finished until mid-October).¹⁵⁷

As an interim measure, Maxwell suggested the reallocation of funds from one contractor to another to buy time before a revised estimate, expected sometime in mid-October, could be produced by the Management Contractor.¹⁵⁸

Maxwell, Wheatley, and other DCL employees had by now been raising alarms about growing delays and increasing costs, many of them attributed to Bell's plans, estimates, and activities, for some two years. Bell's revised estimate would validate many of these concerns. A September 1956 revised forecast raised the total from \$169 million to \$179 million, with all the increase lying in construction costs. In response to Bell's revised estimate, the RCAF and the Executive Committee overseeing the MCL requested a complete review of the project's costs, and the resultant estimate submitted in early October came to some \$206 million. Additional information was requested from TCTS, and on October 31st the company a more detailed examination of costs produced an estimate of \$203.4 million for construction and \$6.4 million for interim maintenance until the line was completed. As a result of this sudden increase in cost estimates, more frequent reviews were instituted.¹⁵⁹ Looking back on the project in the 1970s, Bell's

¹⁵⁷ DCL Inter-Office Memorandum, C. Maxwell to R.G. Johnson, "Re: Mid-Canada Line Costs," 2 October 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

¹⁵⁸ *ibid.*

¹⁵⁹ Lester, *Special Contract*, 198-199; House of Commons, *Debates*, 8 July 1959, 5697; A.G. Lester to CAS, 6 September 1956; A.G. Lester to CAS, 31 October 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3). Lester's memoir dates the revised estimate to August of 1956, while the September 1956 report to the RCAF is worded in a way that points to the revision taking place in September. The 31 October report from Bell apparently made no mention of the problems and cost increases caused by the delays in the production of plans and specifications because of "violent objections" on the part of A/V/M Hendrick, even though Bell considered it to be a "very vital point". DCL Inter-Office Memorandum, C. Maxwell to R.G. Johnson, Personal & Confidential, "Report from M.C. dated October 31," 8 November 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

Lester noted that “for whatever reason, we stayed with the overall figure of \$169 million too long,” although at the time he argued that a contributing factor was the RCAF’s delay in supplying complete building plans, which were not available until the middle of 1956.¹⁶⁰ Politicians, especially C.D. Howe, were concerned that the costs not increase above \$203 million – Lester later noted that “the emphasis had obviously changed from doing everything possible to meet the target date, to making sure that costs were kept within limits.”¹⁶¹ In the struggle between the control of costs and the meeting of deadlines, it appeared that the former was gaining the upper hand.

Despite Bell’s revised estimate of 31 October, DCL’s personnel at Victoria Island and elsewhere were concerned that costs would climb still higher. Just over a week later, Wheatley was arguing that there were obvious discrepancies in the Bell forecast, the statements made by its senior personnel, and in the Bell estimates that remained below DCL estimates. He noted, rather ominously, that “there are rumblings from both Stoney Mountain and Winisk that the DCL figure won’t be sufficient to complete the job” and concluded that he felt “that there is a serious possibility that the sums now being requested will not be sufficient.”¹⁶² By late December, J.P. Stirling, DCL’s Chief Engineer, noted that a confidential estimate of the cost over-runs was being prepared by two other employees, Graham Lancaster and C.A. Wheatley, who were directly involved with the project and had expressed concerns about Bell’s estimate. In any event, Stirling argued, DCL would have to deal with Bell on the termination of construction contracts

¹⁶⁰ Lester, *Special Contract*, 193; A.G. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum C: Comments on particular points raised by Government representatives at meeting in Ottawa on Sept. 27, 1957,” 8, 29 November 1957, DHH 181.009 (D276), vol.2.

¹⁶¹ Lester, *Special Contract*, 199.

¹⁶² “Report by DCL Victoria Island Office – Mid-Canada Line: Overrun of Costs,” n.d.; C.A. Wheatley to C. Maxwell, “Mid-Canada Line – Costs,” 8 November 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

and the reduction of personnel at sites in the upcoming year, and that “further studies from Mr. Lancaster and Mr. Wheatley may be used to provide ammunition for this purpose.”¹⁶³ Despite DCL’s misgivings, Bell’s quarterly financial estimate submitted to the RCAF in early December outlined expenditures unchanged from the October 31st estimate criticized by Defence Construction personnel.¹⁶⁴

As 1956 drew to a close, concerns about Mid-Canada cost overruns continued to grow. DND, DDP, and DCL met in Ottawa in late December 1956 and in Montreal on 7 January 1957 to discuss the issue.¹⁶⁵ In a mid-January letter to R.G. Johnson, Lester attempted to allay concerns expressed by Johnson and others about construction costs. Lester described the figures suggested by personnel at Victoria Island as “tentative” and argued that they “had not been assessed in detail either by your people or our own.” Johnson’s brief reply made no substantial comments on Lester’s arguments, but Wheatley, DCL’s representative at Victoria Island, left a hand-written annotation of “absolute twaddle” on Lester’s letter, and also forwarded it to Maxwell, arguing that “Mr. Lester’s letter shows how far their heads are in the sand.”¹⁶⁶ A few days later the initial deadline for the Mid-Canada Line to begin operations had passed. While the line west of

¹⁶³ DCL Inter-Office Memo, J.P. Stirling to R.G. Johnson, “Re: Mid-Canada Line Costs,” 20 December 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

¹⁶⁴ A.G. Lester to CAS, 10 December 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

¹⁶⁵ Meetings were held on 28 December, and also appear to have been held on the 27th. G/C E.C. Poole, RCAF/DSEG, “Report on Visit to Mid-Canada Line, January 23-29, 1957,” LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3); A.G. Lester to R.G. Johnson, 16 January 1957; D.B. Mundy, Director, Electronics Branch, DDP, to A.G. Lester, 28 December 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4. A number of other meetings on this issue also appear to have been held at about this time.

¹⁶⁶ A.G. Lester to R.G. Johnson, 16 January 1957; handwritten annotation on same; R.G. Johnson to A.G. Lester, 18 January 1957; comments by C.A. Wheatley on DCL transmittal slip, R.G. Johnson to J.P. Stirling, 12 February 1957, LAC, RG83, vol.1, file 122-7-12-T6-0-4. Lester’s letter makes reference to a December 17 letter from Johnson, and a late November letter from Johnson to Lester also addresses this issue, dealing specifically with the large labour force remaining at Great Whale River. R.G. Johnson to A.G. Lester, “Re: Mid-Canada Line Close Out,” 26 November 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

Hudson Bay and parts to its east went into operation during the month, the line as a whole was certainly not ready. By now, it was both late *and* over budget.

By the start of January 1957, DCL personnel involved in the cost-cutting effort were considering the removal of contracting personnel and their replacement with local contractors, or personnel from the operation and maintenance contract. Further meetings in January that included representatives from Bell reviewed revised estimates that suggested that once again the available funds would not be sufficient. The consensus reached was that cutting off construction at an arbitrary date might well produce unusable sites, while initiating a new request to Treasury Board for additional funding was not a preferred solution. Participants at the meeting suggested a visit to sites along the line in order to examine requirements, the organization of the construction effort, and costs, in order that the available funds be put to the best use.¹⁶⁷ The control of costs was now winning out over the drive to meet deadlines, especially since 1957 had begun and the MCL was not yet operational.

As part of these cost-control efforts, later in January RCAF, Bell, and DCL representatives visited all of the major sites along the line and arranged to defer work on all items that were not immediately essential to the system's operational capabilities. According to a 1959 DND report, the RCAF's goal was to reduce Bell's commitment to the project and to avoid paying additional overhead costs that would result from the company's continued involvement. Remaining construction was dealt with by fixed price contracts under supervision by DCL or in some cases by special RCAF Construction and Maintenance Units (CMUs). At this late stage in the project, DCL was being returned to

¹⁶⁷ C.A. Wheatley to C. Maxwell, "Mid-Canada Line Costs," 2 January 1957; C.A. Wheatley to C. Maxwell, "Mid-Canada Line - Costs," 9 January 1957; J.P. Stirling, DCL, to A/C R.B. Whiting, CCE, RCAF, "Re: Mid-Canada Line - Costs," 14 January 1957, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

its accustomed role in the provision of defence infrastructure. Faced with an undertaking that had exceeded its budget and had not met its deadline for completion, the RCAF sought an expedient solution that would control costs and yield a finished, functioning product as soon as possible. This progressive exclusion of Bell can also be seen as a reassertion by the RCAF of its control of the project. A number of commentators, including Bell's Alex Lester, have noted that the Air Force had always resented Bell's position as management contractor. Shortly after this tour, the RCAF made an offer – accepted by Bell – of additional engineering personnel to help deal with remaining problems at the various sites, while procedures to assign responsibility for the remaining site design work the ever-troublesome Winisk SCS were worked out at a Bell-RCAF meeting in late February.¹⁶⁸

Soon after the tour, the RCAF was urging DCL to take over direction of the contractor at Winisk and Great Whale, which the corporation decided to do if it were asked by the MCL Executive Committee. A memorandum for DCL files noted that the company “will not accomplish any miracles but there may be a considerable saving” and expressed concern that “the danger lies in the M/C [Bell] resisting change and not co-operating in the continuity of shipping arrangements.” Suggested tactics to facilitate such action by DCL were noted, as was the conclusion that “if . . . agreement is not obtainable, it is better to continue “hounding” the M/C and by-passing him in talks with the General Contractors without letting him off the hook.”¹⁶⁹ By late February, DCL had tentative plans for winding up construction contracts at Knob Lake, Bird, Stoney Mountain, Cranberry Portage, and Dawson Creek. DCL would negotiate with the contractors for the

¹⁶⁸ DND, “History of the Mid-Canada Line,” 7.

¹⁶⁹ “Memo to File – Mid-Canada Line,” 8 February 1957, NAC RG83, vol.1, file 122-7-12-T6-0-4.

completion of the items selected during the January visits to the sites. "During these negotiations," a DCL memo noted, "the general contractors will be advised that, failing agreement on a firm price amount, their contracts will be terminated [on certain dates]. . . and that other arrangements will be made to complete work outstanding at these dates."¹⁷⁰

The corporation was, to use a modern expression, willing to play hardball to meet its objectives, be it by "hounding" and bypassing Bell, or by delivering ultimatums to contractors. Senior personnel had apparently been planning for the use of such an approach; in December of 1956, for instance, Stirling had been discussing the gathering of "ammunition" for use against Bell.¹⁷¹ In the meantime, costs continued to rise.

Estimates reached a high point in the March 1957 quarterly review, when it was predicted that construction costs would amount to \$230 million and interim maintenance costs to \$9.8 million.¹⁷² This estimate drew further criticism from the RCAF and DDP and Bell, although accepting some of the criticism as justified, defended itself by pointing to the urgency of the project the increased construction requirements of the Line, and the difficulties of transportation, which was costing far more than had been previously estimated.¹⁷³

As completion of the delayed and increasingly expensive Mid-Canada Line neared, interim and final take-over procedures were created to allow individual elements of the line to be accepted from the various contractors as they were finished. Acceptance involved inspection by the prime contractor, the management contractor, DCL, and the

¹⁷⁰ DCL Inter-Office Memorandum, J.P. Stirling to C. Maxwell, Confidential, "Mid-Canada Line" 21 February 1957, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

¹⁷¹ DCL Inter-Office Memorandum, J.P. Stirling to R.G. Johnson, "Re: Mid-Canada Line Costs," 20 December 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3).

¹⁷² House of Commons, *Debates*, 8 July 1959, 5697; A.G. Lester to CAS, 2, 20 March 1957, DHH 181.009 (D276), vol.2.

¹⁷³ Lester, *Special Contract*, 199-203.

RCAF. In this respect, DCL was playing much the same role as it did with other military infrastructure projects. Once any deficiencies that were noted were rectified, Bell would then take custody of the “units” of construction and occupy and maintain them until DND accepted larger elements of the project.¹⁷⁴ Takeover of facilities along the Line from the construction and installation crews began in the fall of 1956 as various sections were finished.¹⁷⁵ While this process continued, Defence Construction also found itself involved in the writing-off of material on the Bell contracts and the disposal of surplus Crown assets at isolated locations.¹⁷⁶

The western half of the Mid-Canada Line was finished on deadline in January 1957, with the remainder finished later in the year.¹⁷⁷ On 1 January 1958, the line became fully operational – a year behind the desired deadline but interestingly in keeping with the original target date. At its peak, it consisted of 8 Sector Control Stations and 90 unattended Doppler Detection Stations. Its final estimated costs, as noted in the table below, were in the vicinity of \$225 million, although differing figures are in circulation. To give some idea of the transportation costs involved in the project, of this amount,

¹⁷⁴ This stage would be reached once plans, specifications, operating manuals, and other materials had been compiled, at which point the completed portions of the MCL would be turned over to DND “Units” of construction were defined as “a finished building (whilst it is preferable that services be connected, this is not absolutely essential), a finished service or part of a service subject to this part being self-contained and capable of being operated and maintained on its own.” “Mid-Canada Line: Interim Take-Over Procedure for Construction, Draft No.9,” 12 November 1956, 1, 4; “Mid-Canada Line: Final Take-Over Procedure for Construction,” 12 November 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-7 (pt.2). This was the final draft of the procedures. By September 1956 some “units” of the MCL were ready for inspection and the interim take-over procedures had already been under development since at least July of 1956. DCL Inter-Office Memorandum, C. Maxwell to all DCL Zone Engineers, “Interim Take-Over Procedure for Construction,” 13 September 1956; handwritten notes, “Meeting of 30 July,” LAC, RG83, vol.1, file 122-7-12-T6-0-7 (pt.2).

¹⁷⁵ Lester, *Special Contract*, 196. See also C.A. Wheatley to N.J. Smith, 12 November 1956, LAC, RG83, vol.1, file 122-7-12-16-0-7, pt.2.; C. Maxwell to all DCL Zone Engineers, “Interim Take-Over Procedures for Construction,” 13 September 1956, LAC, RG83, vol.1, file 122-7-12-16-0-7, pt.2.

¹⁷⁶ See the extensive correspondence on these issues in LAC, RG83, vol.1, file 122-7-12-T6-0-7, pt.2.

¹⁷⁷ Collins, *A Voice From Afar*; 245; Lester, *Special Contract*, 204-212.

some \$15 million had been required to cover the costs of RCAF helicopters alone.¹⁷⁸ As of the end of September 1959, the revised value of the construction contracts – as opposed to transportation or electronics costs – was \$95,562,623.17.¹⁷⁹ Out of this total, DCL had awarded nine major construction contracts with a total value of over \$90 million, in addition to forty minor contracts for freight delivery, small-scale tractor train operations, and minor local construction worth a total of over \$2.3 million. Finally, some \$1.3 million was made available to TCTS to provide miscellaneous requirements for the contract, including transportation and materials.¹⁸⁰

The MCL as finally completed consisted of eight manned Sector Control Stations spaced some 400 miles apart,¹⁸¹ with ninety unattended Doppler Detection Stations spaced some 30 miles apart placed in between the SCS. Locations for the DDS were chosen in order to meet requirements for the Doppler detection system and the microwave communications linking the various sites. The microwave communications system carried data from the Doppler equipment, telemetry data, and voice communications between the SCS sites. The detection equipment was set up as two separate lines, and the final design involved the linking of alternate stations by the Doppler equipment, resulting in two detection lines some 3 to 6 miles apart in a north-south direction. The equipment was capable of detecting aircraft flying as high as 65,000 feet or as low as 200 feet.¹⁸² Conventional air surveillance radar was also installed at three SCS (Knob Lake, Cranberry Portage, and Stoney Mountain) in order to better

¹⁷⁸ Collins, *A Voice From Afar*, 244.

¹⁷⁹ "Mid-Canada E.W. Line – Financial Condition of Contracts to Date 30/9/59," LAC, RG49, vol.465, file 200-3-4-4-2, vol.1, "Radar Screens – Mid-Canada".

¹⁸⁰ House of Commons, *Debates*, 28 March 1960, 2541-2.

¹⁸¹ From east to west, the eight SCS were located at Hopedale, Knob Lake, Great Whale River, Winisk, Bird, Cranberry Portage, Stoney Mountain, and Dawson Creek.

¹⁸² Lester, *Special Contract*, 59.

identify heavier civilian air traffic through their areas of responsibility.¹⁸³ The eight sites varied in cost from \$7 million to \$24 million each, and one of the sites required the transportation of 10,000 tons of materials over some 400 miles by winter tractor train.¹⁸⁴ Line Clearance Airdromes for local unscheduled bush flights crossing the line were built in western Canada at Fort McMurray, Buffalo Narrows, and Lac Laronge.¹⁸⁵

Rearward communications links for the MCL were provided from Knob Lake, Winisk, Cranberry Portage, and Dawson Creek. Three such links were provided by commercial carriers, while Winisk, far from commercial facilities, required the construction of a tropospheric scatter system with five installations. First used on a large scale in the POLE VAULT project along the Labrador coast discussed in Chapter Two, tropospheric scatter used powerful microwave communications signals bounced off the troposphere, a layer in the atmosphere, to points a considerable distance away.¹⁸⁶ Stretching across James Bay and linking it to the SCS at Great Whale River, the tropo scatter system then ran south down the west coast of James Bay and connected with Bell Telephone's microwave system at Ramore, Ontario, which then provided a connection to the ADCOM system, discussed in Chapter Two, at North Bay, Ontario.¹⁸⁷ Direct links

¹⁸³ *ibid.*

¹⁸⁴ "An Introduction to Defence Construction (1951) Limited," n.d., 7, DCC in-house holding.

¹⁸⁵ Lester, *Special Contract*, 60.

¹⁸⁶ Conventional microwave communications systems, like those used for parts of the ADCOM air defence communications system discussed in Chapter Two, were limited to "line of sight" transmissions. Details of the principles of tropospheric scatter communications are provided in Chapter Two. Frank A. Gunther, "Tropospheric Scatter Communications: Past, Present, and Future," *IEEE Spectrum*, September 1956, 79-82, 91; Lester, *Special Contract*, 20-23. For a concise discussion of some aspects of microwave communications during these years, see Philip L. Cantelon, "The Origins of Microwave Telephony – Waves of Change," *Technology and Culture* 36:3 (July 1995): 560-573.

¹⁸⁷ *ibid.*, 59-60. Initial plans for coverage across the northern end of James Bay had involved conventional radar installations, but these were later replaced by Doppler detection links that included two stations on Bear Island. R.G. Lester to D.A. Golden, 4 December 1957, Appendix 1, "Basic Systems Design: Major Changes from Appendix D of August 27, 1954, Report of Systems Engineering Group," DHH 181.009 (D276), vol.2; Minutes of the 568th meeting of the Chiefs of Staff Committee, 21 September 1954, 4-5; Systems Engineering Group Brief: UHF Scatter, October 1955, appended to CAS to Controller of

rearward from the DEW Line were possible through the POLE VAULT system along the Labrador coast in the east and by ionospheric scatter (a longer range version of tropospheric scatter) from Dawson Creek, Stoney Mountain, and Bird in the west.¹⁸⁸

While the construction of the links was an American responsibility, Bell supervised the construction of the necessary facilities at the SCS sites.¹⁸⁹

These Sector Control Stations were fully equipped bases with permanent staffs of some 150. In addition to receiving, interpreting, and passing signals from the MCL to command and control centres further south, the SCS personnel were also responsible for maintaining the DDS in their station's area of responsibility. In order to meet these duties, its own equipment needs, and the requirements of its personnel, each SCS was

Telecommunications, Department of Transport, 19 October 1955, LAC RG12, vol.2400, file 14-13-8-5 (pt.1). The TCTS' July 1955 progress report also refers to plans for a rearwards communication link to Senneterre, Quebec, although these plans were changed to a link to North Bay – both locations had been proposed as alternate end points for the scatter links from the west side of James Bay at an earlier date. R.A. Cline, Chief Engineer, TCTS, to CAS, 5, 15 August 1955; R.A. Cline, Chief Engineer, TCTS, to CAS, 12 April 1955, 7; R.A. Cline to CAS, 13 June 1955, 9, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1); "Systems Engineering Group Brief: UHF Scatter," figure 1.

¹⁸⁸ Ionospheric scatter systems operate on the same principle as tropospheric scatter systems, but in 1955 offered much longer ranges – some 900 miles as opposed to the 150 miles for the POLEVAULT tropospheric scatter links or the 600 miles for the tropospheric scatter link from Cape Dyer to Thule. At this time, the main limitation of ionospheric scatter systems was the limited number of communications circuits (three to four) possible with the equipment. Fletcher, "Military Radar Defence Lines of Northern North America." A variety of plans for DEW Line rearward communications were discussed, including the use of tropospheric scatter circuits for some links, which caused some concern in the Department of Transport. F.R. Miller, DM/DND to DM/DOT, 29 November 1955, LAC, RG12, vol.2400, file 14-13-8-5 (pt.1).

¹⁸⁹ Lester, *Special Contract*, 60. The facilities were built by MCL contractors, while Canada was reimbursed by the US for a portion of the cost, with the US share at \$347,000 and the Canadian share, which covered foundations and some access roads, at \$200,000. The Canadian contractor invoiced Bell Telephone who had the sub-contract with Western Electric which had the contract with the US government. Western Electric was the design authority. DEW Line rearward communications project summary, n.d., DCC in-house file, "DEW Line Treaty". A number of meetings were held with the Americans on this issue; a TCTS representative met with a senior planner for the DEW Line in April of 1955 to obtain information regarding the coordination of rearward communications, while SEG and TCTS representatives met with USAF and Western Electric representatives in New York at the end of August 1955 to discuss DEW Line rearward communications. R.A. Cline, Chief Engineer, TCTS, to CAS, 9 May 1955, 4; R.A. Cline, Chief Engineer, TCTS, to CAS, 12 September 1955, 4, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1). The possibility of Canadian operation of the rearward communication links was also discussed by Cabinet in 1955; External Affairs appears to have been particularly concerned that Canada be involved in providing the logistic support and rearward communications necessary for the DEW Line. Cabinet Conclusions, 06 July 1955, 4-5; 28 September 1955 6-7, LAC, RG2, series A-5-a, vol. 2658, reel T-12184.

largely self-sustaining in terms of equipment, food, and fuel stores.¹⁹⁰ The more numerous DDS sites were designed for unattended operation, but included basic facilities for visiting maintenance crews and for the personnel necessary for the line's initial set up operations in addition to space for the detection equipment and the diesel generators. Because of variations in the height of terrain and the need for the antennae of the detection and communications equipment to be directly visible to each other, the towers for the Doppler detection and microwave communication equipment at the DDS and SCS ranged in height from some 50 feet to 350 feet. They were the most vulnerable to adverse weather of the MCL's facilities, and as such were designed to withstand winds of 120 miles per hour even when encased in a layer of two inches of ice.¹⁹¹

The completed Mid-Canada Line was a tangible expression of Canadian Cold War concerns. Stretching from the Rocky Mountains in the west to the Labrador coast in the east, the project had used Canadian technology and Canadian private and public sector agencies to erect an important element of the North American air defence network. Driven by apprehensions about Soviet capabilities and intentions – particularly with the advent of the hydrogen bomb and more capable long-range bombers – the MCL was also a response to concerns about American designs for continental defence and their implications for Canada. The MCL allowed Canada to be seen to be “doing its part” in defending the continent while avoiding what the Canadian government feared would be the significant financial entanglements of a joint Canada-US Distant Early Warning Line or US involvement in the Mid-Canada Line. By “going it alone” on the MCL, Canada also guaranteed that the industrial and commercial benefits of the undertaking would go

¹⁹⁰ Lester, *Special Contract*, 61-62.

¹⁹¹ *ibid.*, 60-61.

to Canadian firms; this would not be the case in a joint undertaking. In part, the government's decision appears to have been driven by the early, optimistic cost estimates – at the time of initial Cabinet approval in June of 1954, the figure had been some \$120 million. By the time the MCL was completed some three years later, however, that figure had almost doubled. While the Mid-Canada Line had thus served a number of Ottawa's economic, industrial, and commercial policy goals and objectives, it was no longer quite the bargain it had seemed before.

Faced with the delays and cost overruns of the Mid-Canada Line, the agencies involved, both public and private, sought explanations. In 1959, Minister of Defence Production Raymond O'Hurley provided a report to a Parliamentary committee investigating the issue, and his presentation has since served as the basis for much of the analysis of the Mid-Canada Line construction effort and the problems it faced. O'Hurley attributed the increased costs to a number of factors, including additional buildings (from 120 to 185), increased size of buildings (cubic content increased by 31%), two additional rearward tropospheric scatter communications sites, three additional Doppler Detection Sites, harbour work at Winisk, additional airstrips, fire losses at Knob Lake, extra foundations and access roads. The increased number of sites required a corresponding increase in towers, electronic equipment, generators, and transportation costs. The original estimates also did not include many of the transportation costs incurred by the project, nor did they include the equipment to be left on site in order to allow the RCAF to carry out maintenance or the two years' worth of spares also required. Poor shipping conditions in Hudson Bay and a record cold winter in Eastern Canada were also blamed

for the rising costs. The “crash” nature of the operation, O’Hurley argued, also contributed to increased costs.¹⁹²

The reversion from Mark I to Mark II Doppler detection equipment had led to requirements for more Doppler Detection Sites, which had undoubtedly led to increased costs. Transportation was another major component of MCL expenditures, eventually amounting to some \$42 million of the line’s estimated \$228 million total cost. For many sites, supplies had to be flown in to frozen lakes in wintertime, or delivered by tractor trains over hundreds of kilometers of winter roads. Fuel for the eastern section of the line was delivered by train to Knob Lake, then in the fuel tanks of aircraft to the various campsites where it was siphoned out into drums for storage – a necessary and expedient but decidedly inefficient measure. Shipping conditions in Hudson Bay were also problematic, where wintertime conditions trapped supply ships in the ice; a ship was also crushed and sunk in James Bay one winter.¹⁹³ As O’Hurley noted, early estimates had also not included significant aspects of the construction effort, which only served to make the final cost overruns seem even larger. While the factors he set out certainly contributed to delays and increased costs, his explanation omitted and obscured some of the more fundamental problems that plagued the project. The planning and construction of the Mid-Canada Line suffered from insufficient clarity in the division of responsibilities and authorities between the government and private agencies involved, was hindered by

¹⁹² House of Commons, *Debates*, 8 July 1959, 5697-5698. A letter from Lester to David Golden in December of 1957, proposing an increase in the contractor’s fee for Bell, also pointed to the increase in physical requirements since the 1955 estimates, and furthermore noted the substantial changes that had been made to the basic design of the line since the issuing of the August 1954 report of the Systems Engineering Group. R.G. Lester to D.A. Golden, 4 December 1957, Appendix 2, “Major Changes in Physical Pattern and Items Composing the Line,” Appendix 1, “Basic Systems Design: Major Changes from Appendix D of August 27, 1954, Report of Systems Engineering Group,” DHH 181.009 (D276), vol.2.

¹⁹³ Collins, *A Voice From Afar*, 244-245.

Table 1
Mid-Canada Line Cost Estimates, 1952-1960¹⁹⁴

<u>Date of Estimate</u>	<u>Source of Estimate</u>	<u>Amount</u>
1 December 1952	DRB Report #100/RCAF	\$85.5 million
17 November 1953	DRB Report #101	\$69.7 million
30 June 1954	Cabinet approval	\$120 million
9 June 1955	TB Minute 487704	\$170 million
Nov/Dec 1956	TB approval	\$204 million
May 1957	TB Minute 516986	\$239,782,750
28 Feb 1959	DND report	\$224,566,830
28 March 1960	Ministerial statement	\$227,718,302

competing organizational cultures, lacked adequate project management procedures, and was affected by the pressures on continental defence efforts the Cold War that turned it into a “crash” project.

Almost from its outset, the Mid-Canada Line construction effort suffered from insufficient clarity of responsibility and authority. This confused organization was acknowledged by all of the agencies with significant involvement in the project – DDP, the RCAF, Bell, and DCL. O’Hurley’s 1959 report, for instance, explained that the precise division of responsibilities took some time to determine because the initial plans had assigned almost complete control to the management contractor, but the later

¹⁹⁴ DND, “History of the Mid-Canada Line,” 2; House of Commons, *Debates*, 28 March 1960, 2543. Even in 1960, the final costs were not definitely known; according to Minister of Defence Production Raymond O’Hurley, as of 28 March 1960 the final audits of some DDP prime contracts had not yet been completed, and a reserve allowance of \$500,000 to provide for outstanding liabilities was also included.

revisions had divided it between the four agencies.¹⁹⁵ The Royal Canadian Air Force, however, was less sanguine about the allocation of authorities and responsibilities. The historical digest of the construction of the MCL put together by the RCAF's Systems Engineering Group, for instance, noted that

it may be said in the writing of this building digest, unnecessary emphasis has been placed on the organization and administration of the project, while not sufficient has been recorded about the problems encountered in the actual building and construction of the Line. The reason for this is because there were no real physical building problems which were not well within the ability of the Air Force engineers and contractors to overcome.

By use of modern methods and techniques, the ability to build in the north, all year round, is no longer a problem, once the transportation of materials to the site is organized.¹⁹⁶

The author of the digest also argued that after having read through the official paperwork, he did not support the RCAF's then-current negative conclusion about the management contractor, which he argued, arose mainly out of hindsight, ("a Management Contractor should not have been engaged in the first instance,") but instead reached the more positive conclusion that

any agency heading the project, distinguished by whatever name, should have been accorded facilities permitting control of operation within clearly defined limits of authority and responsibility.... This latter was not the case on the Mid Canada Line where the Bell Telephone Company, as the Management Contractor, tried to carry out their assignment within the most nebulous terms of reference.¹⁹⁷

The digest also noted the development of personal difficulties between the MC and government agencies, especially the RCAF, and attributed much of this to the absence of

¹⁹⁵ House of Commons, *Debates*, 8 July 1959, 5696.

¹⁹⁶ "A Digest on the Building of the Mid-Canada Line," n.d., 45, DHH 181.009 (D266).

¹⁹⁷ SEG, "A Digest on the Building of the Mid-Canada Line," 5-6.

a formal contract document and the differing interpretations of the situation held by each major player.¹⁹⁸

This confused situation, the digest argued, had a detrimental effect on the construction effort, since both the management contractor and the government agencies thought they were in control, but none had a contract document that outlined their areas of responsibility. Professional relationships were affected, and the personality clashes that emerged led to the conclusion that the task would have been better handled without TCTS as management contractor. SEG also criticized DND's administrative control, claiming that RCAF reports and recommendations – including those from SEG itself – had frequently been ignored or put aside in favour of their counterparts from Bell.¹⁹⁹ The construction digest noted that

no criticism is directed towards the MC for pressing his point to carry out his duties as he saw them. Too often, however, personnel appointed by a particular department to settle controversial issues had neither the qualifications nor experience to do so. *In so many of these cases, decisions were made on the basis of "who was right" rather than "what was right".*²⁰⁰

Alex Lester held comparable opinions about strained interpersonal relationships affecting the project. According to him, the MCL was a difficult task in which 35% of his

¹⁹⁸ Bell's interpretation of the situation was that it should have control in keeping with their responsibilities for construction of the MCL, while government agencies wanted to retain authority over the project's direction while leaving responsibility for implementing actions with Bell. *Ibid.*, 6-7.

¹⁹⁹ The digest also argued that inaction on the part of the Minister of National Defence when "official reports of a serious nature telling of extravagance and forecasting further waste" reached his desk undermined morale at SEG, where the staff "felt they enjoyed neither the confidence or support [sic] of their seniors." *Ibid.*, 10-14.

²⁰⁰ *ibid.*, 14. The construction digest's author also argued that any future projects of this sort should be administered from a project control centre intended to facilitate the evaluation of progress and cost, their comparison with schedules and estimates, and provide a general overview of the project. One of the advantages of such an approach, the report argued, was that "controversial issues would also be resolved on the basis of factual presentation, as opposed to personal opinions or hearsay, thus preventing such issues from promoting acrimonious personal exchanges." *Ibid.*, 5.

time was spent in “warding off government people” and 65% in accomplishing his task²⁰¹ He disagreed, however, with the assertion that the delay in a formal contract was the source of many of the construction effort’s problems, arguing instead that the contractual terms themselves were to blame.²⁰² Interestingly, DCL does not seem to have been as bothered by this issue as the other major participants. Most of its criticisms, as has been seen, were of Bell’s project management capabilities and its dealings with the construction contractors. In part, this may have been a result of DCL’s rather limited involvement in the Mid-Canada Line. The corporation had representatives at each of the Sector Control Stations, at TCTS in Montreal, at SEG, and a few others in Ottawa occupied with the project. DCL’s role in the project was comparable to its previous experience in the provision of defence infrastructure, and its actions reflect a focus on this area of expertise. Its preoccupation with these matters may help explain why the corporation and its personnel do not appear to have commented extensively on this particular facet of the MCL’s troubles.

If the Mid-Canada Line construction effort suffered from the unclear division of authorities and responsibilities between the agencies involved, it also encountered problems due to the disjunctures and clashes between organizational cultures of those agencies. While DDP, the RCAF, and DCL had gained experience in working together as a result of the Accelerated Defence Programme, the introduction of the Trans-Canada Telephone System and its agent, Bell, complicated the situation.²⁰³ Government agencies

²⁰¹ Collins, *A Voice From Afar*, 242. Lester made a similar statement in 1957. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum C,” 5.

²⁰² Lester, *Special Contract*, 74.

²⁰³ A 1959 DND report, for instance, argued that that the main lesson to be learned was that “future projects of this magnitude and complexity would be more efficiently and economically handled by utilizing the proven procedures already established between DND, DDP and DCL.” DND, “History of the Mid-Canada Line,” 8.

now had to deal with a private sector firm that was given considerable say in the planning and building of the Mid-Canada Line. The RCAF's Construction Engineering section, Alex Lester argues, was eager to carry out the full job themselves, but the government had decided otherwise, which meant that "they were in the frustrating position of being on the sidelines of this, the biggest post war construction job the Air Force had tackled."²⁰⁴ Bell personnel wanted to demonstrate that they could do the job themselves, and tended to sideline the Air Force personnel as a result, a situation which Lester admits was perhaps unavoidable, but he also notes that "a greater degree of diplomacy could well have been shown by our people."²⁰⁵

The RCAF, not surprisingly, had its criticisms of Bell. The main accusations leveled against the company were that it failed to show sufficient leadership or initiative, that it was not sufficiently flexible in dealing with and accepting RCAF requirements and suggestions, which undermined the customer-supplier relationship, and that Bell's relations with the RCAF and other government agencies had been poor.²⁰⁶ Bell, of course, disagreed with these criticisms. DCL, however, shared the RCAF's opinion of Bell's "rigidity." According to notes kept by Lester, at a September 1957 meeting, company president R.G. Johnson commented "on the rigidity of attitude in our construction organization, and not adequate use of resources of construction contractors."

²⁰⁷ Johnson's comments reflected and were probably prompted by similar statements

²⁰⁴ Lester, *Special Contract*, 5.

²⁰⁵ *ibid.*

²⁰⁶ A.G. Lester, "Mid Canada Line – Performance of Management Contractor, Memorandum C," 5.

²⁰⁷ A.G. Lester, "Comments of Government Departments on Bell Performance on Mid-Canada Construction Contract: Meeting held at Ottawa on Sept. 27, 1957," 4, DHH 181.009 (D276), vol.2.

about Bell's inflexibility made earlier by Claude Maxwell, DCL's representative at the TCTS offices in Montreal.²⁰⁸

The Department of Defence Production had its own, much broader criticisms of Bell, and at a meeting between representatives of the department and Bell officials on 16 September 1957, argued, according to Lester, that Bell had contributed nothing to the management of the contract, had done nothing to save the taxpayer money, and had done little or nothing to expedite the project, charges which Lester dismissed, presenting his own criticisms of government actions in reply.²⁰⁹ As part of his response, Lester argued that Bell had brought a team of skilled engineers and managers to the task, with previous experience on defence work through the POLE VAULT project, which had garnered them commendations for efficiency and timeliness from senior USAF officers.²¹⁰ While Bell personnel, including Lester, gained valuable experience on POLE VAULT, this undertaking was perhaps not as comparable to the MCL as Lester's argument suggests. Given the difference in size of the two projects, Bell had to augment its team to handle the Mid-Canada Line.²¹¹ There was, of course, no guarantee that these employees had any experience comparable to that possessed by Bell's staff.

Bell also presented its own criticisms of the Department of Defence Production and its organizational culture. Given DDP's role as procurement agency, many of Bell's comments focused on government procurement through the department and Bell procurement that had to be authorized by DDP. Lester attributed "a fair part" of the

²⁰⁸ C. Maxwell to R.G. Johnson, 31 January 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

²⁰⁹ A.G. Lester, "Mid Canada Line – Performance of Management Contractor, Memorandum B," 1.

²¹⁰ *ibid.*

²¹¹ In September of 1956, DCL's representative in Montreal noted that despite implications to the contrary, Bell had had to hire personnel to meet the requirements of the MCL project – 132 engineers hired through another company, and "I do not know how many of the Head Office staff." C. Maxwell to R.G. Johnson, Personal & Confidential, "Report on Special Contract Dept., Bell Telephone Co., H.W. Britton to D.B. Mundy," 10 September 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

difficulty encountered in the building of the MCL to “a strong trend towards magnifying minutiae” on the part of DDP personnel, along with the atypical nature of the project.

Lester also explicitly contrasted DDP’s actions with Defence Construction’s. “We were never in trouble with D.C.L.,” Lester noted, “who stationed their Assistant Chief Engineer in Montreal and gave him full power to deal with us. D.D.P. stationed people in Montreal for short intervals, but they never had power of decision.”²¹²

The RCAF’s criticism of DDP was extensive and well documented in SEG’s 1959 construction digest. Its comments largely centered around its handling of contract documents for the MCL and its relations with the management contractor, rather than on DDP’s organizational culture. In a particularly stinging comment that may also have been targeted at DND, however, the report complained that

throughout the whole project too many officials were permitted to have their unqualified opinions and directions implemented only because of their status in the government hierarchy. Not sufficient notice was taken either of the professional experience of the comparatively few qualified engineers on the government staff or the construction know how of the prime contractors.²¹³

DCL did not escape criticism from SEG. The author of the construction digest criticized the corporation for the decision by an unnamed senior DCL official to keep a field report from SEG because it was critical of Bell’s site organization at Site 300. At the instigation of this official, the author’s secretary at Victoria Island, where SEG was located and

²¹² A.G. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum C,” 7. In December of 1956, for instance, DDP proposed setting up a liaison office in Montreal as part of the effort to keep control costs on the line, since the situation had become critical by that point. D.B. Mundy, Director, Electronics Branch, DDP, to A.G. Lester, 28 December 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4

²¹³ *ibid.*, 29. The author of the SEG report was also critical of his group’s leadership for much of the construction phase, complaining that the construction and transportation programme had been under the “virtually under the direction of an RCAF signals officer” (an apparent reference to Air Vice Marshal Hendrick), a situation contrasted with the beginning and end of the project, when the officers responsible for SEG had been engineers with construction experience. *Ibid.*

which had a DCL representative, removed the report from the "IN" tray and returned it to DCL.²¹⁴

Later commentators have also highlighted problems with organizational cultures in blaming the overly complicated government procedures for cost overruns. In the instance of the Department of Defence Production, these are arguably a reflection of what Lester described as its "strong trend towards magnifying minutiae."²¹⁵ The process for choosing diesel engines, for instance, involved 50 requests to tender from the government and the submission of 70 bids, which delayed selection of the manufacturer and delivery of the units from the United Kingdom to such a degree that the first 135 had to be airlifted from the UK to MCL airstrips at a cost of \$2,000 each so that they could be delivered to the sites while the ground was frozen. Additional delays in delivery would have postponed the MCL's initial operating capability by a year.²¹⁶ The DDP's 1959 draft memorandum on the project merely noted that "the early target completion date necessitated air-freight of urgently required equipment including the Dorman diesels airlifted from England."²¹⁷ The department's focus on procedural details in the bidding process had jeopardized the project and added more than a quarter of a million dollars to its costs.

²¹⁴ *Ibid.*, 34. The report is reproduced as part of the construction digest, pages 35-42 (G.W. Lancaster to C. Maxwell, "Re: Report on Progress and Cost at Site 300," 28 May 1956). The working agreement that existed between DCL and SEG included the exchanging of copies of all of the organizations' field reports and reports of visits.

²¹⁵ A.G. Lester, "Mid Canada Line – Performance of Management Contractor, Memorandum C," 7.

²¹⁶ Collins, *A Voice From Afar*, 244-245. Bell's 31 October 1956 revised cost estimate noted that air transport of the diesels had come to \$286,250. A.G. Lester to CAS, 31 October 1956, Table 9, "Mid-Canada Line – Major Items Contributing to Increased Transportation Costs," LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3). A February 1956 memorandum from Lester noted that "in order to meet the winter season requirements, it is proposed to airlift sufficient engines from England during the remainder of February and March. The airlift will probably involve both Air Transport Command and Commercial planes. Arrangements are now being made." A.G. Lester, "Memorandum Showing Status of Certain Key Items Pertaining to Mid-Canada Line as of 20 February 1956," LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

²¹⁷ Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 8.

In a development related to organizational cultures and attitudes, the delayed completion and growing costs of the Mid-Canada Line may very well also have suffered because it was built to too high a standard. A worthwhile observation from mid-1957 – and given the cost overruns short operational life of the Mid-Canada Line, one that curiously does not seem to have often been made since then – was that the project had been overbuilt. In comments prompted by an engineering consultant's defence of foundation plans for the troublesome Sector Control Station at Winisk, the point was made by DND's Assistant Deputy Minister (Construction and Properties) that the engineer had

made a sound case for his foundations – provided & expected these structures to last a hundred years. My contention is that at this stage in the development of the doppler technique we built to too high a standard all the way down the line.

The main operations building and perhaps the hangar and some other key buildings – tanks etc. perhaps required this treatment but in the main they could have set up shop in the Construction Camp and run the line for the first few years at least until the bugs were worked out of the system.²¹⁸

Lester made a similar comment, attributing part of the reason for cost overruns to “elaborate, although sound building design, with in many cases specification of highly specialized and expensive fittings, etc., where standard, cheaper items might have served the purpose.”²¹⁹

²¹⁸ Handwritten note to A/C C.F. Johns on A/C C.F. Johns(?) to R.G. MacNeil, Assistant Secretary, Treasury Board, 6 August 1957, DHH 181.009 (D276), vol.2. Unfortunately, the signature is not clear, but the note was written by someone on a first-name basis with Johns and the consulting engineer, but apparently not by MacNeil.

²¹⁹ A.G. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum B,” 3. This sentiment was echoed by an RCAF member of SEG, who noted after a 12-day visit to sections of the line then under construction that “GP [General Purpose] hutting is very satisfactory as camp accommodation. It might have proven satisfactory for permanent accommodation for all buildings except operations, power plants, heating plants and mess halls.” W/C Carver, SEG/CL, “Conclusions from Report of 12 Day Visit to Sites 400-500-700-800-900-627-630 between 22 Apr and 3 May 1956,” 7 May 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

At a time when defence expenditures were at a postwar high, the possibility that the line was overbuilt should not be surprising – not until the late 1950s did limits on defence spending become evident. Before then, the Accelerated Defence Programme and the funding that followed allowed the military to procure infrastructure and equipment on a scale not seen since the Second World War, in sharp contrast with the parsimony of the immediate postwar years. Cost was no longer always the limiting factor; as C.D Howe, speaking in his capacity as Minister of Defence Production, notoriously informed Parliament in 1952, “if the army decides they want a gold-plated piano, and they send along a requisition accompanied by a certificate of encumbrance, we buy the gold-plated piano.”²²⁰ Howe’s comment was a valid but ill-advised explanation of DDP’s powers and limitations, but may also have revealed some broader attitudes within the organizational culture of the department. As noted below, journalist Arnold Edinborough suggested in 1959 that much of its arrogance may have originated from Howe himself. Claims of Howe’s arrogance, of course, were by then commonplace.²²¹ Unlike some of the other factors, such as the confusing and unclear division of authorities and responsibilities, it is difficult to say how much effect such an attitude – if it had existed at all in the planning of the MCL – had had on the delays and cost overruns. If it had existed, of course, it would certainly not have been helpful.

²²⁰ Originally quoted in an abbreviated form in Bothwell and Kilbourn, *C.D. Howe*, 257. Howe’s original statement was made on 30 May 1952, and was intended to help describe the duties of the Department of Defence Production, and the circumstances where it could and could not intervene in the procurement process. He continued by stating that “if it is a nickel-plated piano we can object, because nickel is a scarce commodity. But as to a gold-plated one, we have no reason to object; we would go and buy it. An impossible situation would arise if the Department of Defence Production challenged the right of the armed services to buy what they said they needed, and for which they provide the financial encumbrance.” *House of Commons Debates*, 30 May 1952, 2781.

²²¹ Arnold Edinborough, “The Administrative Muddle of the Mid-Canada Line,” *Saturday Night* 74:7 (March 28, 1959): 48; Bothwell and Kilbourn, *C.D. Howe*, 330-331.

The importance of planning and scheduling for a large-scale, complex project like the Mid-Canada Line cannot be underestimated, and some of the criticisms levied against Bell included accusations that the company had failed to provide for “slippage” in the delivery of supplies when it put together its construction timetables, and that when “slippage” occurred the consequences were serious.²²² Bell, on the other hand, criticized “the Government people” for failing to make use of or refer to its 1955 implementation plan, which was received with mixed reactions, but Lester also noted that the corporation had not set up a master plan kept up to date through constant revisions. Instead, while a general framework was maintained for reference, detailed plans – which changed constantly with weather, delays in delivery of materials and plans, etc. – were set up for various elements of the job, while key dates were watched in an effort to ensure that they were met.²²³

Today, fifty years after the initial planning for the MCL began, project management is a well-established practice, and a number of systems, including the critical path method, have been developed to facilitate complex construction projects and similar undertakings. At the time the Mid-Canada Line was being planned and built, however, the critical path method and similar planning tools were in their earliest stages of development, and would not be introduced to the construction industry until about 1960; as will be seen in Chapters Six and Seven, DCL would be among the first companies to make use of the critical path method in Canada.²²⁴

²²² Minute, SEG/PS to All SEG Staffs, 22 June 1956, on A.G. Lester to CAS, 19 June 1956, LAC, RG83, vol.1, file 122-7-12-T6-0-4.

²²³ A.G. Lester, “Mid Canada Line: Performance of Management Contractor – Memorandum C,” 4.

²²⁴ James M. Antill and Ronald W. Woodhead, *Critical Path Methods in Construction Practice*, 4th ed., (Toronto: John Wiley & Sons, 1990), v, 1-2; James J. O’Brien, *CPM in Construction Management*, 3rd ed., (Toronto: McGraw-Hill, 1984), 5-9. On DCL and the introduction of CPM to Canada, see Ben Dworkin,

The planning methods that were used for the MCL suffered from limitations that played a part in the problems experienced by the project. Devices like horizontal bar charts appear to have been extensively used for the scheduling and co-ordinating of the MCL's various transportation, building, and supply requirements, as well as recording the progress of construction.²²⁵ Unfortunately, such tools had some significant limitations. One textbook on CPM argues that "the bar graph is limited in what it can retain. In the preparation of a bar chart, the scheduler is almost necessarily influenced by desired completion dates, often actually working backward from the completion dates. The resultant mixture of planning and scheduling is often no better than wishful thinking."²²⁶ This comment is an almost uncanny echo of a September 1956 comment about Bell's planning and scheduling from DCL's representative at with SEG, C.W. Wheatley: "This latest schedule continues to present the same optimistic picture where all programming and timing appear to be reckoned from the target date by reshuffling and condensing the work to fit into the time still available."²²⁷ The absence of more capable project management techniques, coupled with Bell's failure to keep an up-to-date master plan, undoubtedly contributed to the problems experienced in building the Mid-Canada Line. Given the significant problems with the division of responsibilities and authorities, however, the limited availability of project management tools was probably not the most

"Ottawa Today: Defence Construction Limited," *Daily Commercial News and Building Record*, 21 April 1965.

²²⁵ A report on a January 1957 visit to MCL sites, for instance, discussed "bar charts" for the scheduling of work and predicting of deadlines. G/C E.C. Poole, RCAF/DSEG, "Report on Visit to Mid-Canada Line, January 23-29, 1957," 11, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (vol.3). A number of bar charts survive in remaining documentation

²²⁶ O'Brien also notes that "the bar chart often suffers from a morning-glory complex: It blooms early in the project but is nowhere to be found later on.... Most specifications require the submission of a schedule in bar-graph form by the contractor soon after the award of the contract. When the project begins to take shape in the field, the early bar-chart plans become as useful as last year's calendar because the bar graph does not lend itself to planning revisions." O'Brien, *CPM in Construction Management*, 2, 4.

²²⁷ DCL Inter-Office Memo, G.W. Lancaster to C. Maxwell, "Re: Comments on Construction and Equipment Schedule," 11 September 1956, LAC, RG83, vol.2, file 122-7-12-T6-0-10.

serious obstacle to the completion of the MCL or the most important cause of delays and cost overruns, but it cannot have been helpful.

Finally, the haste with which the Mid-Canada Line was undertaken contributed significantly to its delays and cost overruns. While the line had originally been scheduled to begin operation by the end of 1957, the decision in June of 1954 to move the deadline forward a year had profound and lasting consequences.²²⁸ Not only did the original programme of development, testing, and construction have to be condensed, but the limited time available also led to substantial changes to the equipment being considered for the MCL. Originally, the Mark II version of the Doppler detection equipment was to have been used. The revised schedule, however, meant that insufficient time was available to adequately develop this equipment, and the decision was made in January of 1955 to revert to its Mark I predecessor.²²⁹ This move had profound consequences. The sites originally chosen for a system based on Mark II equipment were unsuitable for a replacement using Mark I – the former had a single line of installations, while the latter required two separate lines of stations.²³⁰ Not only did new locations for the Doppler Detection Stations have to be selected, but to further complicate and delay matters, DRB was not able to confirm that the stations could be spaced 60 miles apart until May of 1955. Prior to that time, planning had to be undertaken on the assumption that DDS sites might have to be located at 40 mile or at 60 mile separations.²³¹ The delay in selecting the

²²⁸ Minutes of the 564th meeting of the Chiefs of Staff Committee, 28 June 1954, 1-2.

²²⁹ Minutes of the 568th meeting of the Chiefs of Staff Committee, 21 September 1954, 4-5; Lester, *Special Contract*, 57-58; R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 1, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

²³⁰ Ambassador in United States to SSEA, Despatch 1723, "Meeting of Consultation with United States Officials on September 24, 1954," *DCER*, vol. 20, 1100.

²³¹ R.A. Cline, Chief Engineer, TCTS, to CAS, 12 February 1955, 1, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1); DND, "History of the Mid Canada Line," 5; R.A. Cline to CAS, 4, 9 May 1955; R.A. Cline to CAS, 1, 13 June 1955, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.1).

detection equipment and determining its appropriate spacing reverberated through the project, leaving precious little time to meet the January 1957 deadline.

The hastened schedule for the completion of the MCL also acted synergistically with the challenges of transportation and construction in a northern environment. Opportunities for the transportation of supplies, construction materials, and equipment were constrained by the spring thaw or fall freeze that prevented both ocean and tractor train operations, often leaving airlift as the only option. While air transportation was widely used for the construction effort, particularly in the mountainous terrain east of Hudson Bay, the compressed schedule for the MCL meant that any significant interruption of transportation or construction – epitomized by the range of problems suffered at the Sector Control Station at Winisk – would create a situation where only heroic and expensive measures such as the use of air transport on a much larger scale than originally planned could rescue the situation.²³² While the problems caused by the accelerated schedule were significant, on their own they might not have been sufficient to bring about the considerable delays and cost overruns that plagued the Mid-Canada Line. The confused division of authorities and responsibilities, the disjunctures between organizational cultures, and the absence of truly effective project management tools

²³² At Winisk, problems with the landing of supplies from the annual sealifts and difficulty in establishing adequate foundations and drainage had compounded the normal challenges of northern construction. In the summer of 1955, DCL notified the RCAF that the sealift to Winisk had delivered far less cargo than was required – by early October of that year, only some 1,500 tons of the 12,000 tons that was a minimum requirement had been landed, at an average of some 27 tons per day under hazardous conditions that had led to the loss of a barge and the death of one worker. Later accounts would bluntly describe the 1955 sealift to Winisk as “unsuccessful.” See “A Digest on the Building of the Mid-Canada Line,” n.d. but mid-November 1957 or later, 20-24, DHH 181.009 (D266). Both Lester and Arnold Edinborough also make reference to this situation. Lester, *Special Contract*, 205-206. Lester also describes the RCAF idea for a winter airlift of materials and equipment into Winisk and Great Whale River in order to finish the job earlier than might otherwise have been possible as a “sound, though expensive, move.” A.G. Lester, “Mid Canada Line – Performance of Management Contractor, Memorandum B: Comments on General Criticism made by D.D.P. Officials at September 16, 1957 Meeting,” n.d. but possibly 29 November 1957, 4-5, DHH 181.009 (D276), vol.2.

helped produce an environment where interpersonal conflicts, a breakdown in communications, and after-the-fact mud-slinging were used to help explain why the Mid-Canada Line was late and drastically over budget.

In the Public Eye

The Mid-Canada Line's problems and cost overruns did not fail to gain public attention. A.G. Lester notes in his memoirs that of the articles on the MCL, "the most critical, though badly distorted as to fact, was the two part series by Arnold Edinborough in Toronto Saturday Night in March 1959. The burden of his criticism was waste, confusion of command, and frustration of Government Departments, contractors, and of Special Contract itself."²³³ The articles to which Lester refers, Arnold Edinborough's criticisms of the Mid-Canada Line, were published in *Saturday Night* magazine in March of 1959. The author had access to classified official documents, including the SEG construction digest, from which he quoted extensively.²³⁴ Edinborough's primary argument was that at least thirty million dollars could have been saved in the construction of the MCL. He laid much of the blame for these overruns on the confused and conflicted authorities assigned to the agencies – both governmental and private – involved in the process.²³⁵ The construction of the line, he argued, was far more expensive than it need have been, and

²³³ Lester, *Special Contract*, 48.

²³⁴ Arnold Edinborough, "A Story of Waste on the Mid-Canada Line," *Saturday Night* 74:6 (March 14, 1959): 9-13, 49; Edinborough, "Administrative Muddle," 9-11, 48. Edinborough used direct quotations from a number of documents. Copies of the documents he appears to have used can be found as: SEG, "A Digest on the Building of the Mid-Canada Line," 1959, 1-2, DHH 181.009 (D266); Memorandum, SEG/CL2 to C/Co-Ord, "Report on TD to Cranberry Portage, Stoney Mountain, Dawson Creek, and The Pas," 24 July 1956, 3, DHH 181.009 (D276), vol.1; and especially W/C L.V. Carver, SEG/CL, "Report of 12 Day Visit to SCS Sites 400-500-700-800-900 and DDS Sites 627 and 630 During Period 22 Apr to 3 May 56, DHH 181.009 (D276), vol.1. Additional statements by Carver about his visit can be found in W/C Carver, SEG/CL, "Conclusions from Report of 12 Day Visit to Sites 400-500-700-800-900-627-630 between 22 Apr and 3 May 1956," 7 May 1956, LAC, RG83, vol.9, file 122-7-12-T6-0-8 (pt.2).

²³⁵ Edinborough, "A Story of Waste," 9-10.

the blame lay with “the lack of proper supervision occasioned by the peculiar fashion in which authority for construction of the line had been apportioned.”²³⁶

While the absence of a formal contract document until late in the project was one of Edinborough’s explanations for the problems on the line, the confusing administrative structure and the involvement of a large number of departments and agencies was also blamed, and he referred to “inter-departmental muddle and wasteful animosity...which led to tape recordings of executive committee meetings being wiped clean by the secretaries after the edited version of what had gone on had been written.”²³⁷ Perhaps because of the limited mention made of DCL in the documents that were leaked to him, Edinborough’s report makes little mention of the company or of its concerns during the building of the Mid-Canada Line.²³⁸ Edinborough – who may not have understood DCL’s role or been aware of its early and accurate warnings about organization, deadlines, and cost overruns – also claims that the involvement of DCL served to further complicate matters.²³⁹

Edinborough’s final criticism was that the expenditure of money on the MCL had apparently left Canada without the money for interceptors – he pointed to the Avro Arrow, only recently cancelled – or the civil defence network that could be alerted by the Distant Early Warning, Mid-Canada, and Pinetree Lines.²⁴⁰ In some ways, his last point was wishful thinking, since by the mid-1950s, even the Canadian government was acknowledging that the primary purpose of the radar lines was to alert the USAF’s

²³⁶ *ibid.*, 49.

²³⁷ Edinborough, “Administrative Muddle,” 48.

²³⁸ While the identity of the documents quoted by Edinborough can be established with some certainty, it is not clear which other documents – if any – were leaked to him. The limited comments on DCL suggest that he did not have access to many, if any of the company’s documents, or that if he had, he failed to make use of them in his articles.

²³⁹ Edinborough, “Administrative Muddle,” 10.

²⁴⁰ *ibid.*

Strategic Air Command so that its bombers would not be caught on the ground by a Soviet attack. Defending against any such attack took a back seat to maintaining the means to deliver US nuclear retaliation.²⁴¹

Robert Collins, a later commentator on Bell and the MCL, notes that Edinborough's article was based on a memorandum from an RCAF advisor with added marginal notes from Bell's Lester, which included a claim that "this whole report can be construed as a monument of Air Force impertinence and harmful interference."²⁴² Collins also argues that although Edinborough's articles in *Saturday Night* "lacked a full appreciation of the northern conditions, and leaned heavily upon one set of allegations (many of which were later refuted) he made a valid point: haste and divided authority had caused an estimated \$30 million worth of waste."²⁴³ While Rens' history of the telecommunications industry in Canada contains an inaccurate account of the building of the MCL, as mentioned above, it makes no mention – except perhaps very obliquely – of Edinborough's article.²⁴⁴

Edinborough, while working with limited information, drew some important and reasonably accurate conclusions. As Collins notes, the confused division of authorities and responsibilities, and the accelerated deadline for the project, had contributed to delays and cost overruns. Edinborough also highlights the acrimonious relationship

²⁴¹ See, for instance, McLin, *Canada's Changing Defence Policy*, 28; House of Commons, *Debates*, 1956 (V) 5208-5211; Canada, Department of National Defence, *Report on National Defence*, (Ottawa: Queen's Printer, 1957), 24. Edinborough's autobiography makes a brief reference to these articles, describing them as "an investigative piece on the waste in constructing the DEW line [sic], material for which had been leaked to me after a casual conversation in the men's room of the Royal York Hotel in Toronto. This prompted the government to make noises about prosecution under the Official Secrets Act." Given that at least one of the documents in question was classified "Secret", this was perhaps not surprising. Arnold Edinborough, *Arnold Edinborough: An Autobiography*, (Toronto: Stoddart, 1991), 131.

²⁴² Quoted in Collins, *A Voice From Afar*, 245.

²⁴³ *ibid.*

²⁴⁴ Rens, *The Invisible Empire*, 229-233.

between the various agencies, and while not explicitly describing it as such, notes the organizational cultures and the problems they caused, focusing on DDP and the Department of Transport for being more concerned about communication procedures instead of taking prompt action on problems. As noted above, Edinborough also suggested that much of DDP's arrogance may have originated from Howe, who at the time of many of the problems with the MCL was engaged in the parliamentary debates about the Trans-Canada Pipeline.²⁴⁵ Given his limited access to sources, Edinborough did succeed in identifying some of the problems affecting the MCL, and bringing them to the public's attention. Prior to these articles, it appears, relatively little was written about the delays or cost overruns on the Mid-Canada Line.

In drawing public attention to these issues, the articles produced a small flurry of inter-departmental correspondence. DND's Assistant Deputy Minister for Construction and Properties sent a briefing note to the minister in mid-March of 1959 following the first article, briefly outlining the responsibilities of the RCAF, DDP, and DCL, and noting that "if any questions are raised in the House on this article, they should be directed to the Minister of Defence Production, as most of the allegations are directed at the contractual arrangements between D.D.P., D.C.L. and Bell and at the results which flowed from those arrangements."²⁴⁶ As one of the agencies involved in the construction of the MCL, DCL was involved in the bureaucratic process responding to Edinborough's allegations, and the company's Secretary produced an internal memorandum discussing Lester's claims and their significance for DCL. In his report, N.J. Smith, DCL's Secretary, concluded that "the article does not contain any derogatory remarks about

²⁴⁵ *ibid.*, 48.

²⁴⁶ A/C C.F. Johns, ADM(Construction & Properties)/DND to MND, "Article "Saturday Night," March 14th, 1959," DHH 181.009 (D276), vol.2.

D.C.L. or its activities,” but did note that since the articles used construction reports, the public might infer that the company was to blame for delays and increased costs. A detailed discussion of these claims was provided, including observations about a number of interpretations and assumptions made by Edinborough that Smith argued were inaccurate or simply incorrect. In a number of cases, the memorandum made it clear that DCL was either not responsible for construction problems outlined in the articles, or that reports of proposals made but not approved during the construction effort had been misinterpreted as actions actually taken.²⁴⁷

In late April a memorandum on the MCL was drafted for submission to the Ministers of National Defence and Defence Production, and DCL president R.G. Johnson was asked for the company’s comments on and approval of the document.²⁴⁸ DND wanted DDP to act as “general spokesman” if questions were asked about the project, although it did prepare a condensed history of the MCL construction effort setting forth National Defence’s views that would be used if the department was asked about the Line.²⁴⁹ Ultimately, the articles led to questions asked of Defence Production by the House supply committee, in reply to which Minister of Defence Production Raymond O’Hurley delivered a statement based on these memoranda. While factually accurate, it

²⁴⁷ DCL Inter-Office Memo, N.J. Smith, Secretary, to R.G. Johnson, “Mid-Canada Line Costs – Saturday Night Magazine, March 14, 1959.” 7 April 1959, DCC in-house file 011-5, “Information – Historical – Mid Canada Line”.

²⁴⁸ D.B. Mundy, Director, Electronics Branch, DDP, to A/C C.F. Johns, ADM (Construction Engineering & Properties), DND, 21 April 1959, DHH 181.009 (D276), vol.2; W.H. Huck, ADM/DDP to R.G. Johnson, 28 April 1959; Draft Memorandum, “The Mid-Canada Early Warning Line,” 28 April 1959, DCC in-house file 011-5, “Information – Historical – Mid Canada Line”.

²⁴⁹ Memorandum, A/C R.B. Whiting, CCE, to AMTS, “Mid-Canada Line History,” 25 March 1959, DHH 181.009 (D266).

not unsurprisingly played down many of the problems and points of conflict that had plagued the project.²⁵⁰

Operation and Maintenance

In the meantime, the Mid-Canada Line had begun operation. While the line was functioning and largely ready for RCAF occupation by the start of 1958, a number of final details required attention prior to its takeover by the military. A March 1958 meeting convened by the Department of Defence Production to deal with these matters covered the disposal of surplus materials from the construction effort, auditing and accounting, as well as the actual final acceptance and close-out of construction work on the line. The RCAF was prepared to accept the MCL on or about 31 March, with any remaining deficiencies to be the responsibility of the operation and maintenance contractors. "As-Built" drawings of the line were also to be provided to the RCAF by the Canadian Marconi Company and Bell Telephone Company, who jointly held the interim operation and maintenance contract. Minutes of the meeting noted that remaining deficiencies were to be handled by Bell and Marconi and that DDP would provide additional funds for this purpose if necessary, and equipment modifications and site cleanup were in fact carried over to the maintenance contracts.²⁵¹ Such an approach had been suggested earlier. As noted above, the RCAF had sought to reduce Bell's existing commitments to the construction effort as a cost-saving measure, using new contracts let through DCL or even the air force's own construction and maintenance units to deal with

²⁵⁰ House of Commons, *Debates*, 8 July 1959, 5693-5699. See also *Debates*, 9 July 1959, 5765, and 28 March 1960, 2541-2543 for more questions and answers about the construction of the MCL.

²⁵¹ "Minutes of a Meeting Held at the Department of Defence Production, Conference Room, March 14, 1958, 10:30 A.M." 2-3, LAC, RG83, vol.1, file 122-7-12-T6-0-7, pt.2; Draft Memorandum, "The Mid-Canada Early Warning Line," 1959, 6, DHH 181.009 (D266).

any work left incomplete.²⁵² Handling these tasks through the operation and maintenance contractors formed part of such an approach, and may also have allowed this work to be carried out using different funds than those allocated to the MCL construction effort. If so, it represented a pragmatic approach to minimizing the real and perceived costs of building the Mid-Canada Line.

The use of civilian contractors for the operation and maintenance of the line represented yet another pragmatic element of the Mid-Canada Line project. At an early stage in construction, the military and government decided that while operation and control of the line, which included the identification and control of aircraft, the assessment of alarms, and the issuing of warnings, should be a military responsibility, the service, maintenance, and logistics of the line should be undertaken by civilian contractors in order to relieve the RCAF of administrative duties and to avoid having to increase its personnel ceilings. A Cabinet Defence Committee meeting on 27 September 1955, decided that “servicing, technical functioning, maintenance and logistic support” be undertaken by a civilian contractor, with the RCAF prepared to take over “should the contractor not prove equal to the task,” a condition which reflected RCAF concerns. Cabinet approved this decision the following day.²⁵³

Due to the ceilings on RCAF personnel strength and the service’s operational commitments elsewhere, civilian maintenance of and logistical support for the Mid

²⁵² DND, “History of the Mid-Canada Line,” 7.

²⁵³ While the Chiefs of Staff recommended such a course of action to the Cabinet Defence Committee, considerable debate had been required to deal with RCAF doubts about the ability of a civilian contractor to fulfill its role, and as a result CDC was advised of the Chiefs’ apprehensions about the capabilities of any civilian organization assigned this task. Minutes of 581st meeting of the Chiefs of Staff Committee, 22-23 June 1955, 4-5, Minutes of 582nd meeting of the Chiefs of Staff Committee, 20 September 1955, 4-5, DHH 73/1223, series 3, box 62, file 1308A; Minutes of 106th meeting of the Cabinet Defence Committee, 27 September 1955, 4-5, DHH 73/1223, series 3, box 65, file 1329; Record of Cabinet Decision, Meeting of September 28, 1955, DHH 73/1223, series 3, box 66, file 1338.

Canada Line represented a sensible and pragmatic solution. Comparable arrangements had also been adopted for the POLE VAULT communications link along the Labrador coast and for the Distant Early Warning Line.²⁵⁴ The Trans Canada Telephone System and Canadian Marconi were awarded the initial operation and maintenance contracts, but TCTS was not interested in the contract after the initial two-year period had ended on 31 March 1959.²⁵⁵ Bell's area of responsibility on the line was subsequently taken over by Canadian Aviation Electronics (CAE), which had apparently also been involved in MCL maintenance work since 1957.²⁵⁶ The contracts were renewed on a regular basis; in 1962, Canadian Marconi was still responsible for the eastern sector, and was also required to maintain a training facility in Montreal, and was to work in conjunction with CAE to provide engineering services.²⁵⁷

In addition to meeting Ottawa's defence policy goals by supporting the Mid-Canada Line, the operation and maintenance contracts were also intended in part to help fulfill another goal: the supporting of a Canadian electronics industry. Explicit measures were taken in pursuit of these objectives. At the request of the Department of Transport,

²⁵⁴ Lester, *Special Contract*, 190; R. MacLeod, Manager, Special Services Division, CM, to Secretary, DDP, attn. Mr. J.S. Brown, "Re: Proposal 63-ROZIZ-R-001, Removal of Old Polevault Equipment," LAC, MG28 III 72, vol. 101, file "Miscellaneous Tenders – SSD, Part 1," 1959-1963; Bruce-Briggs, *The Shield of Faith*, 139.

²⁵⁵ Memorandum, CAS to MND, "Maintenance of the Mid Canada Line," 24 October 1958, DHH 181.009 (D276), vol.2. The interim maintenance contract dated 29 January 1957 along with subsequent amendments can be found in LAC, RG83, vol.1, file 122-7-12-T6-0-7 (pt.2); Lester, *Special Contract*, 208. In his memoirs, Lester notes that "neither Bell nor the other Trans Canada companies had any desire to be permanently in the maintenance contracting business." *Ibid.*, 213. Bell expressed interest in the MCL again in the early 1960s, but this time as a system that could be modified to form part of a trans-Canada route for civil and military communications. This optimistic proposal was dismissed by the government as an impractical use of the existing MCL facilities, which were not suitable for the operation and maintenance of high-quality voice communications channels. See correspondence from August 1961 to March 1962 in LAC, RG12, vol. 2400, file 14-13-8-5 (vol.3).

²⁵⁶ *ibid.*; DM DND to DM DoT, "Use of Mid Canada Early Warning Line Facilities by other than the Department of National Defence," 18 December 1961, DHH 181.009 (D276), vol.2.

²⁵⁷ Marconi Agreement between DDP and Canadian Marconi, 1 June 1962, DCC in-house file 122-7-12-T6. Canadian Marconi Corporation records on the operation and maintenance contract can be found in LAC, MG28 III 72, vol. 103. Marconi's contract included the DDS, Line Clearance Aerodromes, MCL rearward and DEW scatter communications sites, re-supply marshalling areas, lake head sites and airstrips.

the Department of Defence Production excluded Canadian National Telegraphs from the tender calls for operation and maintenance contracts. Transport wanted to prevent this Crown corporation, which was also a common carrier, from competing with the electronics industry for maintenance work that largely involved electronic equipment unless other common carriers were also invited to submit tenders.²⁵⁸ Such an exclusion, of course, would arguably have served the purposes of DDP; one of the department's motivations in supporting the MCL, after all, had been C.D. Howe's interest in obtaining benefits for Canadian electronics firms. Even after its completion, the MCL continued to serve Ottawa's policy goals, but by that time Defence Construction Limited was no longer involved with the undertaking.

The End of the Line

By January of 1961 some of the Mid-Canada Line's equipment was being removed as surplus to operational requirements. Search radars used to monitor civilian air traffic crossing the line had been removed from the Sector Control Stations at Knob Lake, Cranberry Portage, and Stoney Mountain.²⁵⁹ The warning time provided by the MCL shrank as aircraft speeds increased, and in a time of limited defence budgets it became harder to justify the expense of its operation.²⁶⁰ This was especially the case since the successful Soviet testing of the first intercontinental ballistic missile (ICBM) in late 1957 presented the line with an attacker it could not detect and called into question the seriousness of the Soviet bomber threat and the need for extensive systems to detect

²⁵⁸ W.H. Huck, ADM/DDP to J.R. Baldwin, DM/DOT, 2 October 1958, LAC, RG12, vol. 2400, file 14-13-8-5 (vol.3).

²⁵⁹ See January 1961 correspondence in LAC, RG12, vol.2400, file 14-13-8-5, vol.3.

²⁶⁰ Fletcher, "Military Radar Defence Lines of Northern North America".

and defend against such attacks.²⁶¹ The need to reduce expenditures and free up funds for other RCAF purposes was also a contributing factor. In the early 1960s, the annual operation and maintenance costs for the line were about \$15 million. Parts of the eastern and western extensions of the MCL were closed in early 1964, including the SCS at Bird, Cranberry Portage, Stoney Mountain, and Dawson Creek, while the western DDS and a few eastern DDS were also shut down. The remainder of the line was closed in April of 1965.²⁶² With the exception of some facilities at a few Sector Control Stations, the Mid-Canada Line was abandoned in place. The Doppler masts were toppled to remove the danger to aircraft, while the individual detection stations were padlocked and left to the bush and muskeg.²⁶³

In the years that followed, the Mid-Canada Line largely disappeared from Canadian public awareness, although more recently attention has turned to addressing the toxic legacy created when many of the line's facilities were abandoned in place in 1965. After a short crash construction programme at the height of the Cold War in inhospitable terrain and climate and using a process plagued by divided responsibilities, personality

²⁶¹ Steve Zaloga, *Target America: the Soviet Union and the strategic arms race, 1945-1964*, (Novato, CA: Presidio Press, 1993), 143-145; *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 46-49. The consequences of the introduction of the ICBM for continental defence and DCL are discussed in Chapter Five.

²⁶² "Report on Meeting to Review Mid-Canada Line as a Possible Transcontinental Competitive Communications System," 25 August 1961; DADSL, "Aide Memoire on Closing the Eastern & Western Portions of the Mid-Canada Line," 7 January 1964; CAS to ADM(Air)/DOT, "Telecommunications – Frequencies – Mid Canada Line – Cancellations," 19 May 1964, LAC, RG12, vol. 2400, file 14-13-8-5 (vol.3).

²⁶³ Minimal work was undertaken to dismantle abandoned sites. While documentation of the actual shutdown and abandonment procedures has not been found, minutes of meetings held to plan the close down of the MCL suggests that economic considerations played a major role in what was to be done with respect to removal and abandonment of equipment. "Minutes of a Second Conference held in AMTS Conference Room "B" Building at 1500 Hrs 18 Dec 63 to Discuss the Close Down of Parts of the MCL," 15 January 1964; DADSL, "Aide Memoire on Closing the Eastern & Western Portions of the Mid-Canada Line," 7 January 1964, LAC, RG12, vol. 2400, file 14-13-8-5 (vol.3). Some questions about other possible uses for the facilities can be found in House of Commons, *Debates*, 1964 to 1965, *passim*.

clashes, and cost overruns, the Mid-Canada Line operated for less than a decade before it was shut down and quickly faded from the national consciousness. It deserves attention, however, because of its political, engineering, and military significance to the postwar RCAF and to postwar Canada as a whole. An integral part of any such examination must include an assessment of the role played by DCL.

As with earlier projects, Defence Construction Limited played an active role in the construction of the Mid-Canada Line, but the decision by the Department of Defence Production to introduce a management contractor in the form of the Trans Canada Telephone System changed the scale and form of DCL's involvement. This involvement, while perhaps less direct than in other undertakings, did not prevent DCL from playing a significant role in the building of the MCL. Most notably, DCL's supervisory and senior administrative personnel, who made up by far the largest part of the company's commitment to the project, appear to have been among the first people, if not actually *the* first people, to recognize the potential problems caused by the unclear division of responsibilities and authorities, as well as the dangers of rising costs and missed deadlines, arguably acting as a vigilant eye for the public interest. Such concerns were well founded, as the rise in costs from the initial estimates in 1954 to the final statements in 1960 and the missed deadlines for the start of operations demonstrated. Unfortunately, while DCL personnel were able to identify these problems in a timely manner, they appear to have been unable to bring sufficient influence to bear within Ottawa to adequately address them. While factors that included transportation problems, difficult terrain, and unfavourable weather contributed to the cost overruns and delays, the unclear division of authorities and responsibilities between the government and private sector

agencies involved, the clash and consequences of organizational cultures, the absence of effective project planning techniques, and the accelerated deadline for the line's completion were undoubtedly the greatest contributing factors to the delays and rising costs that plagued this project.

While Defence Construction Limited was involved with the Mid-Canada Line, as discussed in this chapter, and projects that formed part of the Accelerated Defence Programme elsewhere in Canada, as discussed in the previous chapter, the company also found itself playing a more limited role in the construction of the Distant Early Warning Line in Canada's far north. An examination of this subject, as well as more extensive discussions of DCL's involvement in other American military projects in the Canadian north, including the construction of refueling bases for the nuclear-armed bombers of the United States Air Force's Strategic Air Command, will be the focus of the next two chapters.

Chapter 4
A Far Northern Rampart:
The Distant Early Warning Line, 1953-1960

My impression is that the Americans, both in the U.S.A.F. and in the civilian group are quite conscious of Canadian rights in this field and therefore take the terms of the draft more seriously than we might have expected. Under the circumstances I think we should take advantage of every opportunity for Canadian industry and Canadian engineers which this attitude affords....

DCL President R.G. Johnson, 1954¹

If any undertaking epitomized the military aspects of the Cold War in 1950s North America, it was quite arguably the Distant Early Warning, or DEW, Line. Built in a few short years and at astronomical cost in the uncompromising climate of the Arctic, the DEW Line reflected both the technological capabilities of its builders and their fears about the technological capabilities of the Soviet Union. Ultimately stretching from the western tip of the Aleutian Islands in Alaska, across the northern coast of the Alaskan and Canadian mainlands, through Canadian Arctic islands, and then across the Greenland icecap, the DEW Line was a monumental undertaking designed to provide hours of early warning in the event of an attack by Soviet bombers. The fears that such aircraft, armed with tremendously destructive hydrogen bombs, could strike a devastating blow to North America, ultimately persuaded Canada and the United States to agree to the expansion of continental defences, including the DEW Line and the Mid-Canada Line (MCL) discussed in the previous chapter.

As the story of the Mid-Canada Line illustrates, however, the Canadian government was concerned about the tremendous expense that an arctic warning line would entail. As a result, Canada decided to “go it alone” with the MCL, in part to

¹ R.G. Johnson to D.A. Golden, 4 November 1954, DCC in-house file (DEW diplomatic).

restrain expenditures on continental defence. Consequently, the DEW Line, including the portion built on Canadian territory became an undertaking that was paid for and carried out by the United States. Ottawa, however, making use of the United States' concerns and sense of urgency about the project, managed to obtain conditions in the exchange of notes governing the DEW Line that dealt with a wide range of Canadian concerns and policy goals, including Arctic sovereignty, the region's Inuit population, natural resources, construction conditions, and the provision of equipment and electronics. While not all of these met with unqualified success – the provision of equipment and electronics proved disappointing – the Canadian government and its agencies, including Defence Construction Limited, were successful in obtaining construction conditions that guaranteed Canadian firms would build the portion of the DEW Line placed on Canadian territory. Following the completion of the line, these efforts continued, with the new objective of maximizing Canadian involvement in its resupply, operation, and maintenance. The final expansion of the DEW Line across the Greenland ice cap once again required the use of Canadian territory, this time for a communications facility, and again agencies including DCL worked to represent Canadian interests and pursue Ottawa's policy objectives.

If the DEW Line formed a significant a military aspect of the Cold War in 1950s North America, it also resonated with cultural elements of Cold War Canada. Beginning in the early 1950s, southern Canadians demonstrated an increasing interest in the northland, epitomized by the works of Pierre Berton and Farley Mowat. "Berton's finely crafted tales of the Klondike," Kenneth Coates argues,

revived fading notions of the last great gold rush and, by implication, the north as land of opportunity. Mowat's various books, including his impassioned (if not

always convincing) *Canada's North Now*, emphasized the environmental heritage of the northern territories. His stories stressed man-animal relationships, vividly portraying the minuteness of the human intrusion into the northern landscape. These writings and others seemed to touch a sensitive nerve, for an expanded market developed for northern literature and commentary.... The proliferation of novels, histories and photo-essays revealed a fascination with northern themes not seen since the Klondike gold rush.²

Mowat's work reached out to encompass children's literature, and other books for young Canadians reached out to encompass the north. *Dale of the Mounted*, for instance, pulled "DEW Line Duty" in 1957.³ By the end of the 1950s, southerners' interests in consuming images of the north expanded to include Inuit art; with the assistance of Northern Service Officer James Houston, print makers at Cape Dorset captured widespread media attention and created a market for artifacts, including prints and carvings, that would by the 1970s become a major component of the Inuit economy.⁴

If the Canadian public demonstrated a renewed interest in the Canadian northland during the 1950s, so did its government. For a variety of reasons, including concerns about American plans for continental defence and their implications for Canadian sovereignty, increased interest in exploiting northern resources, and the problems faced by northern aboriginal peoples – the plight of some Inuit populations, for instance, had been highlighted by Farley Mowat – Ottawa felt compelled to take action on northern issues. The creation of the Department of Northern Affairs and National Resources in 1953, and the revival of the Advisory Committee on Northern Development in that same year, were testimony to a new interest among Ottawa bureaucrats in northern matters.

² Kenneth Coates, *Canada's Colonies: A History of the Yukon and Northwest Territories*, (Toronto: James Lorimer & Company, 1985), 191-192.

³ Joseph Holliday, *Dale of the Mounted: DEW Line Duty*, (Toronto: T. Allen, 1957).

⁴ Coates, *Canada's Colonies*, 195-196; John Ayre, "The Art that Came In from the Cold," *The Beaver*, 79:1 (February/March 1999), 8-15. Coates observes rather acerbically that "the distinctive Inuit carvings and prints, which sit well on the coffee table next to Berton's or Mowat's works, found a ready market."

They were also, of course, a means of increasing Ottawa's influence and control over these areas. Prime Minister Louis St. Laurent told the House of Commons in December of 1953 that "Canada has governed the NWT in an almost complete state of absent-mindedness for ninety years."⁵ As the 1950s unfolded, however, the influence of Ottawa's governance would increasingly be felt throughout the Northwest Territories. Much of this expansion would be driven, directly or indirectly, by the Distant Early Warning Line and other military projects in the north.

While the Accelerated Defence Programme and the Mid-Canada Line consumed much of Defence Construction Limited's energy during these years, the Distant Early Warning Line also demanded the company's attention, albeit to a lesser degree than these other projects. The broader context and details of planning for continental defence and their relevance for the Mid-Canada Line and the Distant Early Warning Line have been discussed in Chapter Three; this chapter will therefore be able to focus on Defence Construction (1951) Limited's role in planning for the construction of the DEW Line and the corporation's representation of Canadian interests during construction and during the operation and maintenance phase that followed the line's completion. It will examine DCL's role in the planning and construction of the DEW Line and the subsequent DEW EAST project that provided the communications links for the eastward extension of the DEW Line's radar coverage across Greenland to Iceland. While DCL was directly involved in the construction of the Mid-Canada Line, its participation in the construction of the Distant Early Warning Line was much more limited, and consisted largely of

⁵ Quoted in John David Hamilton, *Arctic Revolution: Social Change in the Northwest Territories, 1935-1994*, (Toronto: Dundurn Press, 1994), 57.

representing and protecting the interests of the Canadian construction industry and its suppliers.

A sizeable portion of the corporation's work took place during the planning phases for the DEW Line, large parts of it before the signing of a formal agreement between Canada and the United States. As evidenced at meetings in the United States and Canada and through correspondence with government organizations and private corporations from both countries, DCL worked to maximize the involvement of the Canadian construction industry and its suppliers in this politically, militarily and financially significant undertaking. Following the completion of the DEW Line, DCL continued this mission, and acted on behalf of Canadian design and engineering consultants as well. These efforts to protect the interests of Canadian firms were successful and established a new framework for the building of American and joint Canadian-American defence infrastructure in Canada. Most importantly, the negotiation of a diplomatic agreement for the DEW Line with behind-the-scenes provisions guaranteeing that construction work would be awarded to Canadian firms created a precedent that would be repeated in subsequent agreements. As will be seen in the discussions of undertakings like the Strategic Air Command refuelling bases that were later built on Canadian territory, DCL would continue to act on behalf of the domestic construction industry as part of its function of helping to provide defence infrastructure in Canada.

In performing these tasks, DCL was not acting autonomously, but was instead working to further the policies of the Canadian government. As demonstrated by the unfolding of events, Defence Construction was unable to influence negotiations with the

United States without the approval of the Department of Defence Production (DDP), which worked in conjunction with other departments and agencies in Ottawa. The corporation's most significant input into the DEW EAST construction provisions, for instance, passed through DDP's deputy minister, David Golden, before it reached External Affairs. Even when DCL dealt directly with American organizations on other occasions, DDP was kept "in the loop," either through correspondence or the presence of representatives at meetings, while other Canadian government departments were often included in the immediate discussions or correspondence. Defence Construction, therefore, was acting within and as part of a large bureaucratic environment in Ottawa that sought a number of broader goals – in the case of the DEW Line, these included sovereignty, control of defence expenditures, economic development, and the extension of Ottawa's influence and control over the north. DCL, however, was also working within these broader constraints to represent and further the interests of the Canadian construction industry and its related business sectors.

DCL's work in protecting and advancing the interests of domestic construction firms, their suppliers, and consulting engineers might well seem to make it a Trojan Horse for the private sector, especially given the corporation's close relationship with the Canadian Construction Association (CCA). Most notably, R.G. Johnson, DCL's president, had previously served as General Manager of the CCA, and it was in fact only in 1955 – the same year that the exchange of notes on the DEW Line was made – that he became an employee of DCL rather than a "dollar-a-year man" on loan to DCL. Given Minister of Defence Production C.D. Howe's delegatory style, however, any significant deviation from Howe's – and the government's – intentions would have been short-lived

and rapidly remedied.⁶ If Johnson and DCL were acting on behalf of the Canadian construction industry, then, they were doing so with the tacit – if not actually the explicit – approval of “C.D.”, who had already proven himself quite willing to use defence expenditures and foreign investment to underwrite and stimulate Canadian economic growth and development.⁷ Defence Construction Limited was therefore serving as an instrument of government policy when it acted on behalf of the Canadian construction industry and its suppliers during the negotiation and construction of the Distant Early Warning Line. If the corporation’s actions might make it seem to be a Trojan Horse for the private sector, much of this appearance was arguably derived from the well-recognized broader commonality of interests between C.D. Howe and Canadian businessmen.⁸

Planning the Line

The Distant Early Warning Line, tested and built between 1953 and 1957, provided a further northern extension of early warning radar for continental defence. While Canadian and American military planners had proposed an arctic radar network as

⁶ On the relationship between DCL and the CCA, see Ben Dworkin, “Ottawa Today: DCL’s important roles,” *Daily Commercial News and Building Record*, 16 March 1965, as well as the proceedings of the CCA annual conventions in the 1950s. On Johnson as a “dollar-a-year” man, see Minutes of meeting of Board of Directors, 18 January, 1951, DCC in-house holding, Minute Book Volume III, Wartime Housing Limited (Defence Construction Ltd.); Canada, House of Commons, *Debates*, 29 June 1951, 4966; Minutes of meeting of Board of Directors, 28 February 1955, DCC in-house holding, Minute Book, 1955–1970. In their biography of Howe, Bothwell and Kilbourn note that “when he [Howe] had picked the man he wanted to run an enterprise, he delegated near total responsibility to him. He expected him to take the initiative and backed him up with absolute trust and support, unless he found his confidence misplaced. ‘Keep out of here and keep out of trouble,’ he would say. ‘But if you’re in deep, tell me.’” Robert Bothwell and William Kilbourn, *C.D. Howe: a biography*, (Toronto: McClelland and Stewart, 1979), 114; Peter C. Newman, *The Canadian Establishment, Volume I*, (Toronto: McClelland and Stewart, 1975), 328–329.

⁷ Bothwell and Kilbourn, *C.D. Howe*, 236–237, 320; Newman, *The Canadian Establishment*, 327; James Eayrs, *In Defence of Canada, Volume III: Peacemaking and Deterrence*, (Toronto: University of Toronto Press, 1972), 369–372.

⁸ *Ibid.*, 328; Bothwell and Kilbourn, *C.D. Howe*, 261–282; Michael Bliss, *Northern Enterprise: Five Centuries of Canadian Business*, (Toronto: McClelland and Stewart, 1987), 454–465, 470–477.

part of an ambitious Air Warning and Air Interceptor plan as early as 1946-47, this proposal had come to naught, a victim of postwar financial constraints and the lack of a credible Soviet aerial threat to North America. The testing of the first Soviet atomic bomb in 1949, years before such an event had been anticipated, and which took place among events in Europe including the 1948 coup in Czechoslovakia, and events in Asia, most notably the Communist victory in China in 1949 and the outbreak of war in Korea in 1950, prompted widespread Western rearmament programmes. While Canada had already embraced collective security through the North Atlantic Treaty Organization in 1949, it also jointly undertook continental defence efforts in conjunction with the United States through the Pinetree Line, discussed in Chapter Two.⁹

Even while the Pinetree Line was being built, however, pressures were mounting for a further expansion of air defences. In the United States, the December 1949 creation of the Valley Committee to examine air defence systems had predated Pinetree, but a series of groups and committees formed to study this issue had followed suit. As discussed in the previous chapter, by the early 1950s their recommendations included the creation of an early warning line along the 55th parallel, which became the Mid-Canada Line, and the building of an early warning Line in the Arctic, which ultimately became the Distant Early Warning Line (see Figure 4).¹⁰ The rationale for the northward

⁹ Norman Friedman, *The Fifty Year War: Conflict and Strategy in the Cold War*, (Annapolis: Naval Institute Press, 2000), 43-101, 149-179; Norman Hillmer and J.L. Granatstein, *Empire to Umpire: Canada and the World to the 1990s*, (Toronto: Copp Clark Longman, 1994), 199-205, 211-216; David Bercuson, "Canada, NATO, and Rearmament, 1950-1954: Why Canada Made a Difference (but not for very long)." in *Making a Difference? Canada's Foreign Policy in a Changing World Order*. John English and Norman Hillmer, eds. Toronto: Lester Publishing, 1992.

¹⁰ B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defense from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 52-56; Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987), 61-62; Kenneth Schaffel, *The Emerging Shield: The Air Force and the*

expansion of continental air defence was straightforward: Canada lay along many of the direct routes from the Soviet Union to the United States, which meant that much of any incoming Soviet bomber attack would have to overfly Canadian territory. Time was also of essence to the defence; the further in advance that an alert could be provided, the more effective continental defence forces could be. Politicians, especially the command authorities in Washington who would have to decide on the use of the American nuclear arsenal, would have more time in which to react, and civil defence efforts, which at the time consisted largely of the evacuation of cities, would have a greater chance of success.¹¹

The primary driving force behind this quest for improved defences and additional warning time was the spectre of the hydrogen bomb and the jet-powered intercontinental bomber. The far more destructive "H-bomb" threatened to convert a Soviet attack from an event that could seriously damage the American ability to wage war to a catastrophe that could very well spell the end of the country itself. Jet-powered bombers, flying higher and faster than propeller-driven counterparts, promised to make the task of defenders even more difficult. The effectiveness of defensive weapons systems would be degraded, while warning and reaction times would also decrease.¹² In the United States, despite opposition from the Joint Chiefs of Staff, the Secretary of Defense, and the Secretary of the Air Force, advisers were able to convince President Truman to approve a

Evolution of Continental Air Defense, 1945-1960, (Air Force History Support Office, 1991), 144-145, 197-198.

¹¹ As noted in the previous chapter, historians have paid significantly more attention to civil defence efforts in the United States than to those in Canada. For a brief overview of American civil defence at this time, see Bruce-Briggs, *The Shield of Faith*, 69-74, 114-126, 129-133. See also Laura McEnaney, *Civil Defense Begins at Home: Militarization Meets Everyday Life in the Fifties*, (Princeton, NJ: Princeton University Press, 2000); Andrew D. Grossman, *Neither Dead nor Red: Civil Defense and American Political Development during the Early Cold War*, (New York: Routledge, 2001).

¹² Bruce-Briggs, *The Shield of Faith*, 73-89; Friedman, *The Fifty Year War*, 144-148, 198-207.

policy statement, NSC 139, on 31 December 1952, instructing the US Department of Defense to begin developing an early warning system that could provide some three to six hours' early warning. At the request of the military, however, Truman agreed to keep the decision secret until an ongoing study – the Kelly Committee, chaired by Mervin J. Kelly, president of Bell Telephone Laboratories – reported on the need for such a system.¹³ In late 1952, at the same time that Kelly had been commissioned to undertake his study of air defence, early planning development work on the DEW Line project was initiated by Washington, with the Bell System as the primary contractor and the Western Electric Company (WECO), Bell Telephone's manufacturing division, performing the work. The undertaking was given the designation "Project 572" and it would also be known by the names "Corrode" and "Counterchange" during its experimental phases. The choice of the Bell System, and the services of Kelly as chairman of a committee studying air defence questions, speaks powerfully of the strong relationship between Bell, the American government, and defence projects.¹⁴

Work on the development of an Arctic early warning line was given additional impetus by the Soviet Union's August 1953 announcement that it had successfully tested a hydrogen bomb. While it was later determined by western analysts that the device had in fact been an intermediate stage between the atomic bomb and the hydrogen bomb (a "boosted" atomic bomb), the effect of this announcement on the public and government officials, particularly in the United States, was dramatic.¹⁵ As outlined in the previous

¹³ Jockel, *No Boundaries Upstairs*, 70-71; Schaffel, *The Emerging Shield*, 185-187.

¹⁴ *Ibid.*, 210-212; M.D. Fagen, ed., *A History of Engineering and Science in the Bell System*, vol. 2. (New York: Bell Telephone Laboratories, 1975), 455-6. On the links between Bell and national defence, see, amongst others, *ibid.*, *passim*; Bruce-Briggs, *The Shield of Faith*, *passim*.

¹⁵ The difference between such a "boosted" bomb and a "true" hydrogen bomb is discussed in some detail in the previous chapter. See also Friedman, *The Fifty Year War*, 146; Steve Zaloga, *The Kremlin's Nuclear*

chapter, the US National Security Council shortly thereafter endorsed NSC policy paper 159/4, which for the first time provided unanimous service endorsement of an air defence directive. Prior to this date, the United States Air Force (USAF) had been deeply divided about the most appropriate measures for continental defence, and had often found itself in conflict with the recommendations of the various air defence study groups of the early 1950s.¹⁶ NSC 159/4 endorsed the expansion of continental defences, especially the construction of the Mid-Canada Line, but it also supported the building of an arctic early warning line. Final US approval, however, remained contingent on financial commitments. NSC-162, "A Review of Basic National Security Policy," approved by President Eisenhower on 30 October 1953, not only led to a defence posture that relied increasingly on nuclear weaponry, as was laid out in Dulles' January 1954 "massive retaliation" speech, but also to the improvement and expansion of continental defences.¹⁷

In the interim, the United States had been performing studies and tests to evaluate the feasibility and effectiveness of an arctic warning line, and Canada had again been acting to protect its interests in defence relations with the Americans. In January of 1953, the United States had requested permission for the construction of two experimental radar stations on Canadian territory near Herschel Island and the Alaska border as part of a feasibility study for an arctic distant early warning line. While the request was later reduced to one installation, the Canadian government granted approval for the American funded and American built installation on condition that a joint Canada-United States Military Study Group (MSG) be established. This group, whose mandate was to study

Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000, (Washington, DC: Smithsonian Institution Press, 2002), 31-35, 71-72.

¹⁶ Schaffel, *The Emerging Shield*, 185-193; Jockel, *No Boundaries Upstairs*, 74-76.

¹⁷ *Ibid.*, 74-78.

North American air defence in general, and the proposed distant early warning system in particular, was intended by the Canadian government to give it more freedom of action in the area of continental air defence. Ottawa did not want to be confronted with completed plans from the United States that Canadian experts had not had the chance to review, and the MSG offered a means of preventing such a situation, which had happened in the past. Canada made it clear that until a report on the matter had been received from the MSG, no consideration would be given to any request for the construction of an arctic warning line. The Americans, driven by the urgency of the project, readily accepted.¹⁸ Work on the project, first called Counterchange and later Corrode, began immediately. The Lincoln Laboratory – created to study air defence – established an experimental station at Barter Island, on the north coast of Alaska near the Canadian border. Personnel from Western Electric and the United States Air Force arrived in February of 1953 to establish an experimental installation. Results were sufficiently promising that a installation of a longer test line in Alaska and Canada began in July 1953. By early 1954, the experimental line had proved the practicability of the equipment, its operation, and the necessary logistical support for its operation in a challenging climate.¹⁹

Following the success of the experimental line, in June of 1954 the Canada-US Military Study Group recommended that both governments accept the need to establish the DEW Line. On 18 August 1954, following discussions with the United States, the Canadian government “agreed in principle to the need for the establishment of a distant

¹⁸ *Ibid.*, 70-71; Eayrs, *In Defence of Canada, Volume III*, 362-363.

¹⁹ Schaffel, *The Emerging Shield*, 210-212

early warning line across the most northerly practicable part of North America.”²⁰

Canadian participation would be determined at a later date, and Cabinet was also concerned that the planned seaward extension of the line in the Atlantic would provide only limited warning of attack from the northeast, across the Greenland ice cap and through Labrador and Quebec, a defect it wanted planners to remedy.²¹ At its meeting on 12 November, the Cabinet Defence Committee (CDC) agreed to recommend to Cabinet that the government consent to the construction of the DEW Line “as one element of an overall continental defence warning system, the establishment of which is being undertaken as a joint Canada-United States project.”²² Shortly thereafter, Cabinet approved the DEW Line as a joint Canadian-American project, with the US to be informed of Canada’s intention to participate in ways to be determined more precisely at a later date. This continuing hesitation on a complete commitment was the result of uncertainties about costs, sovereignty, the increased American presence, and some residual doubts about the plans for the line as they existed at that time.²³ The following day, both countries issued a joint statement that took pains to point out that while the US

²⁰ Eayrs, *In Defence of Canada: Volume III*, 371; Jockel, *No Boundaries Upstairs*, 82-83; Minutes of 101st meeting of the Cabinet Defence Committee, 12 November 1954, 2, DHH 73/1223, series 3, box 65, file 1330; Cabinet Conclusions, 18 August 1954, 8, LAC, RG2, series A-5-a, vol. 2655.

²¹ *ibid.* Planners argued that seaward extensions (often referred to as “sea wings”) of the early warning system were necessary in order to avoid enemy bombers making an “end run” around the ends of land-based early warning systems. Aircraft carrying early warning radar and “picket ships” with air search radar were two of the main components of such “sea wings”. At its 11 August meeting, Cabinet had discussed this issue in more detail. The plan for the Atlantic extension of the DEW Line envisaged a “wing” from Cape Race, Newfoundland, to the Azores, leaving an early warning gap between the eastern terminus of the DEW Line on the mainland and its seaward extension. Cabinet Conclusions, 11 August 1954, 14, LAC, RG 2, series A-5-a, vol. 2655

²² Minutes of 101st meeting of the Cabinet Defence Committee, 12 November 1954.

²³ Cabinet Conclusions, 18 November 1954, 12-15, LAC, RG2, series A-5-a, vol. 2656.

was responsible for DEW Line construction and installation, Canada had assumed responsibility for the Mid-Canada Line.²⁴

The DEW Line stretched from Cape Lisburne in Alaska to Cape Dyer on Baffin Island, and consisted of fifty-eight stations, including main stations some five hundred miles apart, auxiliary stations about one hundred miles apart and intermediate stations with a Doppler detection system serving as gap fillers between the auxiliary stations. Five stations – four in Greenland and one in Iceland – were later added as an eastward extension, and were linked to the rest of the line through the DEW EAST communications project discussed later in this chapter.²⁵ In Canada, the DEW Line had four main stations – at Cape Perry, Cambridge Bay, Hall Beach, and Cape Dyer, all in the North West Territories. In between the Alaska border and Cape Dyer lay eighteen auxiliary and twenty intermediate stations. Lateral communications along the line were by tropospheric scatter links similar to those used for the POLE VAULT project along the Labrador coast, and rearward communications in Canada were ultimately provided by ionospheric scatter links connecting some DEW Line main stations to points along the Mid-Canada Line as well as by the POLE VAULT system along the Labrador coast.²⁶

The American government assigned design and construction authority for the DEW Line to the Air Material Command, USAF which employed Western Electric, the

²⁴ Department of Defense Office of Public Information release No. 1129-54, "Distant Early Warning Line Authorized by U.S., Canada," DCC in-house file (DEW diplomatic); Eayrs, *In Defence of Canada, Volume III*, 371-372.

²⁵ Fagen, *A History of Engineering and Science in the Bell System*, 456-460; Schaffel, *The Emerging Shield*, 212-217; David Neufeld, "Trigger for Atomic Holocaust: Aircraft Detection on the DEW Line," *Cultural Resource Management*, 20:14 (1997), 10-11, available online at <http://crm.cr.nps.gov/archive/20-14/20-14-7.pdf>, accessed 31 May 2005.

²⁶ K.J. Holmes, *The History of the Canadian Military Engineers, Volume 3*, ed. J.R. Newell, (Toronto: Military Engineering Institute of Canada, 1997), 127; Fagen, *A History of Engineering and Science in the Bell System*, 456-457. The lateral tropospheric scatter communications antennas are frequently mistaken for "radar antennas" in many published photographs of the DEW Line. Two different designs, 1 kW transmitters with two 30-foot antennas, or 10 kW transmitters with two 60-foot antennas were installed, with the latter being used on links with considerable signal loss. *ibid.*, 562-563.

Figure 6: Map of Distant Early Warning Line as Built

- ▲ Main Sites: 1 – Cape Parry; 2 – Cambridge Bay; 3 – Hall Beach; 4 – Cape Dyer
- Auxiliary Sites
- Intermediate Sites – abandoned 1962-63

Source Map: Natural Resources Canada. Source Data: Map, DCC in-house holding; <http://www.lswilson.ca/dewline.htm>.

manufacturing arm of Bell Telephone, as a Management Contractor. In this capacity, WECO was asked late in 1954 to assume responsibility for the overall project, and the company, making use of its corporate relationships, was able to draw on expertise and resources from Bell Laboratories, Bell Telephone's research and development arm.²⁷

The final cost of DEW Line construction in Canada was estimated at some \$210 million in a DCL project summary written in 1959, shortly after the line's completion. Department of Defence Production statistics from late May of 1957 give the total as some \$204 million, with the vast majority of this total, \$192 million, going to the two Canadian construction companies (the Foundation Company of Montreal and a joint venture of Northern Construction and J.W. Stewart of Vancouver) that were responsible for construction of the line in Canada. The overall cost of the line, including electronics and other equipment, was much higher, arguably well over \$500 million, but there appears to be considerable confusion and reticence on the matter; the standard studies of North American air defence do not provide a cost for the system. At its peak, the construction effort required some 10,000 to 20,000 workers spread across the Arctic, many of them in Canada. In March of 1956, for instance, the two Canadian construction companies alone had a total of 3,700 employees on the line.²⁸

²⁷ Bell Labs planned the system, designed much of the equipment, and acted as a consultant to Western Electric. WECO and personnel on loan from the Bell Telephone operating companies planned the procurement, shipment, and engineering for the installations themselves "General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961," DCC In-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL", 2; Fagen, *A History of Engineering and Science in the Bell System*, 456.

²⁸ "Project: DEWLINE," DCL summary, n.d. but probably 1959, DCC in-house file, "DEW Line Treaty"; "DEW Project: Contracts Placed by Western Electric Company in Canada as of May 29, 1957," NAC RG49, vol. 465, file 200-3-4-4-3, vol. 1; Morris Zaslow, *The Northward Expansion of Canada, 1914-1967*, (Toronto: McClelland and Stewart, 1988), 329; Minutes of 32nd meeting of the Advisory Committee on Northern Development, 12 March 1956, 1-2, NAC, RG2, series B-2, vol. 6183, pt.3. According to the DDP summary, the payments to the contractors covered "construction, river lift, air lift, procurement of equipment and materials required for construction, [and] installation and operation of radio equipment." The latter was sub-contracted to Canadian Marconi. On the issue of DEW Line costs, a number of standard

In addition to its economic effects, the construction of the Distant Early Warning Line had even greater significance for the Canadian Arctic. While it ensured the use of Canadian companies for the DEW Line construction effort, Ottawa also managed to secure the involvement of domestic firms in the transportation of materials and supplies during construction and after completion. Although DCL played a vital role in obtaining favourable construction conditions, the corporation does not appear to have been involved in the planning and execution of the sizeable airlift and sealift effort required for the building of the DEW Line. The provision of transportation for construction and re-supply was a significant element of Ottawa's plans for northern development, and had lasting consequences for the Canadian arctic, since it facilitated access, the construction of other projects, and the exploration for and development of northern resources.²⁹

Coupled with the expansion of defence and other government activities in the north – the Department of Northern Affairs and National Resources was created in 1953, for instance – and the new opportunities for transportation and economic development made possible by its construction, the creation of the DEW Line had profound consequences for the Inuit and other northern aboriginal inhabitants. The DEW Line would represent the most

sources on the subject, including Jockel's *No Boundaries Upstairs* and Schaffel's *The Emerging Shield*, provide no figures or estimates; Bruce-Briggs, in *The Shield of Faith*, simply describes the cost as "outrageously expensive." Bruce-Briggs, *The Shield of Faith*, 86. A.G. Lester, head of Bell's Special Contract Division, claims the cost was \$600 million. Lester, *Special Contract*, 49; Lester also made the point in 1957 – presumably in defence of Mid-Canada Line delays and cost overruns – that this was some 70% above initial estimates. A.G. Lester, "Mid Canada Line – Performance of Management Contractor, Memorandum C: Comments on particular points raised by Government representatives at meeting in Ottawa on Sept. 27, 1957," 29 November 1957, 8, DHH 181.009(D276), vol. 2.

²⁹ Zaslow, *The Northward Expansion of Canada*, 326-331. Available records provide a good starting point for further research in this area. Sources worth examining include the 1948-1960 minutes and supporting documents for the Advisory Committee on Northern Development (ACND), discussed below, Library and Archives Canada (hereafter LAC), RG 2, series B-2, vols. 6181-6183; Zaslow, *The Northward Expansion of Canada*; Gordon Robertson, *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau*, (Toronto: University of Toronto Press, 2000). The ACND minutes and many other sources make frequent reference to Permanent Joint Board on Defence (PJBD) discussions of these and other issues related to DEW Line construction, but unfortunately PJBD records from 1952 onwards remain closed to researchers.

concerted extension of southern Canada's state imperatives into the North since Confederation. Its ramifications would permanently alter life in the Arctic and relationships between north and south.

DCL Enters the Fray

Planning and negotiations for the Distant Early Warning Line preceded the official exchange of notes authorizing the programme, and so, as will be seen, did Defence Construction's involvement. Proposed construction arrangements that had received attention beginning in late 1954 continued to be the subject of discussion by Cabinet and the Cabinet Defence Committee and with the United States. Other issues, including concerns over Canadian sovereignty, the intended Canadian contribution to the undertaking, the impact of the project on the Inuit, and the route to be taken by the DEW Line – which was not yet finalized – occupied the attention of politicians and bureaucrats in Ottawa.³⁰

The bilateral exploration of construction provisions began at an early date. As early as January of 1953, PJBD discussions – the records of which remain closed to researchers – appear to have concluded that Canadian contractors “would have an opportunity to submit tenders for the building and the equipping of the stations.”³¹ Following the Countercharge/Corrode experimental work of 1953-54, in the fall of 1954, Cabinet and the Cabinet Defence Committee were still working out the details of Canadian involvement in the DEW Line. In October, at a meeting of the PJBD, the

³⁰ Jockel, *No Boundaries Upstairs*, 78-86.

³¹ Minutes of the 7th meeting of the Advisory Committee on Northern Development, 16 March 1953, 3, LAC, RG2, series B2, vol. 6183, pt. 1. The comment in question was from General A.G.L. McNaughton, the Chairman of the Canadian section of the PJBD.

United States section reported that “on the basis of the latest report from the Western Electric Company, the U.S. government now considered that the feasibility of constructing an effective distant early warning line had been established and that the necessary data to start work on the sites during the 1955 construction season was available.”³²

A 1955 start date, the Americans believed, would result in an operational system by 1957, but those present at a Cabinet Defence Committee meeting in November noted that this “almost amounted to a crash programme” and that “Canadian authorities did not know how authentic were the estimates of construction costs or of the personnel needed for manning the line. It seemed doubtful, too, if the United States were fully aware of the magnitude of the problems involved.”³³ If this target date was to be met, however, the Americans also argued that an agreement on construction arrangements would soon have to be reached. At the October 1954 PJBD meeting, the US representatives had stated that their country was prepared to assume full responsibility for the line, but would welcome any participation the Canadian government might propose. Western Electric would receive the management contract, but the American government wanted to use available resources in both Canada and the United States, which suggested a willingness to consider the use of Canadian construction contractors and suppliers. The routing of the line through Canadian territory had not yet been finalized – from the Alaska border to Cambridge Bay had already been determined, but the path eastward from that point was not yet clear. Two options presented themselves; the more southerly terminating at

³² Minutes of 101st meeting of the Cabinet Defence Committee, 12 November 1954, 2.

³³ *Ibid.*, 2-3. COSC was concerned that these proposals to the Canadian government had been submitted through the PJBD rather than through agreed channels and that the MSG – which had been created to deal with these issues – had not been consulted. Minutes of the 569th meeting of the Chiefs of Staff Committee, 2-3 November 1954, 2, DHH 73/1223, series 3, box 61, file 1307B.

Resolution Island off the mouth of Frobisher Bay near the southern end of Baffin Island, the more northerly and expensive at Cape Dyer on Baffin Island.³⁴

The Cabinet Defence Committee discussed the DEW Line at length during its November meeting. In addition to the apprehensions outlined above, its members raised concerns about sovereignty, the potential consequences of the line for the Inuit, broader issues of public perceptions of the project, Canada's contribution to continental defence and commitments to NATO, and the potential for further expansion of the continental defence system. Eventually, the committee recommended that the Canadian government agree to the construction of the DEW Line, and the details of its recommendations reveal the concerns about how American and Canadians might perceive this decision. The DEW Line, it was to be made clear, was "one element of an overall continental defence warning system being constructed and operated by both governments," which included the Mid-Canada and Pinetree Lines.³⁵

Cabinet discussions of the recommendation on 18 November echoed many of the same points and concerns, noting, for instance, that "where joint defence installations were considered necessary, it had to be made clear that the U.S. was doing its share in accordance with general principles governing these matters and with the consent of the Canadian government"³⁶ Ultimately, the ministers agreed with the Cabinet Defence Committee's recommendation that the Distant Early Warning Line be constructed as part of an overall continental defence system, the establishment of which was a joint Canadian-American project. In order to do so, authority was granted for the conclusion of an agreement with the United States to allow it to proceed with the construction of the

³⁴ Minutes of 101st meeting of the Cabinet Defence Committee, 12 November 1954, 2.

³⁵ *Ibid.*, 3-6.

³⁶ Cabinet Conclusions, 18 November 1954, 14, LAC, RG2, series A-5-a, vol. 2656.

DEW Line in accordance with terms and conditions that had previously been discussed, and the US government was to be informed of the Canadian intention to participate in the project, although the nature and extent of this participation were to be more precisely determined in the near future. Finally, a joint Canadian-American public announcement on the issue was also to be made.³⁷ The extensive qualifications on Canada's assent and the conditions laid out in the draft exchange of notes were, as Joseph Jockel notes,

imposed to curb the kind of infringement on Canadian sovereignty that Canadians worried about as they remembered the impact of the American presence during the Second World War. ...The conditions were so extensive that R.J. Sutherland later claimed that "Canada received 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."³⁸

As these discussions demonstrated, the concerns of Ottawa officials extended to more than military plans and construction provisions. In addition to the Departments of National Defence and External Affairs, other ministries had interests in the planning and construction of an Arctic warning line. Foremost among these was the Department of Northern Affairs and National Resources (NANR), which had been created in 1953. Replacing the Department of Resources and Development, this new department was a concrete demonstration of Ottawa's interest in expanding its presence, control, and influence over the Canadian northland. The presence of American installations and large numbers of personnel in this area during the Second World War had caused profound misgivings about northern sovereignty within the Canadian government, which had specifically made a point of extinguishing as much of this presence as possible following

³⁷ Cabinet Conclusions, 18 November 1954, 12-15, LAC, RG2, series A-5-a, vol. 2656. The text of the draft exchange of notes can be found in USSEA to SSEA, 16 November 1954 "Distant Early Warning System," in Canada, Department of Foreign Affairs and International Trade, *Documents on Canadian External Relations: Volume 20, 1954*, (hereafter DCER) Greg Donaghy, ed., (Ottawa: Department of Foreign Affairs and International Trade, 1997), 1047-1052.

³⁸ Jockel, *No Boundaries Upstairs*, 83.

the Second World War.³⁹ Similar concerns had motivated the extensive conditions that Cabinet laid out in November of 1954.

At much the same time as the creation of NANR, the Ottawa bureaucracy revived the Advisory Committee on Northern Development (ACND). This committee had originally been created in 1948 “to advise the government on questions of policy relating to civilian and military undertakings in northern Canada and to provide for the effective coordination of all government activities in that area.”⁴⁰ While a few meetings of the committee were held, the majority of its work required specialized consideration through the Sub-Committee on Transportation and Construction, which had been more active during 1949-1953, when the full committee had held no meetings at all.⁴¹ In his history of the committee, Graham Rowley attributes this hiatus in part to government reorganization that saw the Department of Mines and Resources, which had originally been responsible for the committee, reconstituted as the Department of Resources and Development in January of 1950.⁴²

In Ottawa’s bureaucratic environment, committees and project offices were created to address issues and to attempt to solve dilemmas. The Second World War, for instance, had led to the creation of a large number of committees to handle wartime and postwar challenges, while the planning and building of the Pinetree Line discussed in

³⁹ Zaslow, *The Northward Expansion of Canada*, 221-233, 306-331; Robertson *Memoirs of a Very Civil Servant*, 107-115; Dziuban, *Military Relations Between the United States and Canada*, 317-334; Coates, *Canada’s Colonies*, 180-190.

⁴⁰ Minutes of the 6th Meeting of the ACND, 16 February 1953, 2, NAC RG2 series B-2, vol. 6183, part 1.

⁴¹ *ibid.*

⁴² Rowley also notes that Hugh Keenleyside, the Deputy Minister and chairman of the committee, did not call any meetings between the date of the reorganization and his resignation in October of 1950. Given Rowley’s critical interpretation of Keenleyside’s chairmanship, his account also appears to implicitly blame Keenleyside for the some blame for the 1949-1953 gap in activity. Rowley, *The Role of the Advisory Committee on Northern Development*, 7-8.

Chapter Two had prompted the creation of a "Pinetree Project Office."⁴³ The revival of the ACND in early 1953 was no exception. The Department of Resources and Development expressed concerns about American activities in the north in 1951, asking for the revival of the committee, but it was not until late 1952 that concerns on the part of the Department of External Affairs about proposed American projects in the Arctic, including the DEW Line, led to decisive action on this matter. At a Cabinet meeting on 22 January 1953, Secretary of State for External Affairs Lester Pearson expressed his department's concerns that "everything pointed towards an increase in U.S. activity in the Arctic during coming years. Several new U.S. projects had recently come to the attention of the Department of External Affairs. The largest of these if implemented, would involve eventually the establishment of a chain of 40 radar stations right across the Arctic."⁴⁴ Furthermore, Pearson argued,

if Canadian claims to territory in the Arctic rested on discovery and continuous occupation, Canadian claims to some relatively unexplored areas might be questioned in the future. He was concerned about the *de facto* exercise of U.S. sovereignty, examples of which were numerous during the last war in other parts of Canada, and it seemed clear that an increase in U.S. activity in the Arctic would present risks of misunderstandings, incidents and infringements on the exercise of Canadian sovereignty.⁴⁵

⁴³ On government committees during the Second World War, see, amongst others, J.L. Granatstein, *Canada's War: The Politics of the Mackenzie King Government, 1939-1945*, (Toronto: Oxford University Press, 1975). On the Pinetree Project Office, see A.G. Lester, "Taped Recollections," 22-23, DHH 77/493; "Pinetree Progress Reports Issued by Pinetree Project Office," DHH 73/390. In the United States a comparable DEW Project Office was set up for the Distant Early Warning Line. On the DEW Project Office, see Appendix "A" to the minutes of the 23rd meeting of the ACND, 7 February 1955, LAC, RG2, series B2, vol. 6183. This appendix consists of excerpts from the January meeting of the PJBD, at which a US representative noted that the DEW Project Office "had been organized both to expedite all functions pertaining to DEW line construction and to serve as a focal point for contract material. The office would endeavour to coordinate all agencies and to supervise contract fulfillment. It was at present staffed by ten people and located in Baltimore but was getting ready to move to New York City, where it would have a total of thirty-one persons, including representatives from Canada." *Ibid.*, 3.

⁴⁴ Rowley, *The Role of the ACND*, 8; Cabinet Conclusions, 22 January 1953, 12, LAC, RG2, series A-5-a, vol. 2652

⁴⁵ *Ibid.*, 12-13.

As a result, Pearson urged that the committee be reactivated to examine these issues, and following discussion by Cabinet, the ACND was requested to “consider and report periodically on all phases of development of the Canadian Arctic and on the means which might be employed to preserve or develop the political, administrative, scientific and defence interests of Canada in that area.”⁴⁶ Deputy Minister of Northern Affairs and National Resources Gordon Robertson would later provide a succinct evaluation when he noted that “the government became aware that the North was in a strategic location.”⁴⁷

Following its resurrection, the ACND began to meet on a regular basis. Its meetings from 1953 onwards paid considerable attention to defence issues, including their construction and consequences for northern development, but also to the increasing involvement of the Canadian government in the north, including policies for government dealings with the region’s inhabitants, the planning and construction of model settlements like Aklavik, the provision of health care within the region, plans for development, and broad administrative concerns. The minutes of its meetings from that point until 1963 are readily available, and help shed light on some issues not completely addressed by other sources.⁴⁸ Their utility is in large part due to the status of the ACND at this time as a

⁴⁶ *Ibid.*, 13. The composition of the ACND was changed by a Cabinet decision on 30 January 1953, and included the following members: the Deputy Minister of Resources and Development (Chairman), the Under Secretary of State for External Affairs, the Deputy Minister of Transport, the Secretary to the Cabinet, the Chairman, Canadian Section, Permanent Joint Board on Defence, the Chairman of the Chiefs of Staff Committee, the Chairman, Defence Research Board, the Commissioner of the RCMP, the Deputy Minister of Finance, and the Deputy Minister of Mines and Technical Surveys. The Controller of the Meteorological Service of the Department of Transport was not a full member but was expected to attend regularly, and the Chairman, Chiefs of Staff was to bring to the meetings any of the Chiefs of Staff who might be required under the circumstances. W.R. Wright, Chief Secretary, COSC, to COSC members, “Re: Cabinet Conclusions of January 30, 1953: Advisory Committee on Northern Development; composition,” 10 February 1953, DHH 73/1223, series 3, box 65, file 1327. This composition, however, would soon change due to the creation of the Department of Northern Affairs and National Resources in November of the same year.

⁴⁷ Quoted in Hamilton, *Arctic Revolution*, 63.

⁴⁸ Rowley, *The Role of the ACND*, *passim*. The minutes and many of the supporting documents for the ACND for 1948-1960 can be found in NAC RG2, series B2, vol. 6181-6183. Minutes but not supporting

senior and responsible committee. As Gordon Smith explains in his study of the committee,

in concept and as created, the A.C.N.D. was a very senior body, with a very senior role to fill. It functioned thus during its best years, i.e. from 1953 to approximately the mid-1960's. It had a direct line to Cabinet through its chairman and the minister of his department; it was consulted extensively by Cabinet about practically anything and everything respecting northern Canada; and it maintained an all-inclusive and all-pervading view of the North, its problems, and issues relating thereto.⁴⁹

The minutes of the ACND, in other words, provide valuable insights into high-level decision-making concerning northern Canada, including the DEW Line and other military projects, although one minister responsible for NANR, Alvin Hamilton, later claimed that the Department of National Defence "used to lie to us a lot," which suggests the need for some caution in their use.⁵⁰ DCL was involved with the ACND, but this was largely through a committee established to oversee the planning and development of Frobisher Bay as a model community and government centre for the Canadian Arctic – an undertaking that will be examined in the following chapter as part of the Strategic Air Command refuelling base programme. The Department of Defence Production, however, to which DCL was closely tied and responsible, was more closely involved with the ACND through most of the 1950s. Like a number of other departments, its deputy minister attended the committee's meetings, and in his comments and suggestions the

documentation for 1959-1963 can be found in DHH 73/1223, series 3, subseries X, box 89, file 1804. For a summary of defence activities and responsibilities in northern Canada at the time of the ACND's revival, see the Chiefs of Staff Committee memorandum "Advisory Committee on Northern Development," 14 February 1953, NAC RG2, series B2, vol. 6182, part 5.

⁴⁹ This quotation is derived from the conclusion of Gordon Smith's study of the ACND, which is quoted in Rowley, *The Role of the ACND*, 43-44. In *Arctic Revolution*, Hamilton points to some confusion over the role of the ACND and the actual formulation of policy; he quotes Robertson (unfortunately, without attribution), who described the committee as having a "mandate related to the North and especially to the coordination of the activities of the various departments and agencies there....The committee did not deal with the policies of defence, or of transportation, or of foreign relations (in the sense of 'policy'), but only with the fallout of ministerial policies decided by ministers elsewhere. It also dealt with the plans and activities of the departments and agencies in the North." Hamilton, *Arctic Revolution*, 63.

⁵⁰ Hamilton, *Arctic Revolution*, 63, n.

motivations of Defence Production, and consequently some of the driving impulses for DCL, can be discerned.⁵¹

More broadly, the revival of the Advisory Committee on Northern Development reflected the emergence of a new concern about and interest in the Canadian north on Ottawa's part. While concerns about the American military presence and Canadian arctic sovereignty dated back to the Second World War, the plans for the construction of the Distant Early Warning Line amplified these misgivings and gave rise to new, paternalistic apprehensions about its consequences for the region's aboriginal inhabitants.⁵² Like the creation of the Department of Northern Affairs and National Resources, the revived ACND also demonstrated a renewed interest in the North and desire to expand Ottawa's influence and control over the region. This interest was shared by DCL president R.G. Johnson, who would – as will be discussed later – explicitly connect the government's interest in northern development with advocacy for the interests of the Canadian construction industry in gaining opportunities for and developing experience with northern building.⁵³

Soon after its revival, the ACND discussed a number of concerns about the proposed DEW Line and its implications for the Canadian north. At a meeting of the

⁵¹ Smith's conclusions on the ACND include the observation that one of the reasons for its success following its reconstitution in 1953 was its membership of "deputy ministers and their equivalents, responsible through the chairman directly to Cabinet, and with the sub-committees, also composed of senior officials, clearly and directly responsible to the parent committee." Rowley, *The Role of the ACND*, 45.

⁵² The issue of the consequences of the DEW Line, including the exposure of Inuit populations to outsiders (discussed below) and the employment of Inuit on the construction and operation of a number of military projects was frequently addressed by the ACND. On employment, see, for instance, minutes of the 9th meeting of the ACND, 11 May 1953, 5-6; minutes of the 21st meeting, of the ACND, 8 November 1954, 2; minutes of the 30th meeting of the ACND, 9 January 1956, 2; Minutes of 33rd meeting of the ACND, 16 April 1956, 3; 37th meeting of the ACND, 12 November 1956, 1, LAC, RG2, series B-2, vol. 6183.

⁵³ R.G. Johnson to D.A. Golden, 4 November 1954, DCC in-house file (DEW diplomatic); "The Position of the Canadian Construction Industry in 1958," DCC in-house file "US-CDN Diplomatic Agreements Affecting DCL".

Advisory Committee on Northern Development in mid-December 1954, Gordon Robertson, the deputy minister of Northern Affairs and National Resources, noted that his department preferred the more northerly of the two proposed routes for the DEW Line in order to protect the Inuit population along the southern route from outside influences, including disease and hunters.⁵⁴ Graham Rowley, the committee's chair, was concerned, however, that terrain along the more northerly route where it passed through the Melville Peninsula and Baffin Island would prove to be more difficult than aerial surveys had suggested; Rowley's comment probably came from his familiarity with Baffin Island, but the minutes, unfortunately, are tantalizingly vague.⁵⁵ The southern route would not necessarily be any more accessible; J.R. Baldwin, the deputy minister of Transport, argued that it would require air supply for most of the central portion of the line. In addition to Canadian concerns about site selection, the chosen locations along this route also had to be able to provide a source of fresh water, access to the sea, and suitable locations for airstrips.⁵⁶ By January of 1955 a joint location study group with representatives from both countries recommended the more northerly route, as had the

⁵⁴ NANR's objections, as recorded at a meeting of the ACND, were that the more southerly route "would pass through an area where there were many Eskimo who were not adjusted to contact with modern civilization. They had not built up immunity to many common diseases and they were for the most part hunters, relying on the wildlife resources. If the southern route were chosen it might be necessary to have stricter limitation of the activities of those constructing and operating the line, in order to protect the Eskimos and the game on which they depended, than would be necessary if the northern route were chosen." Minutes of the 22nd Meeting of the ACND, 13 December 1954, 3, LAC, RG2, series B2, vol. 6183, part 2.

⁵⁵ *ibid.* Rowley's suggestions were almost certainly not idle speculation. In his memoirs, Robertson describes Rowley as "an encyclopedia of knowledge of the Arctic". Robertson, *A Very Civil Servant*, 116. See also Graham W. Rowley, *Cold Comfort: My Love Affair with the Arctic*, (Montreal & Kingston: McGill-Queen's University Press, 1996), for an account of Rowley's experiences in Baffin Island prior to the Second World War.

⁵⁶ Minutes of the 22nd Meeting of the ACND, 13 December 1954, 3; Fagen, *A History of Engineering and Science in the Bell System*, 456.

Canadian Section of the Military Study Group,⁵⁷ and by March of 1955, the Minister of National Defence was able to inform the Cabinet Defence Committee that such a route had been chosen.⁵⁸

Officials acknowledged that the Distant Early Warning Line would have significant consequences for the north, regardless of the route chosen. Among the concerns about the effects of the DEW Line were the protection of game, and the consequences of "large-scale and indiscriminate employment of Eskimo." Control of contact with Inuit populations was also suggested, and a number of other issues including the dangers of communicable diseases introduced by the influx of southerners were raised. This sub-committee

recognized that both the construction and subsequent maintenance and operation of the D.E.W. line would have widespread and long-term effects on the development of the north. In particular the arrangements developed for the operation and maintenance of the line would establish an administrative pattern for medical, educational, transportation and other services throughout the area.⁵⁹

As Zaslow notes in *The Northward Expansion of Canada*, the DEW Line and other military installations would indeed have noticeable impacts on Arctic society, including the arrival of large numbers of outsiders, the introduction of wage labour to indigenous

⁵⁷ Addendum to Minutes of the 22nd Meeting of the ACND, 25 January 1955. Unfortunately, the records consulted do not explain why the more northerly route was recommended by these two groups. The location study group had considered an even more northerly route running up Prince of Wales Strait, across Viscount Melville Sound and Lancaster Sound, then along the eastern coast of Baffin Island to Cape Dyer, but although such a routing offered military advantages it was turned down for a number of reasons, including the difficulties involved in supplying a construction effort in the area.

⁵⁸ Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6. Canadian agencies played some part in the siting and planning process; the Defence Research Board's Joint Intelligence Bureau, for example, provided general background information on terrain, climate, and coast characteristics for DEW Line planners. Canada. Defence Research Board. Joint Intelligence Research Bureau. *JIB(CAN) 1/55, Distant Early Warning Line Military Geography Support Programme, General Survey*, DHH 79/82, copy 2.

⁵⁹ ACND document ND-122, "Administrative Implications of the DEW Line," 2 March 1955, LAC RG2, series B-2, vol. 6181, pt.4.

populations, and the effects of the large amounts of material imported and discarded as part of the construction, operation, and maintenance of these facilities.⁶⁰

While the Ottawa bureaucracy discussed the DEW Line and its ramifications for northern Canada, military and political negotiations with the United States continued. In December of 1954, the Canadian Chiefs of Staff reached agreement with the US Joint Chiefs of Staff on the description of the immediate requirements for the DEW Line's military characteristics and capabilities necessary to meet the projected threat for 1957-60.⁶¹ In a late January 1955 Cabinet Defence Committee meeting, it was argued that since Canada had undertaken the Mid-Canada Line, the responsibility for the first phase of DEW Line – construction and installation – should be undertaken by the United States, although both countries would participate. As discussed in the previous chapter, this had been one of the primary Canadian motives for undertaking the construction of the MCL. The economic and political benefits of the DEW Line's continuing operations were considered more important to Canada than “any transient operations of a crash nature,” a reference to the construction effort, and the Minister of National Defence argued that the RCAF should also assume as substantial a role as possible in the operation and staffing of the line. As far as possible, logistics support was also to be a Canadian responsibility so that traffic in the Arctic would be largely Canadian, while Canadian participation in operation and maintenance was to be studied in order to determine its requirements and possible consequences – a possible reference to the Northern Transportation Company's need to acquire more information on resupply operations before agreeing to undertake the

⁶⁰ Zaslow, *The Northward Expansion of Canada*, 329-330.

⁶¹ Minutes of the 578th Meeting of the Chiefs of Staff Committee, 29 March 1955, 6, DHH 73/1223, Series 3, Box 62, file 1308A.

task.⁶² “If a substantial contribution were made in this field,” the minutes from this meeting noted,

it should not be necessary to take part in the construction of the line, other than to ensure that Canadian interests [in construction, operation, supply, relations with Inuit, etc.] were protected in ways to be outlined in the agreement to be made governing the construction of the line. Accordingly, it was recommended that Canada should not participate in the first phase other than to assist the United States in organizing Canadian resources, that studies be made to determine effective Canadian participation in the operation of the line, and that the United States be informed that Canadian participation in the first phase would be limited but that Canada intended to participate in the operation and manning of the line.⁶³

The CDC noted that the US was proceeding with DEW Line preparations more rapidly than had been thought possible, but that a “good measure of cooperation had been assured,” and agreed to recommend the points discussed above.⁶⁴ At its 3 March meeting, the committee noted a 28 February memorandum from the Minister of National Defence on the construction of the Canadian section of the DEW Line, and agreed that the US be authorized to proceed with construction, with Canadian government departments facilitating the project.⁶⁵ Defence Construction Limited would be among these departments. This approach formed part of the Canadian handling of the construction of northern air defences, and was directly related to the decision to undertake the Mid-Canada Line as an entirely Canadian venture. The MCL gave the Canadian government a legitimate excuse for avoiding direct involvement in the construction of the DEW Line, with its substantial demands and costs. An all-Canadian venture also permitted Ottawa to

⁶² Minutes of the 103rd Meeting of the Cabinet Defence Committee, 24 January 1955, 1, DHH 73/1223, series 3, box 65, file 1329; Memorandum, USSEA to SSEA, “Operation and Maintenance of the DEW Line,” 27 May 1955, Canada, Department of Foreign Affairs and International Trade, *Documents on Canadian External Relations, Volume 21, 1955*, Greg Donaghy, ed., (Ottawa: DFAIT, 1999), 761-765.

⁶³ Minutes of the 103rd Meeting of the Cabinet Defence Committee, 1.

⁶⁴ *ibid.*, 1-2.

⁶⁵ “Record of Cabinet Defence Committee Decision, 104th Meeting: Thursday, March 3, 1955,” DHH 73/1223, series 3, box 65, file 1329.

make the greatest possible use of Canadian firms and suppliers for construction and operation, whereas a joint effort to build the DEW Line did not offer such possibilities.

By consenting to the building of the DEW Line, however, and advocating the use of Canadian resources during its construction, some benefits could still be derived. Quite possibly, the economic gains from this approach would be comparable to those obtained from a joint construction effort, with the advantage that the financial commitment on Ottawa's part would be much lower. Canadian participation in the ongoing operation of the line also offered much greater benefits than the construction programme. In particular, the transportation of supplies was seen to offer an opportunity for the expansion of the country's northern transportation links that Ottawa believed had to be kept under domestic control.⁶⁶ In addition to its military benefits, therefore, Canadian involvement in the operation and maintenance of the DEW Line offered the prospect of domestically controlled northern development paid for large in part by the United States.

The creation of the DEW Line was confirmed by an Exchange of Notes on 5 May 1955 that were tabled in Parliament on the 20th.⁶⁷ As with many other defence agreements, there was a classified supplementary exchange of notes that was not tabled, in this instance dealing with the disposition of buildings, equipment, or other material no longer needed and "which might have an injurious effect upon the Eskimos," as well as with the use of military aircraft by the United States in Canada as part of the construction

⁶⁶ See, for instance, the ACND meetings of 12 October 1954, 4-5; 13 December 1954, 1-3, LAC, RG2, series B2, vol. 6183.

⁶⁷ While discussions and negotiations had been taking place with the United States since the Cabinet Defence Committee had evaluated the draft agreement in November of 1954, no substantial changes had been made, and at the suggestion of External Affairs and with the concurrence of other departments, the agreement was not referred to the CDC or Cabinet again prior to the exchange of notes. Memorandum, USSEA to SSEA, "Agreement Between Canada and the United States Concerning the Distant Early Warning System," 22 April 1955, *DCER*, vol. 21, 759-760.

and operation of the line.⁶⁸ The former point had earlier been part of the draft agreement, but after mid-April of 1955 was dropped from the Statement of Conditions and became a separate supplementary note because the United States was afraid that any public commitment on the restoration of sites after abandonment might affect its agreements with other countries.⁶⁹ A subsequent DCL project summary, however, would note the most important aspect of the agreement for the corporation and for the Canadian construction industry as a whole. “As far as the work in Canada was concerned,” it noted, “the treaty provided for equal opportunity. *In actual practice the Minister of Defence Production was able to obtain agreement that Canadian contractors only would be considered for the construction in Canada.*”⁷⁰ What had been obtained, in other words, was a guarantee that the construction of the portion of the Distant Early Warning Line lying in Canadian territory would be undertaken by Canadian contractors. This marked an improvement over parts of the Pinetree Line, such as the gap filler radars in Labrador, where work on Canadian territory had been undertaken by American construction firms. The securing of such conditions, and the means by which they were obtained – by an agreement supplementary to the actual exchange of notes – would provide a pattern for

⁶⁸ Distant Early Warning Co-Ordinating Committee Progress Report #3, 19 May 1955, 1, NAC RG24, acc.83-84/167, box 150, file 1279-150. Unfortunately, the supplementary provisions did not prevent extensive environmental contamination caused by the DEW Line's operation and often questionable waste disposal practices; these are discussed below.

⁶⁹ Minutes of the 2nd Meeting of the Distant Early Warning Co-Ordinating Committee, 13 April 1955, 1, NAC RG24, acc.83-84/167, box 150, file 1279-150; Memorandum, USSEA to SSEA, “Agreement Between Canada and the United States Concerning the Distant Early Warning System,” 22 April 1955, DCER, vol. 21, #326. The provisions of the agreement on site restoration are an attachment to *ibid.*

⁷⁰ “General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961,” DCC In-house file “Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL”, 2.

subsequent projects like the Strategic Air Command refuelling bases discussed in the next chapter.⁷¹

By the time this agreement had been reached, Defence Construction Limited had already been involved in meetings with other Canadian and US organizations planning the DEW Line construction effort. As early as November 1954, DCL personnel had played an active role in meetings of the Canadian and American agencies involved in the undertaking. The corporation's involvement would continue through the planning and construction process and into the subsequent operation and maintenance phase of the DEW Line's existence. During this time, at meetings and through its correspondence, DCL played an essential role in the effort to ensure the participation of Canadian contractors and suppliers in the construction, operation, and maintenance of the DEW Line. On the broader front of the entire DEW Line effort, DDP was the Canadian agency responsible for Canadian participation, and it had delegated to its Washington office and to the Canadian Commercial Corporation's Washington office the responsibility of working out with Western Electric and the USAF a "mutually satisfactory modus operandi" for Canadian participation.⁷² As part of this undertaking, representatives from DCL, DDP, and the CCC participated in and were consulted as part of the discussions

⁷¹ While copies of the supplementary letters for the refuelling base programme can be found in a number of files, comparable documents for the DEW Line were not found during the researching of this dissertation. It is possible that the "agreement" referred to in the DCL project summary took a different form. Howe had visited Washington in October of 1954; the arrangements may have been made during this or another visit. For copies of the letters related to the SAC project, see the attachments to CAS to VCGS, "USAF Refueling Facilities in Canada," 30 July 1958, DHH 112.3M2.009 (D151); they are Merchant to Leger, 20 June 1958; Leger to Merchant, 20 June 1958, and Merchant's reply to Leger, 20 June 1958; see also Ambassador of United States to USSEA, USSEA to Ambassador, 20 June 1958, Canada, Department of Foreign Affairs, *DCER Volume 25: 1957-1958, part 2*, Greg Donaghy, ed., (Ottawa: DFA, 2004), 286-287.

⁷² J.A. Teeter to P.A. Gorman, VP(Special Projects), Western Electric, 26 November 1954, DCC in-house file (DEW diplomatic).

and negotiations for the exchange of the notes that eventually governed the construction of the line.

A well-documented and important example of one such meeting was held on 3 November 1954 in Western Electric's Defense Projects Conference Room at 220 Church Street, New York City. R.G. Johnson and D.H. McLaren from Defence Construction, along with representatives from the USAF, Bell Telephone Laboratories, Western Electric, the Canadian Commercial Corporation, and the Department of Defence Production, were present to hear briefings on the project and its construction and to discuss Canadian participation in the DEW Line.⁷³ One DDP representative, N.R. Chappell, believed that "Dick Johnson felt that the information was particularly useful and that he has a fair appraisal of Western Electric's position and intentions."⁷⁴ Chappell also noted that

Bagnall [the manager of Western Electric's Defense Project division and project manager for the DEW Line] further indicated that it was his view that if reliable Canadian firms could be found to take on the work that "it made sense" for them to participate, particularly on the construction which would rely on the Mackenzie River and the Atlantic for transport of materials.⁷⁵

Johnson recorded his account of the meeting the following day in a letter to David Golden, the Deputy Minister of Defence Production, and it bears considerable discussion, both because it reveals DCL's interests and details its interaction with Canadian and American agencies, and also because it uncovers some fundamental interests and concerns about the Canadian north, including government plans for development and the

⁷³ Memorandum, A.B. Hunt to D.A. Golden, 15 November 1954; N.R. Chappell to D.A. Golden, 5 November 1954, DCC in-house file (DEW diplomatic).

⁷⁴ *ibid.*, 2.

⁷⁵ *ibid.* The discussion of the use of Canadian electronics equipment, however was not as productive. Chappell noted that as expected the discussion was not as clear cut as that on construction, and that there was no material progress on the issue of practicability.

threat to Canadian interests and sovereignty presented by the growing American presence.

Johnson, describing the meeting as “most useful,” explained that the Americans expected that Western Electric, as management contractor, would have full responsibility for construction, including the awarding of construction contracts, and that as such WECO would negotiate directly with contractors. Although he had offered DCL’s services “as in the case of the Pinetree project,” where DCL had acted on behalf of the Army Corps of Engineers for American-built installations, Johnson had no objection to a direct relationship between WECO and Canadian contractors. This acquiescence was probably driven by Western Electric’s position that the construction fell

into three natural geographic zones for which three large construction contracts were contemplated. These would be:

- (1) To an American contractor for the Alaska section which would include one or two sites in Canada.
- (2) To a Canadian contractor for the central section.
- (3) To a Canadian contractor for the Eastern section (Baffin Island – East).⁷⁶

Johnson described this proposal, which would meet the Canadian goal of guaranteeing that construction work on Canadian territory would be carried out by domestic firms as “perfectly reasonable provided they carry through with their intention to use Canadian contractors on the two sections mentioned,” and further pursued the objective of obtaining work for domestic firms by emphasizing “the availability of large Canadian contractors as well as labour and materials at this time.”⁷⁷ Johnson also sought to advance the interests of Canadian suppliers of construction materials, noting that the DEW Line’s

⁷⁶ R.G. Johnson to D.A. Golden, 4 November 1954, DCC in-house file (DEW diplomatic).

⁷⁷ *Ibid.*

prefabricated structures could be provided by firms which had recently completed a large number of such huts; the Americans indicating "that this source of supply would be investigated."⁷⁸

Despite these assurances on the part of Western Electric and other American agencies, however, Johnson was still concerned that the interests of the Canadian construction industry and its suppliers were not completely secure. "Item 3(a) of the draft note provides that Canadian contractors and suppliers of construction materials and equipment shall be given equal consideration with Americans," he noted, but

however, unlike the conditions for electronic equipment, which provide that the Dew project office shall be the instrument for dealing with the practicability of Canadian supply of electronic equipment, there is no provision for an instrument for assuring that Canadian construction contractors and suppliers are given equal consideration. I feel that there should be a similar clause whereby the Dew project office is made a vehicle for assuring such consideration so that the Canadian representative there would be required to be consulted in such matters.

Johnson expanded on these concerns, and provided a significant explanation of the interests and concerns of DCL and the Canadian construction industry whose interests he and the corporation were seeking to protect:

You will appreciate that there has been a large influx of American contractors into Canada who are participating substantially in Canadian Federal Government construction contracts. *Because of this the Canadian construction industry would feel very strongly that they were entitled to every assurance of fair consideration for projects on Canadian soil for which they are qualified.* In addition, I think it is highly desirable that the interest of the Canadian government in the development of the Canadian northland, as symbolized by the creation of the Department of Northern Affairs and National Resources, should be implemented by encouraging and affording facility for the Canadian construction industry to develop experience in this area, rather than run the risk that the Americans become more familiar with the problems of the Canadian northland than we ourselves.... Due to the experience which they have gained in Alaska and Greenland there can be little doubt that they are well qualified in this regard but at the same time it is highly desirable that Canadian engineers be afforded as much opportunity as possible to become familiar with this field.

⁷⁸ *Ibid.* On the prefabricated structures used on the DEW Line, see Schaffel, *The Emerging Shield*, 212-217.

My impression is that the Americans, both in the U.S.A.F. and in the civilian group are quite conscious of Canadian rights in this field and therefore take the terms of the draft more seriously than we might have expected. *Under the circumstances I think we should take advantage of every opportunity for Canadian industry and Canadian engineers which this attitude affords....* Under the circumstances, reasonably extensive Canadian participation should not be such a strain on Canadian resources of men and material as to interfere with Canadian progress in the Mid-Canada Line.⁷⁹

In these two paragraphs, Johnson astutely made reference to a number of significant issues. First was the construction industry whose interests he was helping to protect through the advocacy of a form of what Hugh Aitken would later describe as “defensive expansionism.” In this instance, it was intended to maximize the industry’s opportunities for gaining experience in northern construction in the face of American competition.⁸⁰ Johnson’s concerns were well founded, since American and British firms had become increasingly involved in the Canadian construction industry throughout the 1950s, drawn in part by major government projects, including the St. Lawrence Seaway. They competed directly for contracts, established subsidiaries, or bought into existing Canadian firms.⁸¹ Johnson, who at the time of writing this letter was still notionally an employee of the Canadian Construction Association, was using his position as president of DCL to represent the interests of the domestic construction industry faced with this situation.⁸² The corporation’s subsequent involvement in the ongoing negotiations surrounding the

⁷⁹ R.G. Johnson to D.A. Golden, 4 November 1954, DCC in-house file (DEW diplomatic). Emphasis added.

⁸⁰ Hugh G.J. Aitken, “Defensive Expansionism: The State and Economic Growth in Canada,” in *The State and Economic Growth: Papers of a Conference Held on October 11-13, 1956, under the Auspices of the Committee on Economic Growth*, Hug G.J. Aitken, ed., (New York: Social Science Research Council, 1959), 79-114.

⁸¹ James Montagnes, “No Let-Up Seen Next Year in Canada’s Building Boom,” *Barron’s National Business and Financial Weekly*, November 28, 1955, 18; “Too Many U.S. Builders Here? CCA Head Urges Our Industry ‘Sell’ Itself,” *Financial Post*, 13 September 1952, 46:18; Harley Potter, “U.K. Construction Firms Here to Stay: They’re Holding Their Own in Fierce Competition,” *Financial Post*, 23 April 1955, 11; Clifford Fowke, “A Policy That Paid Off,” *Financial Post*, 23 May 1959, 55.

⁸² Minutes of Board of Directors meeting, 28 February 1955, DCL Minute Book, 1955-1970.

DEW Line further testify to its use as an instrument of policy for the promotion and facilitation of this version of defensive expansionism.

The second significant issue raised in the letter is Johnson's reference to the recently created Department of Northern Affairs and National Resources, which is notable for a number of reasons. The first is its adroit demonstration of bureaucratic maneuvering through the invocation of a recently created department that had the attention of the Ottawa bureaucracy. More fundamental explanations for the significance of this statement are linked to the reasons for the creation of this new department: concerns about the growing American presence in the Canadian north, the maintenance of Canadian sovereignty, and the expansion of Ottawa's control and influence over the north. Johnson was therefore ably playing on these concerns in order to support his recommendations on the policies to be adopted. These recommendations, presumably, were also formulated in a manner that was intended to help the Department of Defence Production defend and justify these recommendations to other departments taking part in the negotiation of an agreement on the DEW Line.

Johnson's concerns were well founded, since despite the promising nature of the discussions about construction provisions, one USAF representative at the conference stated that "as far as the U.S.A.F. was concerned...no commitments had been made and that everything that was said contributed only to the exploration of some of the problems. Naturally, he went on, anything beyond exploration would have to await a basic understanding acceptable to both countries."⁸³ Given this uncertainty, prompt additional efforts on the part of Canadian agencies to secure preferential construction conditions were warranted. By mid-November of 1954, DCL was involved in discussions with other

⁸³ N.R. Chappell to D.A. Golden, 5 November 1954, 4, DCC in-house file (DEW diplomatic).

government agencies, including External Affairs and the Department of Defence Production, about the means of ensuring the participation of Canadian contractors in DEW Line construction. External Affairs, for instance, sent Johnson a copy of the draft conditions for the DEW Line, requesting his comments on construction, procurement, and liaison with American agencies through the DEW Project Office.⁸⁴ The greater part of the corporation's efforts, however, were undertaken in conjunction with Defence Production; DCL had the support of its deputy minister, who endorsed its proposals for promoting this goal. The suggestion that selected contractors would travel to New York to discuss their capabilities with Western Electric, for instance, apparently originated from within Defence Construction, and benefited from Golden's support and the suggestions of others within DDP. D.H. McLaren had been the other DCL employee attending the early November meeting in New York, and in a mid-November memorandum to Johnson, he reported on a recent conversation with Golden. McLaren noted that "he [Golden] expressed agreement that it would be desirable to have Canadians do the work and suggested that the time was now opportune for us to do something to promote this."⁸⁵

And promote this the Canadians did. Although there had been some uncertainties about Western Electric's status as management contractor and the functions it would carry out, by the end of November 1954, Western Electric had been given responsibility for the overall DEW Line undertaking, including construction, and sought the assistance

⁸⁴ J.M. Teakles for USSEA to R.G. Johnson, 24 November 1954; R.G. Johnson to USSEA, attn. J.M. Teakles, 26 November 1954, DCC in-house file (DEW diplomatic).

⁸⁵ DCL Inter-Office Memo, D.H. McLaren to R.G. Johnson, "Re: DEW," 19 November 1954, DCC in-house file (DEW diplomatic).

of DDP to determine which Canadian contractors should be approached.⁸⁶ According to DDP representative N.R. Chappell in Washington, Western Electric's Bagnall

did not want at this stage to sit down with prospective contractors and get them all stirred up. He suggested that if he had two listings of Canadian contracting firms who might be interested in the central and eastern sectors, together with some advice as to their size, capabilities, experience, etc., WECO could then proceed independently to get in touch with representatives of the companies.... [Bagnall] was quite emphatic in expressing the desire to contract direct with construction firms and not employ DCL as a contractual device. Although he did not say so directly he certainly gave the impression that their first thought on the middle and eastern sectors was to try to find suitable Canadian construction firms with which to enter into contracts.⁸⁷

Consequently, another round of Canadian-American meetings was held in early December. At these and earlier meetings Johnson appears to have worked closely with J.A. (John) Teeter, the CCC representative in Washington; and the two were on a first-name basis.⁸⁸ Teeter wore two hats; he was also DDP's representative in the DEW project office in New York, where his terms of reference covered construction as well as electronics and transportation; as such, he was able to represent DCL's interests on construction matters.⁸⁹ Both Johnson and Teeter shared the opinion that Canadian construction contractors derive the maximum benefit from the project. "I am most anxious," Johnson stated in a mid-December 1954 letter to Teeter, "that we avail ourselves in every way of the "equal consideration" to be afforded Canadian contractors."⁹⁰ In this letter, Johnson also referred to an early December 1954 meeting, where he urged Bagnall to consider joint ventures by Canadian contractors if the DEW

⁸⁶ Fagen, *A History of Engineering and Science in the Bell System*, 456. Fagen gives the date as "late in 1954."

⁸⁷ *ibid.*; Teletype, N.R. Chappell, DDP, Washington, to D.A. Golden, R.G. Johnson, 30 November 1954, DCC in-house file (DEW diplomatic).

⁸⁸ See numerous pieces of correspondence in DCC in-house file (DEW diplomatic).

⁸⁹ D.A. Golden to R.G. Johnson, 10 December 1954; R.G. Johnson to John A. Teeter, 15 December 1954; R.G. Johnson to D.A. Golden, 15 December 1954, DCC in-house file (DEW diplomatic).

⁹⁰ R.G. Johnson to John A. Teeter, 15 December 1954, DCC in-house file (DEW diplomatic).

Line work proved to be too large for a single firm, pointing to frequent joint ventures by American contractors.

In addition to Johnson and possibly others from DCL, Teeter, and another DDP representative, N.R. Chappell, were present at this 3 December meeting. Chappell's report noted that Johnson's part of the discussion "appears to have been very satisfactory to WECO. I would guess that WECO is particularly pleased to finally understand that no agencies of the Canadian government are putting pressure upon them to use government contractual devices for business which they may wish to place with Canadian contractors or subcontractors."⁹¹ Western Electric, in other words, was happy that they would not have to work through DCL as an intermediary in the DEW Line construction project; they could instead deal directly with Canadian contractors and subcontractors. Such an approach, however, did not exclude DCL from its role of ensuring the participation of Canadian firms and assisting their contacts with WECO. At the meeting, Johnson and Western Electric representatives agreed that prospective construction contractors in Canada be contacted immediately, and DCL assisted Western Electric in these discussions, which resulted in a list of companies to be interviewed.⁹² Western Electric planned to meet with representatives of each company in New York to brief them on the project and to determine their interest and capabilities, and had, so far as Teeter and Johnson could determine, "every intention of contracting with a Canadian company or companies for the work on the central and eastern sectors."⁹³

⁹¹ Teletype, N.R. Chappell to D.A. Golden, W.D. Low, R.G. Johnson, 6 December 1954, DCC in-house file (DEW diplomatic).

⁹² *Ibid.*; R.G. Johnson to V.B. Bagnall, 9 December 1954; V.B. Bagnall, to R.G. Johnson, 13 December 1954, DCC in-house file (DEW diplomatic).

⁹³ Teletype, N.R. Chappell to D.A. Golden, W.D. Low, R.G. Johnson, 6 December 1954, DCC in-house file (DEW diplomatic).

An early December 1954 letter to Western Electric from Johnson noted that a number of Canadian firms were under consideration for the western part of the line in Canada (the central sector), but Morrison-Knudsen, an American contractor, may also have been a contender. Western sector contractors met with WECO representatives in New York City on a number of occasions before a final selection was made.⁹⁴

Contractors for the eastern sector, all of whom were Canadian, subsequently sent representatives to present their bids.⁹⁵ While final decisions were being made on the contractors, in early February 1955 R.G. Johnson met with P.A. Gorman, the vice-president of Western Electric, and Bagnall, with whom he had already had a number of meetings. The two were visiting Ottawa, and met with Johnson to discuss the necessary organization for the construction of the line and the requirements for Canadian participation.⁹⁶ On the 21st, the USAF made the first official public announcement that Western Electric had been awarded the contract to build the DEW Line, valued at some \$500,000,000, a huge amount comparable to some \$3.5 billion Canadian today. In a pattern that had become an all too familiar element of major defence projects, however,

⁹⁴ The three firms were Northern Construction, Marwell Construction Company, and Poole Construction. Poole withdrew themselves from consideration since they felt the job was too big. R.G. Johnson to V.B. Bagnall, 9 December 1954; J.A. Teeter to R.G. Johnson, 15 December 1954, DCC in-house file (DEW diplomatic).

⁹⁵ The four contractors considered by WECO for the eastern section were Foundation Company, Fraser-Brace, Atlas Construction, and Angus Robertson, which was assisted by a representative from the Tower Company. Atlas appears to have been a late addition to the bidding process, since it was not mentioned in the mid-December correspondence on this issue referred to above. J.A. Teeter to D.A. Golden, "Project 572, Committee Meeting No. 5, January 10th, 1955"; J.A. Teeter to D.A. Golden, "Re: Project 572, Project Meeting #4, January 3rd, 1955," DCC in-house file (DEW diplomatic).

⁹⁶ Seven other meetings with senior Canadian officials were scheduled for the pair that day. A.B. Hunt, Director, Electronics Branch, DDP, to R.G. Robertson, Deputy Minister of Northern Affairs and National Resources, 27 January 1955; P.A. Gorman, Vice President, Western Electric, to R.G. Johnson, 8 February 1955; R.G. Johnson to P.A. Gorman, 15 February 1955, DCC in-house file (DEW diplomatic). On February 3rd, Gorman and Bagnall were scheduled to meet with D.A. Golden, the Deputy Minister of Defence Production, C.D. Howe in his function as Minister of Defence Production, R.G. Johnson, A.H. Brown, the Deputy Minister of Labour, J.R. Baldwin, the Deputy Minister of Transport, C.M. Drury, the Deputy Minister of National Defence, M.H. Wershof, Assistant Under-Secretary of State for External Affairs, and R.G. Robertson, the Deputy Minister of Northern Affairs and National Resources. Lunch was, of course, at the Rideau Club.

the final cost would be much higher – estimates of some \$750 million are commonplace, but a definitive figure does not seem to be available. The Canadian share for construction – approximately \$192 million – would represent about 40 per cent of the initial estimate, but in the provision of electronics and equipment Canadian firms would fare far worse; the largest contract in this field was for a total of some \$4 million.⁹⁷ The Canadian subcontractors chosen by Western Electric were Northern Construction Ltd. and James W. Stewart Ltd. of Vancouver for the western portion, which ended at the west coast of the Boothia Peninsula; as Johnson had earlier suggested to Bagnall, two companies were acting in a joint venture to pool their resources for this substantial undertaking. The Foundation Company of Canada, acting alone, was the contractor for the eastern section.⁹⁸ This preferential treatment for Canadian construction contractors, however, did not produce results as clear-cut as they might seem at first glance. Western Electric

⁹⁷ "DEW Project: Contracts Placed by Western Electric Company in Canada as of May 29, 1957," LAC RG 49, vol. 465, file 200-3-4-4-3, vol. 1. As noted above, DEW Line costs are curiously absent from the literature on the subject.

⁹⁸ "The History of the Communications & Electronics Branch, Chapter 6," http://www.dnd.ca/commelec/brhistory/chap6_e.htm; Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6. A number of potential bidders for the eastern sector did not appear to be as interested in the contract as Foundation. J.A. Teeter to R.E. Addison, "Project 572, Committee Meeting #6, January 17th, 1955"; R.G. Johnson to John A. Teeter, 15 December 1954, DCC in-house file (DEW diplomatic). A letter of intent for the western section had been issued on 31 December 1954, and the contract had been awarded by the end of January 1955 on the basis of price even though Western Electric apparently preferred Marwell, the other serious contender. J.A. Teeter to D.A. Golden, "Re: Project 572, Project Meeting #4, January 3rd, 1955," DCC in-house file (DEW diplomatic); Minutes of the 103rd Meeting of the Cabinet Defence Committee, 24 January 1955, 1; Teletype, J.A. Teeter to R.G. Johnson, D.A. Golden, 5 January 1955, DCC in-house file (DEW diplomatic). Teeter's message noted that WECO representatives "definitely stated the award was made on the basis of price. They were most favourably disposed to Marwell [another bidder], but unfortunately that company's fixed fee would be double that asked for in the Northern proposal and their estimated costs ran a good 50 percent higher. Under these circumstances, WECO could not see how they could justify to USAF the awarding of a contract to Marwell. I might say they were very open with me and evidenced considerable sincerity in discussing their decision."

commented that a 67% interest in Northern Construction was held by Morrison-Knudsen of Boise, Idaho, which also controlled six other Canadian subsidiaries.⁹⁹

While the selection of Canadian construction contractors was of considerable significance to the Canadian government and DCL for reasons of finance, sovereignty, and the interests of an industry that made up an appreciable portion of the country's economy, the use of Canadian suppliers for construction materials was also important.¹⁰⁰ Due to the larger number of companies producing a wide range of materials, DCL was necessarily involved on several fronts in this field. Working from the top down, Johnson communicated directly with the two major Canadian construction contractors to urge that they procure plumbing, electrical, and other equipment from Canadian sources – in the case of Foundation Company, he dealt with R.F. Shaw, who had only a few years before been DCL's chief engineer. In a letter to Teeter in the latter's function as CCC's representative in Washington, Johnson noted that he had "no doubt that the fact of my discussing these items in detail with both companies would have the effect of impressing them with our interest in their purchasing as much as possible in Canada."¹⁰¹ Working from the bottom up, Johnson also fielded and directed enquiries from Canadian contractors and suppliers looking for work on the DEW Line.¹⁰² Not surprisingly, given

⁹⁹ J.A. Teeter to R.G. Johnson, 26 January 1955, 2, DCC in-office holdings (DEW diplomatic). WECO informed Teeter that "they do not know where MK [Morrison Knudsen] may fit into the picture" and "as far as they are concerned" they had negotiated with Northern Construction's representative and awarded the contract to that company. Teletype, J.A. Teeter to R.G. Johnson, D.A. Golden, 5 January 1955, DCC in-house file (DEW diplomatic).

¹⁰⁰ A breakdown of contracts placed by Western Electric in Canada as of 29 May 1957 is available in LAC, RG49, vol. 465, file 200-3-4-4-3, vol. 1. Outside of the two major construction contracts and the two large electronics contracts – Canadian Marconi and Collins Radio of Canada – the contracts for supply ranged from \$2.36 million to the Dominion Bridge Company for towers to \$6 to the McCall Frontenac Oil Company for cutting oil.

¹⁰¹ R.G. Johnson to J.A. Teeter, 11 February 1955, DCC in-house file (DEW diplomatic).

¹⁰² See W.M. Mott, President, Mott Electric Limited, to R.G. Johnson, 29 December 1954; R.G. Johnson to W.M. Mott, 5 January 1955; R.G. Johnson to Brigadier Noel Lambert, Northern Construction & J.W. Stewart, "Re: Dew Line," 5 January 1955, DCC in-house file (DEW diplomatic). This enquiry had been

his previous position as president of the Canadian Construction Association, correspondence on this subject reveals that Johnson was on a first-name basis with senior executives at some companies.¹⁰³

By early 1955, Western Electric had settled on a policy for the standardization of electrical, plumbing, and heating supplies; it would explore prices and availability, make decisions on sources, and then advise the construction contractors where they should buy the supplies. DCL and DDP were asked to assist in suggesting Canadian sources of supply. Such a list was provided, although there was some discussion within DCL about the practicability and advisability of implementing complete standardization for these supplies on the DEW Line. The problem of defining "Canadian suppliers" was also raised; one DCL staff member noted that "all the equipment necessary, I feel sure, could be obtained from Canadian outlets although I fully realize that many of these are American in origin, and Head Office administration, but they are located in Canada and do employ Canadian labour."¹⁰⁴ Interestingly, Western Electric had made similar comments about American ownership of Canadian construction firms, and this phenomenon is to some degree problematic. To what extent could DCL and the Canadian government be said to be protecting the interests of the domestic construction industry against American companies if many of its large members were subsidiaries of larger

referred to DCL by C.D. Howe, who had first been contacted by Mott Electric. Johnson forwarded this enquiry from Mott (a British Columbia electrical contractor) to Northern Construction & J.W. Stewart, the contractors for the western Canada section of the DEW Line

¹⁰³ See, for example, Paul McNamara to R.G. Johnson, 18 February 1955, DCC in-house file (DEW diplomatic). Joseph M. Piggott to R.G. Johnson, 17 February 1955, same file, is also interesting, since Piggott had been president of Wartime Housing Limited, DCL's corporate predecessor.

¹⁰⁴ J.A. Teeter, CCC, Washington, to R.G. Johnson, 17 February 1955; Teletype, J.A. Teeter, CCC, Washington, to R.E. Addison, DDP, R.G. Johnson, DCL, 23 February 1955; DCL Inter-Office Memorandum, R.G. Johnson to John Head, "DEW Line," 25 February 1955; DCL Inter-Office Memorandum, J.A. Head to R.G. Johnson, "Re: Dew Line," 28 February 1955, DCC in-house file (DEW diplomatic). Head was concerned that complete standardization across Canada would require a single supplier, with the potential for delays and higher costs.

American firms? Unfortunately, the most obvious source for a contemporary analysis of American ownership of Canadian construction firms, the sector study for the Royal Commission on Canada's Economic Prospects, does not address this issue to any significant degree.¹⁰⁵

C.D. Howe's attitude towards foreign investment in general, however, and American investment in particular, can help to elucidate some of these points. Howe had long proven himself more than willing to use such investment to underwrite and stimulate Canadian economic growth.¹⁰⁶ In this respect, the comment that at least these companies were based in Canada and employed Canadian labour bears repeating, since it echoes some of the arguments used to justify foreign investment; even if head offices were located elsewhere, jobs and other economic benefits accrued to Canadians and their government. While the government, including Howe, supported the use of preferential construction conditions in projects like the DEW Line, the issue of the foreign ownership of some of the companies these conditions were intended to help does not appear to have received much if any attention. It is difficult to believe that Howe or other senior figures in Ottawa felt strongly about this issue but chose not express their opinions on the matter.

Fortunately, the complications DCL encountered in representing the interests of Canadian suppliers help shed further light on this matter. Despite initial progress in guaranteeing Canadian sources of supply, by early March 1955, it appears that some problems had developed as a result of the actions of Western Electric's architects and the

¹⁰⁵ DDP tracked the purchases made by Northern Construction and Foundation Company during the construction of the DEW Line. See, for example, correspondence on NAC, RG49, vol. 465, file 200-3-4-4-3, vol. 1. For the Royal Commission's sector studies, see RG 33/35, vol. 49, file 3-11, vol. 1, "Studies – Ownership and Control of Canadian Industry," and vol. 50, file 3-11, vol. 2, "Studies – Ownership and Control of Canadian Industries," neither of which provides any noticeable discussion of the Canadian construction industry.

¹⁰⁶ Bothwell and Kilbourn, *C.D. Howe*, 236-237, 320; Newman, *The Canadian Establishment*, 327.

American construction contractor involved in the Alaska section of the line. The architects had specified single sources for some items, while the Puget Sound Construction Company, the US firm responsible for DEW Line construction in Alaska, had already placed contracts for many of the other standard items with American firms. As a result, Western Electric, which sought standardization across the line, was asking both of the Canadian construction contractors to purchase these items from the same suppliers. Procedures were in place for these contractors to justify the use of "exact alternatives," and J.A. Teeter, the joint CCC representative in Washington and DDP representative at the DEW Project Office, suggested in a message to DDP and DCL that these procedures be explored. Furthermore, he suggested that Canadian firms complaining about this situation to Ottawa should be advised to ask the Foundation Company and Northern Construction to justify the use of Canadian alternatives to Western Electric. Finally, Teeter explained that "we will not know until we see the standard lists how badly we are being hurt," but also that "I think we will find that a number of the chosen U.S. suppliers have Canadian subsidiaries or Canadian sales organizations, and I would also hope that a number of suitable Canadian alternatives will be approved, by WECO."¹⁰⁷

The efforts to remedy this situation met with some success, in part because of the Canadian subsidiaries that Teeter had identified in his message. DCL president R.G. Johnson made comparable observations when suggesting Canadian suppliers to DDP. Johnson noted that much of the material already contracted for by the Puget Sound Construction Company was made by Minneapolis Honeywell, and suggested their

¹⁰⁷ Teletype, J.A. Teeter, CCC, Washington, to R.E. Addison, DDP, R.G. Johnson, DCL, "Re: Standardization Items -DEW Line," 4 March 1955, DCC in-house file (DEW diplomatic).

Canadian subsidiary as “undoubtedly the best qualified to provide an alternative source in Canada,” with much the same holding true for Canadian General Electric and S.A.

Armstrong of Canada. Johnson also acknowledged that it would be “extremely difficult to do all the research involved, and under the circumstances impractical to try to develop Canadian alternatives for every item listed.”¹⁰⁸ By mid-March, both Canadian construction contractors had been given instructions – unfortunately not described in the available records – about the lists of standardized items where they were free to recommend Canadian suppliers.¹⁰⁹ It would appear, then, that efforts to rectify this situation met with at least some success in directing business to Canadian firms.

Furthermore, Johnson’s acknowledgement that Canadian subsidiaries of American firms constituted acceptably “Canadian” suppliers provides a useful further insight into the prevailing view amongst those in Ottawa who made decisions on defence construction projects.

Given the central role of prefabricated buildings in the DEW Line’s construction, DCL was also asked in early January 1955 to provide CCC and WECO with a list of Canadian companies capable of producing prefabricated modules as subcontractors to the main construction contractors.¹¹⁰ J.A. Teeter, the joint CCC representative in Washington and DDP representative at the DEW Project Office, who made this request, had suggested in an earlier letter to Johnson that “if two Canadian construction companies are chosen, I think we should do all possible to ensure their placing of considerable of the

¹⁰⁸ R.G. Johnson to R.E. Addison, EA to DM/DDP, “Re: Standardized Building Items – Project 572,” 16 March 1955, DCC in-house file (DEW diplomatic).

¹⁰⁹ J.A. Teeter to R.E. Addison, “Project 572: Committee Meeting #13, March 14th, 1955,” 16 March 1955, 2, DCC in-house file (DEW diplomatic).

¹¹⁰ Fagen, *A History of Engineering and Science in the Bell System*, 562-3; Teletype, J.A. Teeter, CCC, Washington, to R.G. Johnson, D.A. Golden, 4 January 1955, DCC in-house file (DEW diplomatic).

prefab business in Canadian industry. You would appropriately discuss this with the companies after contracts are awarded.”¹¹¹ Despite these plans, however, the contract for prefabricated roof and wall panels for hangars and garages was awarded to an American supplier, and not to Dominion Bridge of Montreal, which had been considered a serious contender, and which had been one of the firms originally bidding for the construction of the eastern half of the line itself. Teeter alerted DDP and DCL to the situation in case Dominion raised the issue with officials in Ottawa, and also explained how the contract had been lost. Dominion and some American suppliers lost out to an American supplier who proposed to supply a newer design of prefabricated panel that cost less, was lighter, and more watertight. Following meetings with Dominion Bridge officials, Teeter noted that “they obviously were not aware until very recently that a procurement of this nature must be competitive in accordance with USAF regulations.”¹¹² In this instance, a Canadian firm – and some of its American counterparts – had lost out because it was not able to technologically compete. The efforts of DCL and other government agencies to obtain preferential treatment, therefore, were not always sufficient in themselves; the firms they sought to benefit also had to be reasonably competitive with their American counterparts. Western Electric may have been willing to be obliging, but it was not prepared to compromise the project for the sake of a Canadian firm.

Broader concerns beyond simple economic interest were at play in obtaining these contracts for Canadian firms. R.G. Johnson later argued in a 1958 position paper on the Canadian construction industry that not only had the importance of the construction

¹¹¹ J.A. Teeter to R.G. Johnson, “Re: DEW Project,” 15 December 1954, DCC in-house file (DEW diplomatic).

¹¹² Teletype, J.A. Teeter, CCC, Washington, to R.E. Addison, DDP, R.G. Johnson, DCL, 22 February 1955, DCC in-house file (DEW diplomatic).

industry to the Canadian economy grown since 1950, but that it had gained considerable experience,

particularly in the north *with projects such as Pinetree, Mid-Canada Line and DEW Line all performed by Canadian contractors*. Thus where in 1950 we could not reasonably undertake to commit the Canadian construction industry to efficient and economic work in the areas where it has limited experience, the situation is entirely different today and there is no real reason why all defence works in Canada should not be carried out by the Canadian construction industry.¹¹³

Even if the corporations performing this work were the subsidiaries of foreign organizations, however, their personnel were Canadian. Beginning with the Pinetree Line, the exchanges of notes gave preferential treatment to the use of Canadian labour.¹¹⁴ These workers and their supervisors were gaining experience in the challenges and techniques of northern construction, and their skills were transferable, be it to other companies, or even possibly to new firms formed by some of these people.¹¹⁵ DCL's support for conditions favouring Canadian contractors was thus part of a long-term policy of representing the interests of the Canadian construction industry for work on defence infrastructure in Canada. By the time of the DEW Line, this policy was effective in guaranteeing that construction work would almost certainly be awarded to Canadian firms, even if many of them were subsidiaries of American corporations. As such, the corporation was acting as an instrument that allowed Ottawa to assert national interests in

¹¹³ Capital expenditures on construction as a percentage of GDP rose from 21% in 1950 to 28.3% in 1957. R.G. Johnson, "The Position of the Canadian Construction Industry in 1958," 1-2, DCC In-house file "US-CDN Diplomatic Agreements Affecting DCL". Emphasis in original.

¹¹⁴ The labour conditions are contained in paragraph three of the exchange of notes on the Pinetree Line.

¹¹⁵ The sector study on the Canadian construction industry undertaken for the Royal Commission on Canada's Economic Prospects noted the ease with which new firms could be established, but also pointed out that this was much less likely for engineering construction (work requiring specialized engineering knowledge and abilities) and the building of large units. Royal Bank of Canada, *The Canadian Construction Industry*, (Ottawa: Royal Commission on Canada's Economic Prospects, 1956), 58-64.

the building of these defence projects. It was, to repeat an earlier point, facilitating defensive expansionism.

At least DCL and other organizations could claim some form of success in representing the interests of the Canadian construction industry and its suppliers; when it came to supplying electronics equipment, Canadian corporations fared far worse, despite provisions in the DEW Line treaty intended to facilitate access to the project and strong interest on the part of Canadian corporations. Only two major electronics contracts were awarded to Canadian firms as part of the DEW Line. Collins Radio of Canada was awarded a \$4 million contract for tropospheric scatter communications equipment, while Canadian Marconi was awarded a \$2.3 million contract for the installation and maintenance of communications equipment at the various construction sites.¹¹⁶ Like a number of the construction companies, however, both of these firms were subsidiaries of foreign corporations; Canadian Marconi of a British firm, and Collins Radio of an American company. The Collins contract for the lateral communications had been the subject of nine other competing bids, a number of which had been received from Canadian firms, but almost all of these competitors were also subsidiaries.¹¹⁷ This state of affairs was not surprising; the following year submissions to the Royal Commission on Canada's Economic Prospects would describe a situation "perilously close to full foreign ownership both in final production manufacturing and in the supporting parts

¹¹⁶ "Contracts Placed by Western Electric Company in Canada as of May 29, 1957," LAC, RG49, vol. 465, file 200-3-4-4-3, vol. 1.

¹¹⁷ While the DDP summary implies the contract was ultimately awarded to Collins Radio of Canada, the original bid was submitted by its parent company in the United States, which stated in its proposal that 80% of the order would be subcontracted to Canadian firms, largely Collins Radio of Canada and Northern Electric. J.A. Teeter to R.E. Addison, "Project 572: Committee Meeting #13, March 14th, 1955," 16 March 1955, 2-3; "Project 572: Committee Meeting – April 25th, 1955," 26 April 1955, 2, DCC in-house file (DEW diplomatic).

industry.”¹¹⁸ In this field, therefore, Ottawa’s working definition of “Canadian company” appears to have been much the same as it was for construction firms and their suppliers. Operating within such a definition, there were a number of causes for this lack of success on the part of “Canadian” electronics and equipment firms. First, and most importantly, nothing comparable to the behind-the-scenes arrangement for construction provisions was made for this field, but a number of other factors, including the DEW Line’s status as an American project designed by Americans, Canada’s delay in formally approving the project, and the focus on the Mid-Canada Line as the country’s major air defence project meant that Canadian suppliers were at a disadvantage.

The United States proved itself willing to admit Canadian participation in the “bricks and mortar” element of the DEW Line, as was demonstrated by the special provisions for Canadian construction firms, but it arguably acted to guard its privilege in the high-tech areas of the undertaking – possibly a case of preferring the “new” versus the “old” economy, but domestic political considerations also played a role in American plans.¹¹⁹ The Canadian delay in formally approving the DEW Line may also have been a contributing factor to Canadian firms’ lack of success with electronics and equipment contracts. The experimental Countercharge/Corrode programme had been set up on Canadian territory in 1953, and its equipment tested through to 1954.¹²⁰ These experiments, run as an American undertaking through Western Electric, would have given the firms involved an advantage over their competitors in the United States and

¹¹⁸ Memorandum, W.A. MacKay to D.V. LePan, “References to Foreign Ownership and Control of Canadian Industry in the Submissions Made to the Commission,” 4 July 1956, LAC, RG33/35, vol. 50, file 3-11, vol. 2, “Studies – Ownership and Control of Canadian Industries.” The submission in question was from Canadian Aviation Electronics, one of the few independent Canadian companies in the field.

¹¹⁹ Ambassador in US to USSEA, Letter 2120, “DEW Line Conditions – Electronics Paragraph,” 17 December 1954, *DCER*, vol. 20, 1061-1062.

¹²⁰ Schaffel, *The Emerging Shield*, 210-212.

Canada. Not only had designs for equipment been finalized as a result of these tests, but the firms involved had also gained experience and lead time over their competitors.

While opportunities for Canadian companies to bid on DEW Line electronics and supply contracts did not depend on a commitment to the DEW Line from Ottawa, by the time the Canadian government formally chose to commit itself to the DEW Line, the deadlines for bids on many of these contracts had already passed or was rapidly approaching.¹²¹

The participation of Canadian companies was furthermore not necessarily predicated on a decision from Ottawa, but would have benefited to a considerable extent on the full functioning of the DEW Project Office which had been created to oversee the organizing and expediting of DEW Line construction and to facilitate Canadian input into the process. This organization of some thirty people, including Canadian representatives, ultimately formed part of the conditions laid out in the exchange of notes on the DEW Line, and did not assume its full size and capabilities until early 1955. By that time, there were only a few months in which to award many of the electronics contracts if the strict delivery schedules were to be maintained so that the line could be completed on time. Furthermore, it appears that pending the final negotiation of an agreement on the line, full consideration was given to Canadian sources only when an order exceeded \$25,000 in value. Delays in reaching an agreement on the DEW Line, it appears, may have had significant consequences for Canadian involvement in the supply of electronics for the project.¹²²

¹²¹ See the "Project 572 Committee Meeting" reports in DCC in-house file (DEW diplomatic), which consist of regular reports to DDP from J.A. Teeter, the CCC representative in Washington, DC who also served as DDP's representative at the DEW Project Office in New York. On Teeter's multiple roles, see D.A. Golden to R.G. Johnson, 10 December 1954; R.G. Johnson to John A. Teeter, 15 December 1954; R.G. Johnson to D.A. Golden, 15 December 1954, DCC in-house file (DEW diplomatic).

¹²² Minutes of the 23rd meeting of the ACND, 7 February 1955, Appendix "A," 3, LAC, RG2, series B2, vol. 6183. Unfortunately, the DDP files that might best be able to shed light on these matters (listed as part

Much of the government's postponement of a decision on Canadian DEW Line participation revolved around the Mid-Canada Line. Undertaken in order to minimize the chances that Canada would be required to financially participate in the Distant Early Warning Line, to provide an opportunity for Canadian industry in construction, electronics, and transportation, the MCL rather than the DEW Line was the focus of Canadian efforts on air defence between 1953 and 1957.¹²³ If the Canadian government and its agencies were not as concerned about the provision of electronics and equipment for the DEW Line as they were for later projects, this may well have been in part because of the opportunities offered by the MCL. In their discussions, Canadian officials had revealed that they considered the long-term consequences and opportunities of DEW Line operation to be more important than their short-term counterparts. The immediate benefits from involvement in the construction of the Distant Early Warning Line were therefore, in some respects, gravy. Unlike the Pinetree Line that preceded it, the DEW Line was an entirely US-funded operation; what Canada obtained in return for its participation was the construction work, the supply of some building materials, and a small part of the electronics requirements.

Despite any pre-eminence that the Mid-Canada Line may have held in the provision of electronics and equipment, however, comparable aspects of the DEW Line remained a subject of concern for Ottawa, with the primary concern being the precedent that might be established for future defence projects built on Canadian territory. As a result, the language in the exchange of notes governing the provision of electronic equipment proved contentious. Shortly after Cabinet granted its initial approval in

of the "350" file block that appears in finding aid 49-6) do not appear to have survived as part of the department's papers held by Library and Archives Canada.

¹²³ Jockel, *No Boundaries Upstairs*, 78-90; Eayrs, *In Defence of Canada, Volume III*, 368-372.

principle to the project in November 1954, Secretary of State for External Affairs Lester Pearson noted in a telegram to Canadian ambassador ADP Heeney in Washington that while

we do not anticipate that the wording of this paragraph is likely to have much effect on the final decision as to what electronic equipment is provided from Canadian sources, ...we are concerned about the underlying principle and its application to future projects. In our opinion the strategic importance of industrial production cannot be overlooked in defence planning, nor the need to develop alternative sources of supply in this country. ...It is for these reasons that we maintain the principle that electronic equipment for radar systems on Canadian territory should, as far as practicable, be manufactured in Canada. The determination of practicability in each instance must be a matter of consultation between Canada and the United States. The basis of such consultation would be recognition of the fact that, in the interests of mutual defence, practicability must include strategic as well as commercial or economic considerations.¹²⁴

At a subsequent meeting arranged with American officials in mid-December, David Golden, the Deputy Minister of Defence Production, and M.H. Wershof, a legal advisor from External Affairs, joined by representatives from DDP's Washington office and the Canadian Embassy, met with US officials. While the Americans made it clear that the meeting was "informal and would not give rise to commitments on either side," it was welcomed because it "would provide an opportunity for the direct exposure of Mr. Lewis [the Assistant Secretary of the Air Force] to Canadian views on the subject."¹²⁵

At this meeting, Wershof "traced the history of the practicability formula from the Pinetree agreement to the present and set out the reasons why the Canadian government placed such great store by the maintenance of the principle."¹²⁶ While acknowledging

¹²⁴ SSEA to Ambassador in US, Telegram EX-2136, "DEW Line Provision of Electronic Equipment," 22 November 1954, *DCER*, vol. 20, 1052-1053.

¹²⁵ Ambassador in US to SSEA, Telegram WA-2067, "DEW Line Conditions," 9 December 1954, *DCER*, vol. 20, 1060.

¹²⁶ Ambassador in US to USSEA, Letter 2120, "DEW Line Conditions - Electronics Paragraph," 17 December 1954, *DCER*, vol. 20, 1061. The American draft provision to which the Canadians were reacting can be found in Ambassador in US to SSEA, Telegram WA-1932, "DEW Line: Provision of Electronic Equipment," 10 November 1954, *DCER*, vol. 20, 1038-1039.

that the urgent nature of the DEW Line might well mean that opportunities for Canadian firms would be much the same regardless of whether the Canadian or the American provisions on electronics were accepted – an echo of Pearson’s earlier message – Wershof noted that the DEW Line might not be the last radar line to be built on Canadian territory and that

it was important therefore that the United States authorities should know of the strength of view of the Canadian Government on the principle of practicability involved in the electronics paragraph in the hopes that in whatever future projects might have to be undertaken, a real opportunity would be given to the Canadian electronics industry to prepare itself to meet construction timetables.¹²⁷

Golden emphasized that “the main concern of the Canadian government was to maintain an adequate *defence* electronics industry,”¹²⁸ which explained its strong interest in having the formula for “practicability” take into account the need to develop this industry. On the other hand, the American proposal had laid out conditions that would have favoured US firms, particularly those already involved with DEW Line development work.¹²⁹ The primary American concerns with the Canadian counterproposal appeared to be the difficulty of defending any sort of preferential treatment for Canadian suppliers that might result from the practicability clause, as well as the possibility of delays brought about by the need to address the issues of “practicability” if the Canadian government objected to American decisions.¹³⁰

¹²⁷ *Ibid.*

¹²⁸ *Ibid.* Emphasis in original.

¹²⁹ The American definition of “equal consideration” took into account price, including transportation costs, quality, and delivery requirements, but most importantly and most contentiously proposed that “subject to the above both the United States and Canada recognize the desirability of allocating the procurement of any piece of electronic equipment to such source whether United States or Canadian that is currently in production for such item or a closely related item,” a condition which implicitly favoured US firms. Ambassador in US to SSEA, Telegram WA-1932, “DEW Line: Provision of Electronic Equipment,” 10 November 1954, *DCER*, vol. 20, 1039.

¹³⁰ *Ibid.*

While the disagreement over electronics procurement was eventually resolved in favour of Ottawa's approach to "practicability," the Canadian predictions that these conditions would have little effect on the actual procurement for the DEW Line were borne out.¹³¹ In March of 1955, for instance, the Cabinet Defence Committee noted that some equipment and installation work had been awarded to Canadian Marconi, and that discussions on this issue were continuing, but also noted that Canadian prices in many areas were not competitive with their American counterparts. According to the minutes of the meeting, Western Electric had provided the "utmost cooperation" in their dealings with Canadian firms and government departments. Canadian representatives on the PJBD also acknowledged the "sympathetic treatment" Canadian interests had received in DEW Line planning, but unfortunately did not provide any further specifics.¹³² Despite this helpfulness and the actions of Canadian agencies, substantial Canadian participation in these fields was not forthcoming.

Over a year later, a DEW Line Progress Report from the DEW Co-Ordinating Committee noted that the Department of Defence Production was by that point prepared

to accept in lieu of the "practicability clause" on electronic procurement, participation by Canadian firms in bulk procurements of common items with other USAF requirements, provided that satisfactory procedures can be worked out with Air Materiel Command to implement it. Canadian sources will be extended an equal opportunity to tender on other common items not of an electronic type.¹³³

¹³¹ The proposed Canadian conditions on electronics from mid-November are essentially the same as those in the final exchange of notes. USSEA to SSEA, 16 November 1954 "Distant Early Warning System," *DCER*, vol. 20, 1047-1052.

¹³² Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6; Minutes of the 23rd meeting of the ACND, 7 February 1955, Appendix "A," 3.

¹³³ "Distant Early Warning Co-Ordinating Committee Progress Report #9," 20 July 1956, 4, NAC RG24, acc.83-84/167, box 150, file 1279-150. The DEW Co-Ordinating Committee, which held its first meeting in late February of 1955, was established "to provide a means of consultation and co-ordination of activities between officers of departments and agencies, where appropriate, on matters concerning the DEW project which involves more than one department. The Co-ordinating Committee will not be responsible for or exercise executive authority on subject recognized as the responsibility of specified departments." Due to

In other words, the Canadian electronics industry had not been able to reap direct benefits from the DEW Line as easily as had the construction industry, and in compensation alternate arrangements had been made with the United States. As historian Danford Middlemiss has noted, while the “‘equal consideration’ principle set an important precedent for later defence production sharing agreements, the DEW line agreement also revealed the practical limitations of Canada-United States economic defence collaboration after the Korean War.”¹³⁴ The agreement, Middlemiss argues, was limited to this single case, rather than applying to a broader range of projects, while only a few defence products such as electronics equipment were explicitly involved. The provisions for the use of “qualified Canadian labour,” he observes, meant that “the agreement was oriented to construction, not to technology.”¹³⁵ Furthermore, the ad-hoc nature of the electronics provisions, which led to bids being evaluated on a case-by-case basis, the loopholes allowed to the United States (the economic criteria were only “factors to be taken into account” rather than definite guidelines), and the more favourable position of the American electronics firms already established in this field, meant that very little of the electronics work was awarded to Canadian firms. This particular problem with American and joint Canadian-American defence projects in Canada was to be encountered again during the DEW EAST project discussed below and even more

its interdepartmental nature, the minutes of this committee’s meetings shed light on a number of issues relevant to the planning and construction of the DEW Line. While a number of the meetings discussed construction, DCL does not appear to have had membership on the committee or to have sent representatives to any of its meetings. Minutes of the 1st Meeting of the Distant Early Warning Co-ordinating Committee, 23 February 1955; Memorandum, A/VCNS to Naval Secretary, “Distant Early Warning Co-ordinating Committee,” 24 March 1955, NAC RG24, acc.83-84/167, box 150, file 1279-150. The committee’s records can also be found in DHH 73/409.

¹³⁴ Danford W. Middlemiss, “Defence Co-Operation,” in *Partners Nevertheless: Canadian-American Relations in the Twentieth Century*, Norman Hillmer, ed., (Toronto: Copp Clark Pitman, 1989), 174.

¹³⁵ *Ibid.*

noticeably during the debate over the Continental Air Defence Integration North programme, discussed in Chapter Six, that followed closely behind the DEW Line.¹³⁶

Canadian companies were also involved in site selection and the transportation of construction materials, but DCL, unsurprisingly, did not play any noticeable role in these areas. Canadian aviation firms received a substantial boost from DEW Line requirements, with the aerial survey for site selection being awarded to Spartan Air Services of Ottawa.¹³⁷ Canadian air carriers, already busy with the Mid-Canada Line airlift, were used to the remainder of their capacities, providing almost eighty-five per cent of the commercial flights, in which they were joined by a USAF airlift effort for particularly large and bulky items.¹³⁸ The Northern Transportation Company, a subsidiary of the Crown corporation Eldorado Mining and Refining Company, provided water transport down the Mackenzie River for stations near the river delta.¹³⁹ In addition to Northern

¹³⁶ One of the largest single electronics contracts, and quite possibly *the* single largest electronics contract awarded to a Canadian firm during the construction of the DEW Line was the contract for lateral communications (UHF tropospheric scatter) equipment awarded to Collins Radio of Canada, which came to a total of just over \$4 million by the end of May 1957. The two major construction contractors had handled contracts totaling \$192 million, including a \$2.2 million subcontract to Canadian Marconi for the installation and operation of radio equipment. "DEW Project: Contracts Placed by Western Electric Company in Canada as of May 29, 1957".

¹³⁷ "Canada Gets Ready to Build Dew-Line," *Financial Post*, 12 February 1955, 1; Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6; Reports of a January 1955 planning meeting suggest that WECO had apparently been considering carrying out the siting surveys itself. J.A. Teeter to R.E. Addison, "Project 572, Committee Meeting #6, January 17th, 1955," DCC in-house file (DEW diplomatic). For a description of Spartan Air Services' aerial survey operations, see Larry Milberry, *Air Transport in Canada, Volume 1*, (Toronto: CANAV Books, 1997), 444-455.

¹³⁸ "DEW Line Statistics," n.d., but probably fall of 1957, LAC, RG 49, vol. 465, file 200-3-4-4-3, vol. 1.

¹³⁹ Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6. Northern Transportation was begun as Northern Waterways Limited, was formally acquired by Eldorado in 1937 and renamed Northern Transportation Company Limited (NTCL). As a consequence of the federal government's takeover of Eldorado in January of 1944, NTCL was also a crown corporation. By 1954 it was the largest freight-handling operation on the Mackenzie River system; its twenty-one vessels and sixty-six barges had carried 79,000 tons of freight in 1953. Freight was carried from Waterways, Alberta, to Aklavik, NWT, Beaverlodge in northern Saskatchewan, Yellowknife, and Port Radium. The uranium mine at the latter was, of course, the primary reason why it had initially been acquired by Eldorado. The Hudson's Bay Company also operated a small fleet of tugs and barges, primarily to support its trading operations, since it had given up much of its role as a common carrier in 1948. Finally, the Yellowknife Transportation Company, controlled in part by the Imperial Oil Company, was responsible for the distribution of petroleum from Norman Wells along the river as well as handling some freight in the Great

Transportation, the Canadian government also expected that Imperial Oil's oilfield at Norman Wells would play a role in this undertaking. Norman Wells was conveniently located for shipping along the river system, but perhaps more importantly, given that petroleum, oil, and lubricant (POL) requirements were expected to form more than half of the annual supply requirements for the DEW Line once it was in operation, it could be a contender for supplying these essentials.¹⁴⁰

The issue of transportation had been receiving attention for quite some time already; as early as October of 1954, the Advisory Committee on Northern Development had discussed the matter, with a special emphasis of the role of the Mackenzie River and the need to have Canadian companies perform the work, referring the issue to its Transportation sub-committee for additional study.¹⁴¹ The president of Northern Transportation had been made a member of the sub-committee, which made its report in late November of 1954.¹⁴² In the introduction to its report, the sub-committee noted that

Slave Lake area. For a short history of river freighting on the Mackenzie River and Northern Transportation, including a brief discussion of the DEW Line operations, see Robert Bothwell, *Eldorado: Canada's National Uranium Company*, (Toronto: University of Toronto Press, 1984), 351-368. The records of Northern Transportation, including reports on the DEW Line sealift in the first years of the line's operation, form part of the Eldorado Nuclear records at the National Archives (RG134), and access to them is subject to donor restrictions requiring ATIP review. See also ACND Document T/1, "Transportation Implications of the D.E.W. Line," 22 November 1954, 3, LAC, RG2, series B-2, vol. 6181, pt.3; Zaslow, *The Northward Expansion of Canada*, 315.

¹⁴⁰ ACND Document ND-149, "Development of the Mackenzie River System," 23 November 1955, NAC RG2, series B-2, vol. 6181, pt.4. The Imperial Oil oilfields and refinery at Norman Wells had been shut down following their initial discovery and operation, but had been reactivated in 1932 as part of the uranium mining boom on Great Slave Lake and during the Second World War were the source of oil for the controversial and expensive Canol Pipeline project that stretched from Norman Wells to a refinery at Whitehorse, Alaska. New wells were drilled to expand the field's production capacity, but with the end of the war demand for this oil had decreased. Zaslow, *The Northward Expansion of Canada*, 181-183, 217-219, 320-324; Hamilton, *Arctic Revolution*, 47-54; Coates, *Canada's Colonies*, 176-177.

¹⁴¹ Minutes of the 20th Meeting of the ACND, 12 October 1954, 4-5, LAC, RG2, series B-2, vol. 6183, part 2.

¹⁴² Minutes of the 21st Meeting of the ACND, 8 November 1954, 2; Minutes of the 22nd Meeting of the ACND, 13 December 1954, 1-3, LAC, RG2, series B-2, vol. 6183, part 2. The report included consideration of Canadian air and sea transportation capabilities, the requirements of the ongoing mid-Canada Line, and the possibility of ongoing logistics support for the DEW Line once it was operational. See also ACND Document ND-113, which summarizes the report, and Document T/1, the report itself.

part of the Canadian contribution to the DEW Line might consist of the provision of transportation facilities, especially in the Mackenzie District and the Western Arctic.

"This would have the advantage," it noted, "of maintaining effective Canadian control over these routes which will be important for the development of the Canadian north as a whole."¹⁴³ The Department of External Affairs held similar views on the benefits of Canadian involvement in DEW Line transportation and resupply. In December of 1954, it argued in favour of Canadian

participation in the DEW Line in such a way that the Canadian economy will get the maximum benefit from our contribution and [that we] should not be concerned that the dollar value of our participation in the DEW Line will be low relative to the total cost of the project. For example, two or three million dollars spent on the improvement of the transportation system down the Mackenzie River and along the Arctic coast in the Beaufort Sea – Coronation Gulf area would have real value in the successful accomplishment of that project and at the same time would be of benefit to the Canadian communities in that area.¹⁴⁴

Such an effort would necessarily involve Northern Transportation Limited. Once again, a Crown corporation was to be used as an instrument of national policy; in this instance, the extension of government control and government-encouraged development of the Canadian northland.

Although the transportation sub-committee concluded that with the exception of any assistance that Northern Transportation could provide, that the United States should handle sea supply during the construction phase, it "agreed to recommend that Canada should consider assuming responsibility for the annual supply of the D.E.W. line during the operational phase." Consideration should also be given, it argued, to requiring the use

ACND Document ND-113, "Report of the Transportation Sub-Committee," 6 December 1954; ACND Document T/1, "Transportation Implications of the D.E.W. Line," 22 November 1954, LAC, RG2, series B-2, vol. 6181, pt.3.

¹⁴³ *ibid.*, 1.

¹⁴⁴ Draft telegram prepared R.A. Mackay, Assistant USSEA, for SSEA to Head, UN Delegation, 2 December 1954, "Canadian Participation in the Distant Early Warning Line," *DCER*, vol. 20, 1054-1055. The draft memorandum was not sent but was initialed by Pearson.

of Canadian carriers if the task were financed by the United States. Northern Transportation, it was expected, could eventually assume the task in its entirety.¹⁴⁵ This Crown corporation, therefore, could be used to assert a Canadian national presence in the Arctic and as part of the ongoing operation of the DEW Line. By November 1955, a working group created at the transportation sub-committee's suggestion concluded that while significant increases in capacity could not be created by the 1956 shipping season, in following years Canadian agencies could take over the supply of Western Canadian Arctic sites and some of the most eastern sites in Alaska if suitable coastal vessels and transshipment facilities were provided and some improvements were made to the Mackenzie River system.¹⁴⁶

The Mackenzie River had become an important route for supply of the Western Arctic due to the difficulties and dangers of ocean transportation through the Bering Strait and along the Alaska coast with its difficult ice conditions. By 1954, almost all of the freight for destinations in the Western Canadian Arctic was sent down the Mackenzie River by barge and then transferred to small coastal vessels at Tuktoyaktuk.¹⁴⁷ Further improvement of the river system and the provision of additional rail and road transportation links was seen as essential to the ongoing development of the north, and had formed part of the Territorial government's briefing to the Royal Commission on

¹⁴⁵ Minutes of the 22nd meeting of the ACND, 13 December 1954; ACND Document ND-113, "Report of the Transportation Sub-Committee". At the suggestion of the sub-committee, a working group was established to study the expansion of the river transportation system and consider how much freight could be handled in 1956 and in subsequent years. ACND Document ND-148, "Report of the Transportation Sub-Committee," 23 November 1955; appended "Report of the Working Group Established to Study the Possible Expansion of the Mackenzie River System," 23 November 1955, LAC, RG2, series B-2, vol. 6181, pt.4.

¹⁴⁶ "Report of the Working Group Established to Study the Possible Expansion of the Mackenzie River System," 23 November 1955, 3. See also ACND Document ND-149, "Development of the Mackenzie River System," 23 November 1955, LAC, RG2, series B-2, vol. 6181, pt.4.

¹⁴⁷ ACND Document T/1, "Transportation Implications of the D.E.W. Line," 2.

Canada's Economic Prospects in 1955.¹⁴⁸ Like the Canol project during the Second World War, barge trade on the Mackenzie offered a secure, interior route for strategic defence. While the route through the Bering Strait and round the north of Alaska was dangerously close to Soviet territory, the Soviet military did not present the greatest risk to that supply route. The necessity of rounding Point Barrow, the northernmost point of Alaska, where sea ice presented hazards even during the height of the navigation season, made resupply via the Bering Strait a riskier proposition than via the Mackenzie River.¹⁴⁹

While improvements to the Mackenzie River route were essential to plans for northern development, they would also be necessary to accommodate the traffic generated by the new arctic radar network. Western Electric's estimates for the completed DEW Line's transportation requirements were considerable, and for the nine sites Canada wanted to supply via the Mackenzie River amounted to some 1,569,000 gallons of POL, which would make up the majority of the shipping requirements. The other sites in Canada would require an additional 2,724,000 gallons of POL as well as an unspecified volume of freight.¹⁵⁰

While the details of the negotiations for DEW Line transportation requirements during its operational phase were not an area of responsibility for DCL, an examination of their outcome is worthwhile because it provides insight into another case of Crown corporation instrumentality. Northern Transportation provides a parallel case of a

¹⁴⁸ ACND Document ND-149, "Development of the Mackenzie River System," 23 November 1955; Robertson, *Memoirs of a Very Civil Servant*, 176-8. Robertson's memoirs present a concise version of the case for the construction of the railway as an essential part of development plans.

¹⁴⁹ At the January 1955 meeting of the PJBD, for instance, the US Navy representative read a message from the USN's Chief of Naval Operations on the resupply of Canadian DEW Line sites which noted that one of the challenges to resupply in the area was "the presence of the Polar ice pack between Barrow and Barter Island [which] permits only a short annual operating period." Appendix "A" to the 23rd Meeting of the ACND, 7 February 1955, 4.

¹⁵⁰ "Report of the Working Group Established to Study the Possible Expansion of the Mackenzie River System," 23 November 1955, 2.

“Crown” that bolstered national interests. Using NT, Canada assumed responsibility for DEW Line sealift in the Mackenzie River Delta area and in the eastern Arctic. In addition to serving government objectives, these events proved to be a particular boon for Northern Transportation. In his history of its parent company, Eldorado, Robert Bothwell notes that NT not only received a contract for the transportation of fuel and building supplies during the construction of the line, but also a contract to supply some twenty-five stations once the line was completed. NT also acquired the remainder of the Hudson’s Bay vessels used on the Mackenzie River when the latter company abandoned its transport operation, and DEW Line business also led it to begin operations along the coastline beyond the river delta. Within a few years the company had become the common carrier for the western Arctic and for eastern Alaska.¹⁵¹ By using the opportunity presented by the Distant Early Warning Line, therefore, Northern Transportation was able to gain control of transport operations along the Mackenzie River and along the adjacent arctic coast. This work would be carried out by a corporation that was not only Canadian, but also the subsidiary of a Crown corporation. As such, NT was more likely to continue to implement Ottawa’s northern ambitions than a private sector analogue.

If DEW Line construction had substantial consequences for sea transportation in the Canadian arctic, it also significantly affected air transport in the same area. As historian Morris Zaslow would later note, the transportation requirements for the construction and operation of the DEW Line would have significant and lasting consequences. “These air operations,” he argued,

¹⁵¹ Bothwell, *Eldorado*, 365-366.

represented an unprecedented windfall for the Canadian air industry. One company [Spartan] secured a valuable contract for help with the preliminary air surveys and ground support operations, and eleven airlines, flying many types of aircraft, received very lucrative work during the hectic construction phase.... The high profits transformed some of the companies – Pacific Western, Maritime Central, and Transair – into sizeable regional air carriers. Air travel to and from the Arctic was made infinitely easier by all the installations after 1945 and y the considerable traffic the many stations generated. Scheduled air services were regularly flown from Montreal, Winnipeg, and Edmonton to Frobisher Bay, Cambridge Bay, and Resolute. The DEW Line itself was a busy air route for military and commercial aircraft delivering supplies, transferring staffs, and bringing in inspecting officers, doctors, clergymen, and visitors. By 1958, it was asserted, “as one measure of the profound change wrought by the DEW Line, you may now fly completely across the North American Arctic without losing sight of the lights of a human habitation, and rarely being more than 25 miles from an airstrip.”¹⁵²

The arctic tour undertaken by Governor-General Vincent Massey in 1956 provides an ideal example of the changes to northern transportation wrought by the Distant Early Warning Line. As Massey’s biographer, Claude Bissell, notes, this trip would have been virtually inconceivable, and almost impossible, a few years earlier. Almost twenty years before, for instance, one of Massey’s predecessors, Lord Tweedsmuir, had visited parts of the Arctic, but only a part of that 1937 trip had been by aircraft; Massey and his party, on the other hand, visited the whole of the Northwest Territories and overflew the North Pole in a TCA North Star. The trip had been made possible by the widespread proliferation of navigational aids and airstrips at DEW Line sites, installed to enable their construction, operation, and resupply, also made possible trips like these.¹⁵³

Perhaps the greatest consequences of the construction of the DEW Line, however, were for the inhabitants of the Arctic, especially the Inuit, although other indigenous peoples in Canada’s northern regions were affected by the growing presence of

¹⁵² Zaslow, *The Northward Expansion of Canada*, 328.

¹⁵³ Claude Bissell, *The Imperial Canadian: Vincent Massey in Office*, (Toronto: University of Toronto Press, 1986), 253-257. See also Gordon Robertson’s description of a 1954 aerial tour of the Arctic with Minister of National Defence Brooke Claxton, see Robertson, *Memoirs of a Very Civil Servant*, 124-125.

southerners made possible by a new federal focus on the north and the vastly easier access to the area, much of which came as a consequence of defence operations, including the DEW Line.¹⁵⁴ John David Hamilton argues in *Arctic Revolution* that although deliberate efforts were made to keep DEW Line stations and other military installations away from existing or planned Inuit communities, such settlements often grew up around the facilities. In a number of cases, Hamilton notes, settlement sites did not come into existence until the DEW Line stations were built, and it was often the construction effort itself that drew Inuit from the land to the areas around the stations.¹⁵⁵ DEW Line construction was taking place at the same time as ambitious government plans for the development of the north were being formulated in Ottawa. In the wake of the Distant Early Warning Line, DCL would play an important role in plans for the development of the small settlement at Frobisher Bay (now Iqaluit) as a model arctic town and government administrative centre. On a broader scale, Kenneth Coates has argued that the DEW Line, combined with other southern involvement in the Canadian north, including the expanded exploitation of natural resources, the fur trade, and increased tourism "all increased the scale if not the shape of the northern economy."¹⁵⁶

Another significant consequence of the DEW Line's construction and operation for northern inhabitants was the pollution and environmental degradation that was an almost inevitable consequence of the line's existence, and which was worsened by the manner of its operation. Wastes and surplus material, for instance, were either buried in

¹⁵⁴ *ibid.*, 271-305; Hamilton, *Arctic Revolution*, 42-44. Scholarly examinations of the arrival of the DEW Line and its effects on the Inuit are a relatively recent phenomenon; see, for example, David Neufeld, "Commemorating the Cold War in Canada: Considering the DEW Line," *Public Historian*, 1998 20(1): 9-19; Maxime Begin, "Presence of the Akiillirmiut in Hall Beach (Nunavut): Inuit memories of the DEW Line," (preliminary version; not for quotation without author's permission), paper presented at the Second IPSSAS seminar, Iqaluit 2003. Seminar website at <http://www.hum.ku.dk/ipssas/index/index.htm>.

¹⁵⁵ Hamilton, *Arctic Revolution*, 65-67.

¹⁵⁶ Coates, *Canada's Colonies*, 211.

pits on land or left out on the ice to sink into lakes or the sea when the ice melted. The consequence has been contamination of the Arctic environment by persistent organic pollutants, especially polychlorinated biphenyls (PCBs), the presence of copper, lead and zinc, and petroleum contamination from spillage and improper disposal of fuel and lubricants. Over thirty tons of PCBs, for instance, were brought to the arctic in the United States, Canada, and Greenland, for DEW Line construction and maintenance. Further exacerbating the problems of these pollutants was the arctic climate, where cold and limited sunlight slowed the natural degradation of pollutants. Many of these chemicals would concentrate in the food chain – a particular concern for aboriginal inhabitants consuming “country foods” – and were also readily spread by water.¹⁵⁷ The necessary cleanup, according to an August 2001 DND estimate, would cost some \$320 million.¹⁵⁸

Building the Line

While Defence Construction and other government agencies were working to represent Canadian interests and maximize Canadian involvement in the DEW Line, the United States forged ahead with the construction effort itself. Work on finalizing the locations for the numerous radar sites continued as the Exchange of Notes concerning the

¹⁵⁷ Canada, Office of the Auditor General, *Report of the Auditor General to the House of Commons, November 1996*, (Ottawa: Minister of Public Works and Government Services Canada, 1996), 22-22. Fortunately, however, nuclear waste is not among the contaminants, although it could have been: plans to power and heat DEW Line sites with small nuclear reactors never came to pass due to a fatal accident with the prototype SL-1 reactor in early January 1961. Susan M. Stacy, *Proving the Principle*, (Idaho Falls, Idaho: Idaho Operations Office of the Department of Energy, 2000, DOE/ID-10799), 138-157.

¹⁵⁸ A 1985 evaluation of the intermediate or “gap filler” sites that were abandoned in 1962/3 and subsequently transferred to NANR jurisdiction revealed the presence of waste oil, aviation and diesel fuel, capacitors and transformers containing PCBs, solvents, chlorofluorocarbons (CFCs), and lindane. Some 5,000 litres of PCBs were removed from the sites at that time. Environment Canada, *The State of Canada's Environment – 1996*, (Ottawa: Minister of Public Works and Government Services, 1996), 9-23-9-24; K.L. Capozza, “The DEW Line: Ditched drums and all,” *Bulletin of the Atomic Scientists*, January/February 2002, 15. On cleanup estimates, see “The Distant Early Warning Line Clean up Project,” DND backgrounder BG-01.013, 31 August 2001, http://www.dnd.ca/eng/archive/2001/aug01/31distant_b_e.htm.

DEW Line was tabled in Parliament in May of 1955.¹⁵⁹ Construction of the line required the airlift of supplies on a large scale, and three major sealift operations in the summers of 1955, 1956, and 1957. Icebreaker support for the sealift in the eastern Arctic was provided by a Canadian icebreaker, HMCS *Labrador*. Canadian requirements for the use of Canadian coastal shipping were waived for the construction effort so that US owned and manned vessels, many from the United States Navy's Military Sea Transportation Service could be used in the sealift.¹⁶⁰ At 0830 hours on 8 July 1955, the first Canadian unloading of DEW Line supplies was carried out at Cape Fisher by a helicopter from HMCS *Labrador*. This also marked the only recorded use of Canadian military aircraft to transport DEW Line construction supplies – as mentioned above, the remaining Canadian aircraft were all civilian machines under contract to the USAF.¹⁶¹

The Distant Early Warning Line was a substantial undertaking, and its transportation requirements were similarly massive. As of early fall, 1957, the transportation effort had delivered 352,300 short tons to the DEW Line.¹⁶² The airlift was an unprecedented effort for the support of a construction project. Aircraft had delivered 106,500 tons of the total, with 24,612 commercial flights, 84% of them Canadian, and over 440 USAF flights. Commercial aircraft had flown some 16.5 million air miles, while the USAF flights covered over 8.5 million air miles. Navy convoys had delivered

¹⁵⁹ Distant Early Warning Co-Ordinating Committee Progress Report #3, 19 May 1955, 1-2, 4.

¹⁶⁰ Minutes of Canada-United States Military Cooperation Committee Meeting 1/55, 2-5 March 1955, 3, DHH 80/540; Copy of PC 1955-729, appended to Distant Early Warning Co-Ordinating Committee Progress Report #5, 21 October 1955, 5, NAC RG24, acc.83-84/167, box 150, file 1279-150.

¹⁶¹ "The History of the Communications & Electronics Branch, Chapter 6," http://www.dnd.ca/commelec/brhistory/chap6_e.htm; Minutes of the 101st Meeting of the Cabinet Defence Committee, 3 March 1955, 6.

¹⁶² A number of other sources give higher totals for the tonnage transported; it is possible that the source below refers only to Canadian sites while the other sources refer to the line as a whole. Bruce-Briggs, for example, gives a ballpark figure of a half million tons, a figure that can be found elsewhere. Bruce-Briggs, *The Shield of Faith*, 86.

211,000 tons, while Mackenzie River barges had delivered 15,100, tractor train operations 14,700, Alaska Freight Lines Barges 3,600, and commercial ships 1,400 tons.¹⁶³ The DEW Line construction effort therefore represented a broad, mechanized assault on the North that was designed to emplace an occupying force – the personnel who would operate the line year-round.

Building, as mentioned above, entailed extensive use of prefabrication, and both buildings and the outdoor electronic equipment, such as antennas, had to be designed to withstand harsh Arctic conditions and, in many cases, the salty air that was an inevitable consequence of station locations near shorelines. The final cost of the line remains unclear, particularly since many of the works on continental air defence and on the Canadian north fail to provide any figures. Even the lowest estimates, however, are staggering. Morris Zaslow, for instance, gives the total as some \$500 million, although higher figures are in circulation. Air transport costs alone totaled some \$49.9 million. Adjusted for inflation, Zaslow's conservative figure gives a 2005 equivalent total expenditure of some \$3.6 billion Canadian on the building of the Distant Early Warning Line.¹⁶⁴

On 15 July 1957, the DEW Line, stretching from Cape Dyer to Cape Lisburne, Alaska, was declared technically ready. The USAF issued a press release on 30 July 1957, stating that WECO had successfully completed pre-operational trials of the line and

¹⁶³ Although relatively few in number, many of the USAF flights were carried out by heavy transport aircraft like the four-engine Douglas C-124, which were essential for the delivery of bulky cargo like construction equipment. "DEW Line Statistics," n.d., but probably between 27 August and 31 October 1957, NAC RG49, vol. 465, file 200-3-4-4-3, vol. 1. Regular summaries of the delivery efforts can be found in the ACND minutes, NAC RG2, series B-2, vol. 6183.

¹⁶⁴ Fagen, *A History of Engineering and Science in the Bell System*, 456-457, 562-563; Zaslow, *The Northward Expansion of Canada*, 329; "DEW Line Statistics". The Bank of Canada inflation calculator provides a 2005 value of \$3,605,714,285.71 for a \$500,000,000 1957 construction cost. http://www.bankofcanada.ca/en/inflation_calc.htm, 28 June 2005.

had been notified that the system would be accepted and placed on an operational basis on the 31st. The following day, the eastern and western portions of the line were placed under the operational control of USAF Air Defense Command and Alaskan Air Command, respectively. Ceremonies to mark the official turning over of the line from Western Electric to the USAF and from the USAF to Federal Electric, which held the operation and maintenance contract, were held in both Alaska and Canada. The former was held on 24 October, but American plans to hold the latter at Cambridge Bay worried Canadian officials, who were concerned about the potential for negative publicity. An unofficial and unpublicized ceremony was eventually held at Cambridge Bay on 12 December.¹⁶⁵

As it was initially completed, prior to extensions along the Aleutian Islands and across the Greenland ice cap, the DEW Line stretched from Cape Lisburne in Alaska to Cape Dyer on Baffin Island. Fifty-eight stations were built along the line, including main stations some five hundred miles apart, auxiliary stations at roughly one hundred mile intervals, with intermediate stations providing gap filler coverage between the auxiliary stations. Four stations in Greenland and one in Iceland were later added to extend early

¹⁶⁵ DEW Co-Ordinating Committee Progress Report #18, 7 August 1957, 1, NAC RG24, acc.83-84/167, box 150, file NSS1279-150, vol. 1; NORAD Selected Chronology, <http://www.spacecom.af.mil/norad/maschron.htm>; Minutes of 36th Meeting of ACND, 15 October 1956, 1-2; Minutes of 37th Meeting of ACND, 12 November 1956, 1 ; Minutes of 38th Meeting of ACND, 17 December 1956, 1, NAC RG2, series B-2, vol. 6183, pt.3. At the 36th meeting of the ACND, F.R. Miller, who was representing the Chiefs of Staff, "questioned the advisability of a ceremony at Cambridge Bay. It had probably been suggested by the U.S. authorities since a single ceremony at Point Barrow might give the impression of ignoring Canadian co-operation in the line. On the other hand a ceremony in Canada, at which responsibility would be passed from one U.S. company to another, might give occasion for further criticism regarding the scope of U.S. activities in the Canadian north." Mr. Macdonnell, representing External Affairs, "considered at ceremony at Cambridge Bay would serve no useful purpose, but that if such a ceremony were held adequate Canadian representation was important." The committee "agreed that the Department of National Defence should determine the reasons for the proposed ceremony at Cambridge Bay, and suggest to the U.S.A.F. that it might be undesirable." The DEW Project Office was informed that such a ceremony was not wanted in Canada, but the subsequent meeting of the ACND was informed that the USAF still thought it desirable. The reasons for the change in American plans are not mentioned.

warning coverage further to the east, and were linked to the rest of the line through the DEW EAST communications project discussed later in this chapter.¹⁶⁶ Four main DEW Line stations were built in Canada, from east to west, they were at Cape Perry, Cambridge Bay, Hall Beach, and Cape Dyer, all in the Northwest Territories. Eighteen auxiliary and twenty intermediate stations were also built in Canada. The stations along the line were linked by lateral communications using tropospheric scatter techniques similar to those used for the POLE VAULT project along the Labrador coast, while rearward communications to southern Canada and the United States were ultimately provided by ionospheric scatter links connecting some DEW Line main stations to points along the Mid-Canada Line as well as by the POLE VAULT system along the Labrador coast.¹⁶⁷ The radar equipment at the main and auxiliary stations (the AN/FPS-19) was a search radar which could detect targets to a maximum range of 160 miles and up to an altitude of 65,000 feet. Like most large search radars, however, this unit offered poor low-level coverage, and “gap filler” radar equipment (AN/FPS-23) was also installed. A Doppler detection system comparable to the equipment used on the Mid-Canada Line, its limited range was the sole reason for the construction of the intermediate sites.¹⁶⁸ With this equipment in service, the most ambitious and controversial of the three continental

¹⁶⁶ Fagen, *A History of Engineering and Science in the Bell System*, 456-460; Schaffel, *The Emerging Shield*, 212-217; Neufeld, “Trigger for Atomic Holocaust,” 10-11.

¹⁶⁷ K.J. Holmes, *The History of the Canadian Military Engineers, Volume 3*, ed. J.R. Newell, (Toronto: Military Engineering Institute of Canada, 1997), 127; Fagen, *A History of Engineering and Science in the Bell System*, 456-457, 562-563. As explained in the previous chapter, ionospheric scatter systems operate on the same principle as tropospheric scatter systems, but at the time offered much longer ranges, albeit with a far more limited number of communications circuits. Roy J. Fletcher, “Military Radar Defence Lines of Northern North America: An Historical Geography,” October 1989, <http://www.pinetreeline.org/resartg.html>.

¹⁶⁸ Schaffel, *The Emerging Shield*, 211-212; Neufeld, “Trigger for Atomic Holocaust,” 10. Winkler’s description of the AN/FPS-19 as a gap-filler radar is probably in error. Winkler, *Searching the Skies*, 83.

air defence radar lines was complete. Well north of the Pinetree Line, and beyond the Mid-Canada Line, a far northern rampart had been erected in the Arctic.

The Distant Early Warning Line represented a huge Cold War era injection of cash into the economy, with profound and long-reaching consequences for Canada and the Canadian arctic. The presence of so much material wealth and the creation of wage-paying jobs for local inhabitants, both during the construction and the operation of the DEW Line, prompted the emergence of new settlements near many DEW Line stations, ultimately drawing many Inuit in from the land. Transportation facilities, both for the shipment of freight down the Mackenzie River and along the Arctic coast, facilitated the development and exploitation of northern resources, as did the numerous airstrips and navigational facilities created to support the radar installations. Concerns about American intentions for the Arctic had helped bring about a new awareness of the north in Ottawa, and the resultant creation of the Department of Northern Affairs and National Resources and its accompanying bureaucratic infrastructure allowed Ottawa to extend its influence and control over vast areas that a few short years before had been ignored by Canadians and their government.

Operation and Maintenance

Building the Distant Early Warning Line required an intensive effort, planned to create a radar warning system in the Arctic in as short a time as possible. Once the line was complete, however, its continued operation and maintenance required a different approach using a sustained effort to support the ongoing, seamless, operation of this radar network through the supply of fuel, food, equipment and spare parts, and the

transportation of personnel to and from the far-flung array of stations. Like the planning and building of the DEW Line, the system's operation and maintenance was also the subject of considerable discussion by the Canadian and American governments. Similarly, it was also an area where DCL actively represented the interests of the Canadian construction industry, its suppliers, and engineering consultants. While planning for resupply of the DEW Line during its operating phase dated back to the inception of the project by October of 1956 discussions concerning the specific details of supporting the line during its operating phase had been underway for a number of months. By that time, some basic principles outlining the preference for commercial over military air transport, the use of the existing USAF supply chain, and Federal Electric's responsibility for transportation from Fairbanks, Alaska, and Frobisher Bay to points on the line, had been established. Canadian authorities had also attached "great importance" to the use of north-south transportation services through Canada rather than from the western and eastern ends of the line. A number of physical preparations had also begun. Facilities to transfer cargo from the Mackenzie River barges to coastal traffic, for instance, had begun at Tuktoyaktuk.¹⁶⁹ The creation of these north-south links within Canada represented an assertion of national sovereignty and an effort to continue to use expenditures on the Distant Early Warning Line to further Ottawa's goals of developing and controlling the north.

For a number of reasons, DEW Line operation and maintenance was handled differently from other American defence installations in Canada. The remote and widely dispersed locations of the sites, the short summer shipping season, and the challenging

¹⁶⁹ The need for such improved facilities had been noted by the ACND's Transportation Sub-committee's November 1954 report. ACND Document T/1, "Transportation Implications of the D.E.W. Line," 22 November 1954, 5. See also Hamilton, *Arctic Revolution*, 79-80.

climate all served to complicate matters. Responsibility for the line's operation and maintenance rested with the USAF's 4601st Support Wing (Air Defence Command) in Paramus, New Jersey, and Federal Electric, another subsidiary of Bell Telephone, held the operation and maintenance contract.¹⁷⁰ As a result, all design and construction contracts, both for maintenance and for new construction, were sub-contracts awarded by Federal Electric. Canadian and American contractors could bid for the supply of materials, but only Canadian contractors were permitted to carry out on-site work. Soon after the DEW Line's completion, for instance, DCL held a watching brief on construction work carried out by Brown-Root Limited of Edmonton, which held the contract for alterations, repairs, and minor new construction programmes. A variety of contractors seem to have been chosen for this task; in the 1959 fiscal year, for instance, Mannix Company of Calgary was selected by Federal Electric. Design contracts were open to Canadian and American consultants, but were generally awarded to the latter as a result of their experience in the original DEW Line design programme. Once again, being "in on the ground floor" as part of the planning and construction effort gave American firms an advantage over their Canadian counterparts. In yet another instance of its operation as an instrument of government policy, DCL was involved in these procedures in order to ensure that Canadian firms were treated equally, or, if the treaty and its subsidiary agreements required it, preferentially. The corporation's actions facilitated

¹⁷⁰ USAF units with four-digit codes are established and controlled by major commands, such as the former Air Defence Command. They are notionally temporary, although they may operate for years, and differ from organizations with one, two or three digit numbers that are controlled by the General HQ of the USAF.

these efforts to such a degree that by 1961, Federal Electric was requesting advice from DCL in order to avoid difficulties with such arrangements.¹⁷¹

Correspondence with the USAF relating to the operation and maintenance construction projects for 1960 makes it clear that the work had to proceed on the basis of

procedures worked out with the Department of Defence Production and Defence Construction Ltd., and with the understanding that construction work will be performed in Canada by Canadian contractors. It is requested that the U.S. Corps of Engineers and the Federal Electric Corporation, who will be responsible for the design and construction of the projects, are notified of this understanding.¹⁷²

DCL examined and documented these procedures in order to ensure consistency, and as part of this review, its president, R.G. Johnson, explained that

the purpose of our maintaining close relations with the USAF, the U.S. Corps of Engineers and Federal Electric on Dewline matters is to obtain the heaviest possible participation by Canadian consultants, suppliers, and contractors. The memorandum [being created by DCL employees] should set out the ways and means by which we endeavour to achieve this and in fact should constitute a check list against which we could satisfy ourselves by periodic review that our objectives are being consistently pursued and achieved.”¹⁷³

This review appears to have been undertaken in part because of concerns that American organizations, and Federal Electric in particular, might not fully observe the requirement that Canadian contractors perform the construction work in Canada. A handwritten note on a DCL file, apparently in Johnson's hand, notes that the Assistant Deputy Minister of

¹⁷¹ “DEWLINE,” DCC In-house file “Statements – Various Canadian and U.S. Government Programs”; DCL inter-office memorandum, “Re: U.S.A.F. DEW Line Construction,” no date, but late December 1959 or early 1960, DCC in-house file, “DEW Line Treaty”; “General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961,” 8.

¹⁷² F/L D.H. Washington, RCAF Liaison Officer, to Commander, 4601st Support Group, (DEW) (ADC) USAF, Federal Electric Corporation, Paramus, NJ, “O&M Construction Projects – in Canada – FY 1960,” 25 June 1959, DCC in-house file, “DEW Line Treaty”.

¹⁷³ DCL Inter-office memorandum, R.G. Johnson to N.J. Smith, 22 December 1959, DCC in-house file, “DEW Line Treaty”. Emphasis added. The review was motivated by Johnson's concern that the written procedures for DEW Line construction contracts referred to in departmental correspondence and in communications with US agencies were apparently not available. DCL inter-office memorandum, R.G. Johnson to J.A. Head, D. Laird, N.J. Smith, “Re: DEW Line FY 1960 Construction,” 10 July 1959, DCC in-house file, “DEW Line Treaty”. The multi-page summary of procedures, which was eventually produced to detail DCL's role in the process, can also be found on this file.

Defence Production, W.H. Huck, had had to directly inform the USAF in 1958 and 1959 that Canadian contractors had to be used for the operation and maintenance contract. On the first occasion, Federal Electric was required to choose from either Brown & Root of Edmonton or Foundation Company of Montreal, while on the second, Federal Electric's Request for Proposal was changed by adding a clause requiring a Canadian contractor for Canadian DEW Line sites and an American firm for the Alaskan sites. "It will be necessary," Johnson noted, "to watch this again for 1960. FEC may again 'forget' to include the requirement."¹⁷⁴ Johnson's comment is an outright admission that implementing the provisions of the agreements governing DEW Line operation was not always straightforward. His use of quotation marks effectively implies that Federal Electric was attempting to circumvent the requirement that a Canadian firm be used for the operation and maintenance contract. As it had during the construction phase, DCL was acting as a guardian of the interests of the Canadian construction industry and an instrument for implementing government policy. The corporation had performed such tasks since its inception and throughout its involvement in the planning and construction of the DEW Line. Following the line's completion, it was continuing to perform this role as part of the operation and maintenance efforts. Johnson's concerns that American agencies might try to avoid meeting their commitments would be expressed again during discussions of the DEW EAST diplomatic agreements discussed below. Vigilance was required if Canadian firms were to obtain what Ottawa considered to be a "fair share" in the work supporting DEW Line operations.

¹⁷⁴ Handwritten note, apparently by R.G. Johnson, n.d., but probably December 1959, DCC in-house file, "DEW Line Treaty".

While DCL, DDP, and other agencies acting in concert were able to secure operation and maintenance work for Canadian firms, the selection of Canadian design consultants for operation and maintenance contracts was a more problematic issue. In part because of their prior experience with work on designing the line, some American contractors were at an advantage in bidding on the work, while the number of Canadian companies able to muster the resources and experience to compete for the work was more limited. For the 1960 fiscal year, for instance, DCL provided a list of Canadian consultants to Federal Electric, but the work was awarded to an American firm associated with the original DEW Line design company and a Montreal firm. Foundation Company, the only Canadian firm which could have mustered comparable expertise, chose not to offer themselves for the work, but were doing the engineering for work on a freight passenger terminal at Cape Dyer and a hangar at Broughton Island, which were the part of the DEW Line programme being carried out by the Corps of Engineers. D.W. Laird, the DCL engineer responsible for DEW Line projects, discussed this issue with Federal Electric, and in a report found no fault with the selection process which used a mandatory USAF formula that awarded points based on experience and capability. "It was apparently an honest appraisal," his note concludes, "and no fault could be found with the result."¹⁷⁵

In this area, therefore, DCL and DDP had to acknowledge that even with their assistance the opportunity for Canadian consulting firms was more limited than it was for their counterparts in the construction industry. While these agencies were effective as instruments of policy in protecting Canadian interests in the operation and maintenance

¹⁷⁵ Handwritten note, apparently by R.G. Johnson, n.d., but probably December 1959; DCL inter-office memorandum, D.W. Laird to R.G. Johnson, 8 September 1959, "Re: DEWLine – New Construction FY 1960," DCC in-house file, "DEW Line Treaty". The "Montreal firm" is not identified in this document.

of the DEW Line, the obstacles for design consultants were more significant. Much as with the provision of electronics and equipment for the construction effort, the Canadian government's delay in deciding on the nation's involvement in the construction effort, and its focus on the Mid-Canada Line as the country's contribution to northern aerial defence, meant that Canadian firms arrived on the scene too late to "get in on the ground floor," and had to compete with the American firms that had been involved from the outset.¹⁷⁶ A further factor may have been at work. Since the United States was not compelled to use Canadian firms for consulting engineering work, there may have been a desire on the part of Federal Electric or other US organizations to accord preferential treatment to American firms. Economic nationalism is a double-edged sword.

Shortly after its hasty and expensive completion, parts of the Distant Early Warning line in Canada and Alaska were closed and abandoned. By late November of 1962, the DEW Line Co-ordinating Committee had been advised that the USAF was considering a recommendation that the intermediate sites be abandoned because of improved equipment at the main and auxiliary sites; presumably this is a reference to improved radar coverage that made the unreliable and temperamental "gap filler" Doppler equipment redundant. The intermediate sites were closed down and abandoned, and title to the sites was ultimately transferred to the Department Northern Affairs and National Resources.¹⁷⁷ The remainder of the Distant Early Warning Line, however, soldiered on with the occasional upgrade until it was supplanted by the North Warning

¹⁷⁶ Middlemiss, "Defence Co-Operation," 173-175.

¹⁷⁷ Minutes of the 14th Meeting of the DEW Co-ordinating Committee, 21 November 1962, 3; Minutes of the 16th Meeting of the DEW Co-ordinating Committee, 12 June 1963, 1-3; DEW Line Progress Report No. 33, 20 June 1963, 1, DHH 73/409; Neufeld, "Trigger for Atomic Holocaust," 10; Canada, Office of the Auditor General *1996 Report of the Auditor General*, Chapter 22, Insert, "National Defence", Iram Khan, "DEW Line Doo-Doo," <http://www.track0.com/cc/issues/1298dewline.html>, 25 June 2002. The rather more casual attitude towards the environmental considerations of site deactivation in the early 1960s is particularly evident in the minutes of the 12 June 1963 meeting.

System in the late 1980s and early 1990s. Defence Construction would find itself involved in the planning and construction of the replacement system.

Much as with its construction, Canadian involvement in the operation and maintenance of the DEW Line proved to be a mixed success story. DEW Line construction work had been awarded to Canadian firms, and numerous Canadian suppliers had been used, but the supply of equipment and electronics had largely been from American sources despite Ottawa's efforts. While DCL and other Canadian agencies were successful in ensuring that the actual construction work for modifications or for new facilities built as part of the line's operation and maintenance would be performed by Canadian firms using Canadian suppliers, they appear to have encountered rather less success in representing the interests of Canadian architects and consulting engineers for the necessary design work. In both instances, the advantage held by American firms that had been involved from the early stages of DEW Line planning – be it for the development of the equipment and electronics or for the design of the facilities themselves – proved to be a significant obstacle for Canadian companies seeking to compete. Only a few of the largest and most experienced Canadian firms, such as the Foundation Company of Montreal, were in a position where they stood a realistic chance of obtaining such work. While the Canadian government and its agencies, especially DCL, were increasingly able to obtain the “bricks and mortar” elements of these contracts for domestic firms, the more complex and arguably more “high tech” elements of these defence projects remained a largely American prerogative.

DEW EAST

Even while the DEW Line was being built across northern Alaska and the Canadian Arctic, air defence planners sought to extend the Line's coverage from Cape Dyer further to the east in order to complete the northern early warning system by stretching it out over the Atlantic. In early February 1956 the Chiefs of Staff Committee discussed a memorandum from the US Joint Chiefs of Staff that outlined modifications to the plans for an eastern extension of the DEW Line that would close the gap between Newfoundland and Greenland. The proposal had also been submitted to the bilateral Military Study Group for review, and the committee decided to defer concurring with the report until this review was completed.¹⁷⁸ By April, the MSG had concluded that the proposal was technically feasible and that its detection capability would be generally comparable to the rest of the DEW Line. By stretching as far as the UK, the Atlantic extension would also be connected to the European air defence system. The MSG recommended the implementation of this proposal, and drew attention to the radar coverage problems mentioned above. After consideration, COSC supported the recommendation.¹⁷⁹

Canada was not involved to any significant extent in the detailed planning or construction of the eastern extension itself, but the need to provide communications links between the extension and the main part of the DEW Line required diplomatic arrangements with the United States and, almost inevitably, involved Defence Construction Limited. The DEW Co-ordinating Committee was advised of progress on

¹⁷⁸ Minutes of the 588th meeting of the Chiefs of Staff Committee, 9 February 1956, 1-2, DHH 73/1223, Series 3, Box 62, File 1308A.

¹⁷⁹ The MSG concluded that some gaps in low-level coverage would exist, and that some of the radar picket ships could not provide coverage to the same height as the land-based radars. Minutes of the 592nd meeting of the Chiefs of Staff Committee, 12 April 1956, 2-3, DHH 73/1223, Series 3, Box 62, file 1308A.

the project in mid-May of 1958. External Affairs had advised the Americans that the USAF could seek permission from the RCAF on a service-to-service basis for preliminary site surveys, so long as requests for construction were made through diplomatic channels. "In view of the reply by External Affairs to the US," the report noted, "it is particularly desirable that *no* impression be given at this stage that the Canadian Government regards this project as coming within the terms of the 1955 DEW Line agreement."¹⁸⁰ Although companies from both countries had submitted proposals, an American company was finally chosen to perform the testing.¹⁸¹

In October 1958 the Permanent Joint Board on Defence examined the installation of additional communications facilities at Cape Dyer on Baffin Island to support the Greenland extension of the DEW Line. After discussing the most satisfactory means of confirming Canada-US approval of the programme, at the request of the American representatives Canadian military officials considered the applicability of the existing DEW Line diplomatic notes to the project. The Americans also provided details of the necessary construction and equipment to their RCAF counterpart. After consideration, DND believed that these provisions were generally satisfactory, but suggested that the sections on construction, procurement, and telecommunications be replaced by those in the recent discussions of an Exchange of Notes on the Ballistic Missile Early Warning System (BMEWS), which is discussed in Chapter Six. As a result, some paragraphs

¹⁸⁰ DEW Line Progress Report #15, 20 May 1958, 6, LAC, RG24, acc.83-84/167, box 150, file 1279-150.

¹⁸¹ The RCAF advised the USAF that the path-testing work for the link – an undertaking designed to evaluate the conditions that would affect the design and operation of the system – could be undertaken by commercial contract, so long as the RCAF received copies of the reports, as well as details of the proposed uses for the link, especially if it was intended to form part of a trans-ocean communications link for non-DEW purposes. DEW Line Progress Report #15, 20 May 1958, 6, LAC, RG24, acc.83-84/167, box 150, file 1279-150. Western Electric was apparently considering sub-contracting the path testing to Canadian Marconi. J.A. Wiseman, RCAF Project Officer, DEW Project Office, to CAS, "DEW Line – Eastern Extension – Path Testing – Cape Dyer," 28 March 1958, appended to Minutes of 8th Meeting of DEW Line Co-ordinating Committee, 3 April 1958, DHH 73/409.

outlining suggested construction and communications requirements were provided to the Americans.¹⁸² These provisions had been the reason for Ottawa's desire to avoid having the project fall under the auspices of the DEW Line agreement, since the conditions that would ultimately be obtained for BMEWS were more favourable to Canada and Canadian firms than their DEW Line predecessors. Contracting for DEW EAST was to be by the Corps of Engineers, but agreement on the matter was still pending in November of 1958. At the time, DCL believed that the Corps of Engineers, acting on the advice of DCL, would engage a Canadian consultant to carry out site adaptation design work for the tropospheric scatter installation, with the tender call being held under DCL's auspices.¹⁸³

Largely because of the urgency of the requirement and the limited Arctic shipping season, work began before a formal agreement was in place. By late February 1959 the Corps of Engineers had been authorized to proceed with construction of the DEW EAST facilities provided that the work, pending an agreement between the two governments, would be generally covered by the DEW Line Agreement with the exception of the construction provisions proposed by the Canadians. USAF Headquarters, using much the same wording as would ultimately be used in the exchange of notes, informed the DEW System Project Office that "procedures for awarding contracts for construction of the Cape Dyer facilities and for the procurement of construction equipment, construction

¹⁸² F.R. Miller, DM/DND, to N.R. Robertson and USSEA, "Re: Additional Communication Facilities at Cape Dyer in Connection with Programme DEW EAST," 7 November 1958; USSEA to Milton C. Rewinkel, US Embassy, Ottawa, "Project DEW EAST," 14 January 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement – DEW EAST".

¹⁸³ "Can. – US Agreements – Defence Installations," no date, DCC In-house holding – booklet "Various Canadian and US Government Programs," 1958; "DEWEAST," DCC In-house file "Statements – Various Canadian and U.S. Government Programs".

supplies and related technical services shall be determined by agreement between appropriate agencies of the two governments.”¹⁸⁴

The USAF also noted that

in concluding arrangements for construction envisioned by this language, we are prepared to restrict bidding initially to Canadian contractors in accordance with wishes of Canadian govt. In making these arrangements, however, we reserve right to reopen bidding in event lowest Canadian bid or proposal should exceed US cost estimates. It should be understood in any agreement you reach . . . that in the event exchanges of notes at diplomatic level differs from arrangements made between your office and CLO [Canadian Liaison Officer] the terms and provisions of diplomatic notes will prevail to extent of inconsistency if any.¹⁸⁵

In such a case, the DEW System Project Office was also asked to convene a meeting of Canadian representatives, Air Force representatives, Corps of Engineers representatives, and DEW System Project Office representatives to help resolve this issue.¹⁸⁶

Construction provisions would prove to be an ongoing challenge to the negotiation of an agreement on the DEW EAST project. Despite the apparently promising start to discussions, both DDP and DCL were concerned about the proposed wording of the provisions for Canadian contractors. A meeting at the DEW Project Office in early March of 1959 had discussed the issue of proposed US methods for letting construction contracts for work in Canada. The Canadian representatives at the meeting, H.P. Warnock from DDP’s NYC office and DCL employee John A. Head, argued that the USAF suggestion for re-advertising the contract with US and Canadian contractors if the first, all-Canadian, round of bids exceeded estimated project costs was unacceptable, since it implied that some sort of collusion existed between Canadian contractors.

Representatives of the Corps of Engineers’ Eastern Ocean District, which had often dealt

¹⁸⁴ Headquarters, USAF to USAFIR NAR New York, DEWS PO New York, 24 February 1959, DCC in-house file 122-25-8, “Diplomatic Notes and Agreement – DEW EAST”.

¹⁸⁵ *ibid.*

¹⁸⁶ *ibid.*

with DCL in the past, thought this concern was purely theoretical, noted “that, in fact, Canadian bids on work performed thus far have been generally lower than Corps of Engineers’ estimates,” claimed that the American approach was “not at odds with presently accepted practices,” and therefore felt that the advertising could proceed. The USAF representative, however, could not concur with such a move until the Corps’ interpretation of the situation was verified.¹⁸⁷

At this meeting Warnock also pushed the issue of Canadian generators and switch gear for the Switching Center at Cape Dyer, but encountered resistance from the Americans on issues of specifications and “absolute compatibility” with existing systems. While the DDP representative had no objection to the use of an American diesel prime mover as part of the generating equipment, he argued that Canadian suppliers could meet the specifications for the generators and switching gear. The Americans, after noting “that the matter of obtaining approval for the proprietary item, unless expedited, could hold up the job,” did promise to further examine this issue, although it appears that the equipment was ultimately supplied by an American company.¹⁸⁸ As with the Distant Early Warning Line itself, while Canadian firms may have been provided with opportunities to bid on supplying the “high-tech” elements of projects, they were rarely awarded these supply contracts. While Canadian representatives were often successful in obtaining American agreement to “bricks and mortar” construction provisions favouring

¹⁸⁷ Minutes of Meeting, DEWS Project Office, 4 March 1959, DCC in-house file 122-25-8, “Diplomatic Notes and Agreement – DEW EAST”. Warnock was the Canadian Liaison Officer at the DEW Project Office.

¹⁸⁸ The Americans’ arguments were based on the operational requirement for “absolute compatibility between existing power equipment in the DEW DROP building and any additional generators and related equipment for DEW EAST. In this case, EOD [the Eastern Ocean District of the Army Corps of Engineers] stated that it must have a Letter of Authority from the Air Force permitting it to specify items to be manufactured by proprietary name.” *ibid.*; Fagen, *A History of Science and Engineering in the Bell System*, 563.

Canadian companies, corresponding advantages for Canadian electronics firms were much harder to come by. This discrepancy, and its consequences for Canadian industry, would become a contentious issue as part of the negotiations for the Continental Air Defence Integration North (CADIN) programme that were underway at this time and that are discussed in Chapter Six. Ultimately, the failure of Canadian firms to obtain these electronics contracts would prove to be a strong contributing factor to the creation of the Defence Production Sharing and Defence Development Sharing Agreements of 1958 and 1963.¹⁸⁹

DDP and DCL also objected to the letter from the Chief of the DEW System Project Office, Colonel Critchfield, that followed the same day and which tried to argue for the usual Corps of Engineers approach to contracting projects, which had been used on some earlier occasions, rather than for the provisions being pushed by the Canadians. Critchfield's letter stated that "if the Contracting Officer makes the determination that the lowest Canadian bid is unreasonable and is therefore rejected, the plans would then be advertised for bid by both Canadian and US construction firms."¹⁹⁰ Someone, possibly Warnock, subsequently wrote "NO!" in large letters in the margins of this letter at the section dealing with the proposed contracting policy.¹⁹¹ Disagreement on this particular point would finally be resolved just over a month later. Despite what might initially appear to be an emerging and solidly grounded pattern of Canada-US co-operation in defence construction, therefore, friction still emerged during the discussion of some of

¹⁸⁹ Danford W. Middlemiss, "Defence Co-Operation," in *Partners Nevertheless: Canadian-American Relations in the Twentieth Century*, Norman Hillmer, ed., (Toronto: Copp Clark Pitman), 175-186, 191 n.49.

¹⁹⁰ Col. Richard E. Critchfield, Chief, DEWS Project Office, to H.P. Warnock, DDP Liaison Officer, Electronics Defence Systems Division, 4 March 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement - DEW EAST".

¹⁹¹ *ibid.*

the most fundamental provisions in these agreements. Defence Construction Limited and the Department of Defence Production sought to increase the benefits that Canadian firms derived from these projects, but often had to contend with countervailing American interests.

In an informal letter in mid-March, the United States agreed to the Canadian conditions on construction and telecommunications, as well as to initially restricting the bidding to Canadian contractors, subject to the conditions outlined above. The US also acknowledged "that a qualified Canadian contractor is already established at this remote site with suitable equipment and personnel."¹⁹² The presence of this firm – the Foundation Company of Montreal – and the acknowledgement of its suitability would certainly have placed it at an advantage when bidding against other Canadian contractors and against potential American competitors as well. Given these conditions, the American insistence on the bidding provisions outlined above was arguably driven by a desire to avoid setting a precedent in these matters; agreeing to restrict bidding to Canadian contractors would have had significant repercussions for American military projects in Canada and overseas, especially if such provisions were made public.¹⁹³ As subsequent chapters will demonstrate, the Canadian drive to obtain these provisions and the American concern for the precedents that would be set – and their domestic political repercussions – were a significant issue in American and joint Canadian-American defence construction projects in Canada in the late 1950s.

¹⁹² Milton C. Rewinkel, Counselor of US Embassy, Ottawa, to D.V. LePan, A/USSEA, 17 March 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement – DEW EAST".

¹⁹³ This issue is discussed in more detail in Chapter Five. The Canadian perception of the American view is perhaps most concisely expressed in Cabinet Conclusions, 18 July 1957, 10, LAC, RG 2, Series A-5-a, vol. 1893.

The American drafts of an exchange of notes included with the letter agreeing to these conditions, however, also contained proposals for the bidding process – on terms similar to those that had drawn Canadian criticism less than two weeks earlier.¹⁹⁴ DCL president R.G. Johnson promptly expressed his dissatisfaction with these terms, suggesting that if the first tenders or proposals were not satisfactory, a decision about calling further tenders or taking further action should be determined by the Corps of Engineers *and* DCL. Johnson's approach would allow DCL to better perform its role as an instrument of policy used to protect the interests of the Canadian construction industry. DCL input in potential negotiations with Canadian firms to obtain better bids, or, if that failed, input in the decision on the calling of further tenders would present an additional restraint on the American impulse to turn to US firms for such work. Johnson articulated these concerns in a letter to Assistant Deputy Minister of Defence Production W.H. Huck, objecting to

the reference to "bidding of proposals initially being restricted to Canadian contractors". The word "initially" indicates that at a later stage invitations to American contractors are contemplated. If a satisfactory price *cannot* be obtained by tender or negotiation from Canadian contractors *then* I think we should agree that an effort be made to obtain them from U.S. contractors.¹⁹⁵

Johnson also did not want Canada to be bound by cost estimates, which he described as "frequently unreasonable," especially since the estimates "can be set at whatever level the U.S. authorities decide," a direct expression of concern that American agencies might deliberately set the cost estimates at an artificially low level in order to invoke the

¹⁹⁴ U.S. Embassy to D.V. LePan, A/USSEA, 17 March 1959; USSEA to DM/DND, DM/DOT, DM/DDP, copies to others including D.W. Laird at DCL, "Project DEW EAST," 18 March 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement – DEW EAST".

¹⁹⁵ R.G. Johnson to W.H. Huck, ADM/DDP, "Re: DEW EAST," 20 March 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement – DEW EAST". Emphasis in original.

provisions allowing them to invite tenders from American contractors. Johnson pointed to the

well established understanding between ourselves [DCL] and the U.S. Corps [of Engineers] in keeping with normal practices of tender calling agencies, namely, if the lowest price exceeds the estimate, both the price and the estimate are reviewed. Sometimes the estimate is adjusted upward, sometimes the price is adjusted downward, sometimes new tenders are called. I see no reason to depart from normal practice on terms that may be designed to favour U.S. contractors.¹⁹⁶

Again, DCL was placing itself in a position where it could act as an instrument representing and defending the interests of the Canadian construction industry. The bidding conditions sought by the United States, however, make it clear that although a pattern of co-operation had been established between some Canadian agencies, including DCL, and some American agencies, including the Corps of Engineers, this provided no guarantee that new projects would not encounter problems.

In keeping with established practice, the draft exchange of notes had been forwarded by the United States in order to obtain Canadian comments and suggested revisions, and DCL played a role in this process. A few days later, Johnson wrote again to Huck, suggesting a comment on construction conditions – that any review of the reasonableness of bids and cost estimates be undertaken by both the Corps of Engineers and DCL – to be passed on to External Affairs when replying to the American proposal. In forwarding the comment to External Affairs, Huck commented that “it may be noted that very cordial relationships exist between the Corps of Engineers and D.C.L. and normal arrangements presently provide for a review of bids by both agencies before an award is made.” Johnson’s comment, largely unchanged, was used in the Canadian reply

¹⁹⁶ *ibid.*

sent to the Americans on 3 April.¹⁹⁷ In addition to requiring the application of the conditions in the DEW Line agreement of 1955, it was also suggested that the DEW EAST agreement should take retroactive effect because work at Cape Dyer had actually begun a few months earlier. To simplify administrative arrangements, the new agreement would also remain in effect for the same length of time as the existing DEW Line agreement.¹⁹⁸

The programme was authorized by an exchange on notes on April 13th, 1959, with construction governed by essentially the same conditions that had been used for the Strategic Air Command refuelling bases and that would be adopted for the BMEWS system – the “procedures for awarding contracts for construction of the Cape Dyer facilities and for the procurement of construction equipment, construction supplies and related technical services shall be determined by agreement between appropriate agencies of the two governments.”¹⁹⁹ By this point, the Corps of Engineers had already shipped plans and specifications for DCL, with the company then issuing them to a list of contractors it had nominated as soon as an agreement was reached with the Americans. Senior DCL staff had already discussed the situation; D.W. Laird, (Engineer in charge of special projects (Radar)), suggested to Johnson that the corporation issue an invitation to tender as soon as the US accepted Canadian conditions, with the actual award of the contract being delayed until a formal exchange of notes had been made. This approach

¹⁹⁷ R.G. Johnson to W.H. Huck, ADM/DDP, “Re: DEW EAST,” 23 March 1959; W.H. Huck to USSEA, 26 March 1959; USSEA to Milton C. Rewinkel, Counsellor, US Embassy, 3 April 1959; D.W. Laird to J. Head, “Switching Centre, etc., Cape Dyer,” 10 April 1959, DCC in-house file 122-25-8, “Diplomatic Notes and Agreement – DEW EAST”.

¹⁹⁸ USSEA to Milton C. Rewinkel, Counsellor, US Embassy, Ottawa, “Project DEW EAST,” 3 April 1959, DCC in-house file 122-25-8, “Diplomatic Notes and Agreement – DEW EAST”.

¹⁹⁹ The agreement was also deemed to have come into effect as of 15 January 1959. Canada, Department of External Affairs, *Augmentation of Communications Facilities at Cape Dyer, Baffin Island (DEW EAST)*, 13 April 1959, (Ottawa: Queen’s Printer, 1959), Canada Treaty Series 1959/9.

would allow the Corps to make best use of the 1959 construction season, and Laird pointed to the DEW DROP project of two years before as a precedent.²⁰⁰ DCL's actions in this respect were a demonstration of its "very cordial relationship" with the Corps of Engineers that Huck had earlier described to External Affairs. The necessary switching center was designed, built, and installed at Cape Dyer by the end of 1960, and was capable of connecting communications from the DEW Line, rearward communications links from Greenland, and the Ballistic Missile Early Warning System radar at Thule Air Force Base, Greenland. The eastern extension of the line made possible by DEW EAST stretched 1,200 miles from Cape Dyer to Keflavik, Iceland, and included four stations, complete with radar and tropospheric scatter communications links built in Greenland, two of them on the icecap itself.²⁰¹

The objections raised by the Department of Defence Production and Defence Construction during the planning and negotiations for DEW DROP seem to have been based more on the principle of entrenching and protecting preferential treatment for Canadian contractors in the construction arrangements than on any immediate threat that this specific contract might be awarded to a US firm. The American comment about the suitability of the Foundation Company of Montreal, already on site at Cape Dyer, for instance, would seem to suggest that the Americans understood and were willing to concede the "bricks and mortar" construction work to a Canadian firm as they had often done in the past, but unfortunately the available records do not shed any useful light on

²⁰⁰ Closing date for the tenders was May 12th. U.S. Diplomatic Note #235, 13 April 1959; D.W. Laird to J. Head, "Switching Centre, etc., Cape Dyer," 10 April 1959: Minute, D.W. Laird to R.G. Johnson, 6 April 1959, DCC in-house file 122-25-8, "Diplomatic Notes and Agreement – DEW EAST". DEW DROP, a voice communications link from Cape Dyer to Thule in support of Strategic Air Command operations, is briefly discussed in Chapter Six.

²⁰¹ Fagen, *A History of Engineering and Science in the Bell System*, 563. The BMEWS programme is discussed in Chapter Six

this matter. DCL's focus in this instance was partly on ensuring that American agencies did not evade their obligations under the existing agreements, with the corporation performing much the same role as it had during the selection procedure for the DEW Line operation and maintenance construction contractors. In the few years that passed between the DEW Line agreement and DEW EAST, however, the Canadian government and its agencies sought additional guarantees of benefits from American and joint Canadian-American defence projects being built on Canadian territory – a guarantee that Canadian firms would perform the construction work – and DCL also played an important role in furthering Ottawa's intentions in this respect. Using both its bureaucratic ties to the Department of Defence Production and the close working relationship it had established with the US Army Corps of Engineers, Defence Construction was able to help the Canadian government arrive at its desired objectives. During this process, both DCL and DDP were acutely aware of the possibility that precedents might be created that would undermine the preferential treatment that had been progressively obtained for Canadian contractors since the early 1950s, and these concerns helped drive their responses to American proposals and suggestions for Canadian reactions during the negotiation of the exchange of notes governing the DEW EAST project.

While perceptions of a growing Soviet threat prompted these calls for improved defences, in the longer term they also led to a questioning of whether any effective defence against the growing threat was feasible. As historians including Joseph Jockel and Andrew Richter have argued, many, including members of the Canadian defence

establishment, turned to nuclear deterrence as a means of avoiding war.²⁰² Air defences would still play a role, but their primary purpose would change from the protection of the North American continent – an increasingly uncertain and elusive goal – to the provision of early warning for and protection of the USAF's Strategic Air Command bomber bases that housed the bombers carrying the American nuclear deterrent.²⁰³

Defence Construction Limited's involvement in the Distant Early Warning Line was much more limited than its role in other major defence programmes built in Canada during the 1950s, and consisted largely of representing and acting on behalf of the interests of the Canadian construction industry, its suppliers, and engineering and design consultants. A sizeable portion of DCL's work took place during the planning phases, even before the signing of the formal agreements between Canada and the United States for the DEW Line and the DEW EAST project. At meetings and through correspondence, DCL worked in conjunction with the Department of Defence Production to maximize the involvement of the Canadian construction industry and its suppliers. Following the completion of the DEW Line, DCL continued to perform similar functions during the operation and maintenance of the line. While its track record in ensuring that construction work would be awarded to Canadian firms was quite good, and while suppliers fared almost as well, two areas remained problematic for DCL and other agencies. The first was the supply of equipment and electronics during the construction phases of the DEW Line and DEW EAST, where despite the best Canadian efforts very few domestic firms were awarded contracts. The second was the use of Canadian

²⁰² *Ibid.*, 73-89; Friedman, *The Fifty Year War*, 144-148, 198-207; Jockel, *No Boundaries Upstairs*, 86-90; Richter, *Avoiding Armageddon*, 60-63.

²⁰³ For further articulations of Canadian views on this subject, see McLin, *Canada's Changing Defence Policy*, 28; House of Commons, *Debates*, 1956 (V) 5208-5211; Canada, Department of National Defence, *Report on National Defence*, (Ottawa: Queen's Printer, 1957), 24.

architects and consultants for DEW Line operation and maintenance, where much the same situation developed. In both instances, the American firms that had been involved from the outset held the advantage in bidding for contracts. These factors, and Canadian dissatisfaction with their consequences, would prove to be strong driving forces behind the Defence Production Sharing and Defence Development Sharing Agreements of 1958 and 1963 respectively. As will be seen in the discussion of Continental Air Defence Integration North and the Ballistic Missile Early Warning System in Chapter Six, these issues would become central to future joint defence construction programmes in Canada.

The Distant Early Warning Line represented quite literally, the farthest reaches of continental air defence in the 1950s. While more advanced equipment would be fielded in southern parts of the continent, nothing more physically ambitious than a radar line across the arctic would be undertaken. In large part, this was the result of a sudden change in the nature of the perceived Soviet threat to North America. In August of 1957, shortly after the completion of the DEW Line, the Soviet Union announced the successful testing of an intercontinental ballistic missile (ICBM).²⁰⁴ Passing high above conventional radar detection systems like the DEW Line and travelling far faster than any aircraft, the ICBM was a new threat that promised to nullify all existing air defence systems. As will be seen in subsequent chapters, the advent of the ICBM brought about profound changes in continental defence plans and projects, and hence had a significant effect on Defence Construction Limited. While it had been involved with this far northern radar network, however, other projects in Canada's north had helped occupy Defence Construction's attention. The construction of bases for the tanker aircraft of the USAF's

²⁰⁴ Steve Zaloga, *Target America: the Soviet Union and the strategic arms race, 1945-1964*, (Novato, CA: Presidio Press, 1993), 143-145; Zaloga, *The Kremlin's Nuclear Sword*, 46-49.

Strategic Air Command and the installation of TACAN navigational equipment were yet another round of undertakings for DCL and are the subject of the following chapter.

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Chapter 5
DCL in the Era of the “Northern Vision”:
Bombers on Alert and Building Northern Communities, 1957-1963

...the American war plans, one must conclude, intended that the war would last only about twenty-four hours, in the expectation that the Soviet Union would only last about twenty-four hours.

B. Bruce-Briggs¹

The victory of John George Diefenbaker and the Progressive Conservatives in June of 1957 marked a significant turning point in the nation's political life. Coming to power in the wake of the disastrous handling of the Pipeline debate by a complacent Liberal government that had held power for almost a quarter century, the new government, confirmed in its position by an unprecedented victory the following year, brought with it a number of changes that would be significant for relations with the United States and attitudes towards northern Canada, changes that would prove important to the activities of Defence Construction (1951) Limited. Canada's relations with the United States would be significantly affected by the change in governments; the previously close and generally cordial relationship with Washington was replaced by increasingly strained ties that culminated in Diefenbaker's openly hostile anti-Americanism of the 1963 federal election. Diefenbaker's election also had significant consequences for northern Canada. While the creation of the Department of Northern Affairs and National Resources in 1953 had evinced the growing interest of Canada in its north – and especially of Ottawa in expanding its influence and control over northern areas – the 1958 election campaign that confirmed and reinforced Diefenbaker's 1957 victory provided him with a platform for his “Northern Vision.” The “Vision” called for

¹ B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defense from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 77-78.

the development of the Canadian north – territorial as well as provincial – through a variety of programmes including “Roads to Resources,” a railway to Great Slave Lake, improved northern navigation, expanded scientific research in the Arctic, the building of a modern city at Frobisher Bay, and, ultimately, greater self-government in the territories.² The growing presence of American military personnel and installations – highlighted by the creation and operation of the Distant Early Warning Line – also raised concerns about Canadian sovereignty and control in the Arctic.

By the late 1950s, although the Canadian north had already been extensively militarized through the construction of defence installations for early warning, communications, and air defence, the American government and military were carrying on discussions with their Canadian counterparts about the establishment of further projects in the Arctic. Two of these undertakings – the construction of refuelling bases for the United States Air Force’s Strategic Air Command (SAC), and the establishment of tactical air navigation, or TACAN, stations on the East and West coasts to provide navigational aid to aircraft – will be examined in this chapter.³ Of the two projects, the refuelling bases presented the greater challenge, not only for their demanding construction but also because of the delicate agreements between the Canadian and American governments that were necessary to make their construction possible.

The refuelling base programme was undertaken at a time when the value of projects DCL was supervising had peaked, and the size of the company was drastically decreasing. Cold War expenditure on both sides of the border was passing its apogee. In

² Morris Zaslow, *The Northward Expansion of Canada, 1914-1967*, (Toronto: McClelland and Stewart, 1988), 332-334.

³ “General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961,” DCC in-house file “Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL”, 2-3. TACAN is an acronym for TACTical Air Navigation, a short-range, ultra-high frequency electronic air navigation system.

1957, reduced workload due to the imminent completion of the Mid-Canada Line and many of the Accelerated Defence Programme projects, particularly Camp Gagetown, led to substantial numbers of the company's employees being let go. From a peak of 832 in July 1956, staff levels were reduced to 453 by November 1957, a reduction of forty-five per cent in sixteen months.⁴ This swift reduction in staffing also demonstrated another useful characteristic of a Crown corporation – its ability to expand and contract in a timely manner as required. This flexibility was one of the reasons why C.D. Howe favoured “Crowns” as instruments of policy, and why he had used this corporate structure when creating DCL.⁵

Given these circumstances, the refuelling bases were significant for DCL because they provided the corporation with new responsibilities at a time when many of its earlier large projects were winding down. The programme was important for other agencies as well, especially the Department of Northern Affairs and National Resources. In his history of the Advisory Committee on Northern Development, for instance, Graham Rowley notes that the bases were the most important new military development handled by the committee in 1957.⁶ As a result, DCL would find itself more closely involved than

⁴ At a meeting of the Board of Directors in December of 1957, DCL President R.G. Johnson noted that staff had been reduced by approximately 37% over the past twelve months “without undue dislocation to the Company's operations and without apparent hardship to the personnel so released.” Meeting of the Board of Directors of Defence Construction (1951) Limited, 12 December 1957, DCC in-house file, Minute book, 1955-1970. R.G. Johnson, “Defence Construction Programme and Practices,” 22 January 1957, *Proceedings of 39th Annual General Meeting of the Canadian Construction Association, 1957*, (Ottawa: Canadian Construction Association, 1957), 99; R.G. Johnson to Raymond O'Hurley, “Re: Defence Construction (1951) Limited and the Civil Service Commission,” 27 April 1960, DCC in-house file, unlabelled folder.

⁵ R.G. Johnson, “Nostalgia,” speech delivered to DCL's 25th anniversary reunion party, 14 November 1975; A.G. Bland, address to 1978 annual FMC/CCE conference, 1 March 1978, 4. For Howe's views on these matters, see Robert Bothwell and William Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland and Stewart, 1979), 89-92.

⁶ Graham W. Rowley, *The Role of the Advisory Committee on Northern Development in the Development of Policy and the Coordination of Federal Government Activities in Northern Canada*, (Ottawa: Department of Indian Affairs and Northern Development, 1992), 16.

it had been before with plans for northern development, with senior management representatives serving on committees planning the future of the settlement at Frobisher Bay.⁷ These ambitious plans for a model Arctic town ultimately fell by the wayside. The reasons for their demise provide worthwhile insights into the problems faced by the “Northern Vision.”

The refuelling bases were significant in other ways for DCL and the Canadian construction industry. In contrast with earlier projects, the Canadian “construction condition” in the diplomatic agreement – the requirement that Canadian agencies and contractors be used for construction – was not seen as open for discussion by Canadian officials; it was instead taken for granted at meetings of organizations including the Chiefs of Staff Committee, Cabinet Defence Committee, and Cabinet itself that the construction would be undertaken by Canadian agencies using Canadian contractors. Officials in Ottawa also took extraordinary measures to further this position, at one point deliberately delaying action on negotiations about the TACAN installations until an agreement had been reached on the refuelling bases. This position marked a change from earlier projects, and would have lasting consequences for American defence construction projects in Canada by setting a precedent for subsequent programmes. Following the SAC refuelling base programme, work on American air defence projects in Canada was handled on a service-to-service basis, with the Department of National Defence acting as the agent for the USAF, a procedure authorized by Cabinet under the Defence Appropriation Act. The Deputy Minister of Defence Production would explain in 1959 that “U.S. air defence requirements in Canada were now being handled in exactly the

⁷ R.G. Johnson, “D.C.L. at Home and Abroad,” 28 January 1958, *Proceedings of 40th Annual General Meeting of the Canadian Construction Association, 1958*, (Ottawa: Canadian Construction Association, 1958), 114.

same way as Canadian requirements, with Canadian contractors dealing with D.N.D. who were acting as agents for the United States. This procedure was very different from that followed for D.E.W. contracts which had been let directly by the United States.”⁸ DCL had therefore proved its utility in leveraging Canadian economic “rents” for the country’s participation in the Cold War. It had demonstrated its effectiveness as the chosen instrument of the Canadian federal presence in defending Canada’s sovereignty – both geographically and economically – in the Cold War. The United States was now prepared to pay such rents with little or no objection, although it remained unwilling to publicly acknowledge their existence.

In addition to the refuelling bases, a number of other projects were subsequently handled through the administrative structures that the United States Air Force, its Strategic Air Command, and later its Air Defence Command had created within Canada. DCL and the Canadian government were able to use these arrangements to advantage and gain further benefits – for example, the acceptance of Canadian Standards Association (CSA) certification as equivalent to Underwriters Laboratory (UL) certification for the purposes of American military construction contracts, which was a boon for Canadian suppliers.⁹

Unlike a number of earlier air defence programmes, including the Pinetree and Distant Early Warning Lines, the refuelling base project was largely concerned with the construction of facilities alone rather than the construction of facilities and installation of complex electronic equipment. Since there was relatively little need for electronics in

⁸ Minutes of the 54th meeting of the Advisory Committee on Northern Development (hereafter ACND), 6 July 1959, 1, Library and Archives Canada (hereafter LAC), RG2, series B2, vol. 6183, pt. 5.

⁹ “General Outline of U.S. Military Construction Activities in Canada,” 5; United States Air Force, Strategic Air Command, History and Research Division, Directorate of Information, *History of the Canadian Refueling Base Program*, (SAC Historical Study No. 87, 1962), 38-43.

comparison with air defence projects, planning and negotiations for the bricks and mortar of the refuelling base programme were less affected than other programmes by ongoing Canadian concerns about obtaining preferential treatment for the Canadian electronics industry. In contrast, the TACAN installations, where the electronics requirements formed a far greater proportion of the overall expenditures and where the United States proposed to use existing American supplies of equipment, proved to be a trickier negotiation for Canadian agencies in this regard.

Although these projects represented a further militarization of the Canadian north, the refuelling bases were fundamentally different in their implications from their predecessors. The bases were intended to facilitate nuclear attacks on the Soviet Union and Warsaw Pact. They were an aggressive reflection of the Cold War. With the exception of the American bases in Newfoundland and its base at Goose Bay in Labrador, previous projects in Canada had arguably been defensive in nature, intended for the detection and interception of enemy aircraft, for the gathering of intelligence on Soviet activities, or for the provision of early warning to Strategic Air Command in order to maintain a credible US deterrent.¹⁰ This point would prove to be of considerable importance for the debate surrounding the planning and construction of the refuelling bases. While the public might believe that the primary purpose of continental defences was to protect North American cities and their inhabitants against Soviet attack, by the mid-1950s both the Canadian and American governments acknowledged that their

¹⁰ For discussions of the earlier use of Canadian bases by Strategic Air Command, see James Eayrs, *In Defence of Canada, Volume IV: Growing Up Allied*, (Toronto: University of Toronto Press, 1980), 236-247; David Bercuson, "SAC vs Sovereignty: The Origins of the Goose Bay Lease, 1946-52," *Canadian Historical Review*, 70:2 (Spring 1989), 206-222, and John Clearwater, *U.S. Nuclear Weapons in Canada*, (Toronto: The Dundurn Group, 1999), *passim*. Clearwater's account has the benefit of access to more declassified material than Bercuson's.

primary purpose was to protect Strategic Air Command's nuclear deterrent forces.

"Preservation of the deterrent," the expression often used, generally involved launching the bombers upon warning of an attack in order to destroy Soviet cities and military targets instead of having the bombers destroyed on the ground by Soviet weapons. The early warning provided by North American air defences was thus a vital requirement for SAC and its planners.¹¹ Another of the planners' concerns was SAC's ability to carry out its nuclear strike mission. By providing support facilities for aerial tankers in the Canadian north and the arctic, the SAC refuelling bases served to increase the range and effectiveness of American strategic bombers. They were specifically built for the support of a nuclear attack on the Soviet Union.¹²

The Americans were not alone in their focus on Strategic Air Command and its mission. The Canadian government had for some time believed that the protection of the American deterrent was an important task. As onetime Minister of National Defence

¹¹ In notes based on a 1954 SAC briefing, for instance, an American naval officer noted that "the amount of alert time is the most important factor as far as SAC is concerned." Captain William B. Moore, "Briefing given to the representatives of all services at SAC Headquarters, Offutt Air Force Base, Omaha, on 15 March 1954," in David Alan Rosenberg, "A Smoking Radiating Ruin at the End of Two Hours," *International Security*, 6:3 (Winter 1981-1982), 26. The broader issue of American nuclear war-fighting strategies at this time remains largely veiled in secrecy, especially where questions of the conditions under which US forces would launch a nuclear attack are concerned. Despite official decisions that the US would not fight a preventive nuclear war, both this issue and the question of the actions that would be taken to pre-empt a pending Soviet strike remained unclear, particularly given the reputation of SAC commander Curtis LeMay and a number of his statements on the issue. Bruce-Briggs, *The Shield of Faith*, 130-131; Norman Friedman, *The Fifty Year War: Conflict and Strategy in the Cold War*, (Annapolis: Naval Institute Press, 2000), 141, 194, 202-203.

¹² Just how horrific the results of such an attack were expected to be are evidenced in a briefing based on a 1955 report on the effects of nuclear weapons used to support US war objectives. Seventy-seven million casualties, sixty million of them fatal, were forecast within the Soviet bloc, along with the "total loss" of 118 of 134 major Soviet cities. In those cities, fatalities were expected to range from 75 to 84% of the population. Weapons System Evaluation Group Director to Joint Chiefs of Staff, "Briefing of WSEG Report No. 12," 6 April 1955, in Rosenberg, "Smoking Radiating Ruin," 30-31, 34. Moore's widely-quoted 1954 report covered SAC's presentation on an "optimum" attack according to 1954 plans "with pretty stars to indicate the many bombs dropped on DGZs. The final impression was that virtually all of Russia would be nothing but a smoking, radiating ruin at the end of two hours." DGZs were "Designated Ground Zeros" – the intended targets for the nuclear weapons. Moore, "Briefing," in Rosenberg, "Smoking Radiating Ruin," 25. As Bruce-Briggs would later put it more succinctly, "the American war plans, one must conclude, intended that the war would last only about twenty-four hours, in the expectation that the Soviet Union would only last about twenty-four hours." Bruce-Briggs, *The Shield of Faith*, 77-78.

Brooke Claxton would record in his unpublished memoirs, “the greatest factor for peace today is the capacity of the United States Strategic Air Command to deliver A and H bombs anywhere in Russia. The defence of that capacity is of top priority, *and that defence is partly Canada’s responsibility.*”¹³ This belief was, not surprisingly, shared by the Canadian military. At a Chiefs of Staff Committee meeting in January of 1955, for instance, the committee agreed with a recommendation by the Chief of the Air Staff that the protection of the Command’s air base system in North America be considered the top priority “target system” for protection by air defences.¹⁴

Jon McLin noted in his mid-1960s study of Canadian defence policy that the Canadian government had acknowledged as early as 1956 that the primary purpose of continental air defence was the protection of the Strategic Air Command and its nuclear deterrent. The 1957 *Report on National Defence* listed “warning of impending air attack essential for immediate retaliation by the U.S. Strategic Air Command” first among the purposes of the RCAF’s aircraft control and warning system. Minister of National Defence Douglas Harkness would publicly reaffirm this view in September of 1961.¹⁵ More recently, Canadian historian David Bercuson has also pointed to Canadian involvement in planning for the use of American nuclear forces. In his study of SAC’s presence at the Goose Bay air base in Labrador early in the Cold War, he argues that in addition to co-operation in air defence efforts with the United States from the early years

¹³ Brooke Claxton, *Memoirs*, 984, LAC, MG32 B5, vol.253. Emphasis added. In this particular instance, Claxton was arguing on behalf of Canada’s obligation to discharge this responsibility by having adequate air defences.

¹⁴ Minutes of 572nd meeting of Chiefs of Staff Committee, 2-3, 28 January 1955, Canada, Department of National Defence, Directorate of History and Heritage (hereafter DHH) 73/1223, series 3, box 62, file 1308A.

¹⁵ Jon B. McLin, *Canada’s changing defence policy, 1957-1963: The Problems of a Middle Power in Alliance*, (Baltimore: Johns Hopkins Press, 1967), 28; House of Commons, *Debates*, 1956 (V) 5208-5211; Canada, Department of National Defence, *Report on National Defence*, (Ottawa: Queen’s Printer, 1957), 24; “Harkness Appeals for Public Support of Defense Plans,” *Globe and Mail*, 4 September 1961, 4.

of the Cold War onwards, Canada was also involved with planning American offensive efforts. Bercuson argues that

in the late 1940s and early 1950s, the United States began to place nuclear strike forces at bases around the globe, usually on the periphery of the Soviet Union, which were intended to launch an air-atomic offensive against the USSR. These forces were not only the heart of the United States' offensive punch, they were also considered by Canada and its NATO allies to constitute the primary offensive of the entire western alliance.¹⁶

Bercuson also notes that one of the basic responsibilities assumed by Canada as part of NATO during the Cold War was helping SAC "meet its continuing objective of preparing for an air-atomic offensive against the Soviet Union in the event of war."¹⁷ In his recent study of Canadian military strategy and nuclear weapons, Andrew Richter argues that mid-1950s studies prepared by both External Affairs and National Defence agreed on the importance of nuclear deterrence as a means of avoiding conflict with the Soviet Union, and that Canada should co-operate with the United States in improving SAC's operational capability and the credibility of the threat it presented to the Soviet Union.¹⁸ The construction of refuelling bases could obviously help achieve such goals.

Although SAC's bombers and their support facilities formed a fundamental element of western defence planning, the early stages of the refuelling base programme took place at a time of drastic change in the military threat to North America. The successful testing of the first Soviet intercontinental ballistic missile (ICBM) in August of 1957 had a profound effect on many areas of military technology and policy, including

¹⁶ Bercuson, "SAC vs. Sovereignty," 207-208.

¹⁷ *Ibid.*, 221.

¹⁸ Andrew Richter, *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950-63*, (Vancouver: UBC Press, 2002), 60-63.

the defence of North America and the plans for the deployment and use of SAC.¹⁹ The original plans for an extensive SAC refuelling base programme of up to twenty-two bases in southern Canada were scaled back, and the DEW Line and other radar systems, although able to detect Soviet aircraft, were unable to pick up incoming ballistic missiles. As a direct response to this new threat, the United States embarked upon the construction of Ballistic Missile Early Warning System (BMEWS) radars in Alaska and Greenland, and the necessary rearward communications links through Canada to the United States.²⁰ The advent of the Soviet ICBM meant that, at best, any indication of a missile attack would be measured in minutes and not the hours of warning provided by the DEW Line. As a result, getting SAC's bombers into the air before the incoming weapons arrived became far more difficult.²¹ Revisions to plans for the deployment of SAC bombers – including, ultimately, a round-the clock procession of bombers flying “aerial alert” to guarantee their survival in case of attack – formed part of the reply to this threat, and plans for the construction of the refuelling bases changed accordingly.

The vulnerability of Strategic Air Command's bombers to Soviet attack had been an object of concern for some time before the advent of the ICBM, and received attention from a number of organizations, including the RAND Corporation; it is worth noting that

¹⁹ Clearwater gives the date for the first R-7 ICBM flight test as 3 August 1957, while Zaloga provides a date of August 21 for the first partially successful test. A re-entry vehicle to allow the missile's warhead to survive its fiery plunge through the atmosphere to its target had not yet been developed; this and other problems would keep the R-7 ICBM from being officially accepted for service until 1960. Even at that date, the R-7 remained a profoundly limited weapons system; it was far better suited to its alternate career as a workhorse launcher for the Soviet space programme. Clearwater, *U.S. Nuclear Weapons in Canada*, 72; Steve Zaloga, *Target America: the Soviet Union and the strategic arms race, 1945-1964*, (Novato, CA: Presidio Press, 1993), 143-145, 255-256; Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 46-49.

²⁰ The BMEWS project in Canada and DCL's involvement in the programme are examined in the following chapter. A third BMEWS radar was built on Fylingdales Moor in Yorkshire, England, but it falls outside the scope of this history.

²¹ David Alan Rosenberg, “The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960,” *International Security*, 7:4 (Spring 1983), 44.

Richter argues that Canadian defence officials recognized this problem at the same time, if not actually before, their American counterparts.²² Following official resistance, SAC eventually built additional bases and conducted tests to evaluate the maintenance of one-third of its bomber strength on a “ground alert” that would permit the aircraft to take off within fifteen minutes of receiving an attack warning.²³ Concerns about bomber vulnerability were reinforced by the findings of the Gaither Committee, whose final report to President Eisenhower in November of 1957 assigned the highest priority to improving SAC’s survivability, arguing that the only way to protect the United States was through deterrence via the maintenance of a secure and effective retaliatory force.²⁴

²² Richter, *Avoiding Armageddon*, 72-75. The RAND Corporation was created from the Research and Development (RandD) department of the Douglas Aircraft Company to provide the USAF with examinations of long-term technical issues that would affect aerial warfare. Albert Wohlstetter first established himself as a prominent analyst at RAND by performing detailed studies of bomber basing and vulnerability. Bruce-Briggs, *The Shield of Faith*, 48, 110-114. Wohlstetter was responsible for a number of studies throughout the 1950s that examined the vulnerability of SAC, the bases that should be provided for its bombers, and the utility of aerial refuelling. His best-known study on the subject is “The Delicate Balance of Terror,” RAND Report P-1472, 6 November 1958, <http://www.rand.org/publications/classics/wohlstetter/P1472/P1472.html>. A version of this report was published in *Foreign Affairs*, 37:2 (1959): 211-234. Copies of many of his other studies are also available on the RAND website. For a general discussion of RAND and its more prominent analysts during the 1950s, see Bruce-Briggs, *The Shield of Faith*, 109-130. See also Bruce L.R. Smith, *The RAND Corporation: Case Study of a Nonprofit Advisory Corporation*, (Cambridge, MA: Harvard University Press, 1966), and especially *ibid.*, 195-240 for a case study of the role Wohlstetter and other RAND personnel in the formation of policy on the selection of overseas USAF bases.

²³ Rosenberg, “Origins of Overkill,” 46. Bruce-Briggs, *The Shield of Faith*, 110-114. Following initial tests between November 1956 and March 1957, SAC began to go on “ground alert” in October of 1957. Ultimately one third of its bomber force would be held in readiness, with another third flying training operations and the remainder under maintenance. Clearwater, *U.S. Nuclear Weapons in Canada*, 72-73; Friedman, *The Fifty-Year War*, 207.

²⁴ Created in the spring of 1957 to analyze a proposal for a civil defence programme, the Gaither Committee was later given permission to expand its scope to study the issue of national defence in an era of ballistic missiles. Part of the Gaither Committee’s output was R.C. Sprague’s report on SAC readiness, which concluded that as things currently stood, in a surprise attack, the Command would probably not be able to get enough bombers off the ground to carry out a “substantial retaliatory attack.” Bruce-Briggs notes that the committee was “a classic case of bootlegging” and that the committee exceeded its “mandate of evaluating the civil defense programs and made an across-the-board investigation of the U.S. strategic posture.” Bruce-Briggs, *The Shield of Faith*, 130. For Bruce-Briggs’ brief history of the committee, see *ibid.*, 129-133. Rosenberg, “Origins of Overkill,” 46-47. Rosenberg describes the report as “more a symptom than a cause of change.” *ibid.*, 48.

Faced with the vulnerability of SAC's bombers and an emerging ICBM threat, the Eisenhower administration's approach to protecting the bombers was not to attempt to increase the survivability of bombers on the ground, as some had suggested, but to make sure that the bombers were in the air by the time a Soviet attack hit home. Beginning in 1957, airfield defence programmes including missiles, interceptor aircraft, and hardened command and control systems were cut back, while an increased emphasis was placed on increasing the warning time provided to SAC and to improving the speed of that organization's response. Fiscal Year 1958 in the United States would mark the apex of spending on strategic defence; in that year, more was spent on it than on strategic offence, but in subsequent years expenditures and available forces for the defence would decline in both the United States and Canada.²⁵ This change in focus from defence to early warning, coupled with the advent of the ICBM, would soon have significant consequences for future continental defence programmes and hence for DCL. In the meantime, however, continued American concerns about the vulnerability of Strategic Air Command's bombers would drive the construction of bases for the Command's aerial tankers on Canadian soil.

The Refuelling Base Programme

When it was created in 1946, Strategic Air Command (SAC) was given the mission of performing "long range offensive operations...employing the latest and most

²⁵ Rosenberg, "Origins of Overkill," 48; Bruce-Briggs, *The Shield of Faith*, 134-140; Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Air Force History Support Office, 1991), 260-268. The American fiscal year differed from its Canadian counterpart, starting on 1 October of the preceding calendar year and ending on 30 September of the given year.

advanced weapons.”²⁶ Due to the birth pangs of the United States Air Force, which emerged as a separate service in 1947, and the ongoing challenges of demobilizing the wartime air force, occupation duties overseas, significant budget reductions, and inter-service rivalries, SAC initially received little attention from senior USAF leaders or American politicians.²⁷ By 1948, however, the progressive reduction of the American defence budget prompted a new reliance on strategic air operations using nuclear weapons instead of more expensive defence strategies that relied on larger, conventionally equipped forces. At the same time, the results of a new round of testing suggested that the availability of nuclear weapons would not be so limited in the future. As a result, instead of being a scarce weapon reserved for attacks on the more “valuable” targets such as major political and industrial targets, nuclear weapons could be used on a wider range of targets, including military forces in the field.²⁸ That same year, Curtis LeMay, “a powerful personality and consummate operational commander” became the commander of SAC, and quickly began a programme to increase his command’s operational readiness, arguing that the USAF’s highest priority was to deliver SAC’s atomic attack “in one fell swoop telescoping mass and time.”²⁹ The capabilities of

²⁶ Quoted in Clearwater, *U.S. Nuclear Weapons in Canada*, 61.

²⁷ For a discussion of this period of SAC’s history, see Harry R. Borowski, *A Hollow Threat: Strategic Air Power and Containment before Korea*, (Westport, CT: Greenwood Press, 1982), 27-111.

²⁸ *Ibid.*, 112-136; Friedman, *The Fifty-Year War*, 125-132. The Soviet Union also recognized the cost-effectiveness of the atomic bomb in comparison with conventional forces in any future conflict. While publicly dismissing the military consequences of the “bomb” in 1945, Stalin launched a crash programme to develop a Soviet weapon, and in 1946 bluntly stated that “atomic bombs were the cheapest means of war.” Zaloga, *The Kremlin’s Nuclear Sword*, 3.

²⁹ Rosenberg, “Origins of Overkill,” 19. LeMay would remain commander of SAC until 1957, after which he became Air Force Vice Chief of Staff until 1961, and Chief of Staff from 1961 to 1965. Richard H. Kohn and Joseph P. Harahan, eds., “U.S. Strategic Air Power, 1948-1962: Excerpts from an Interview with Generals Curtis E. LeMay, Leon W. Johnson, David A. Burchinal, and Jack J. Catton,” *International Security*, 12:4 (Spring, 1988), 79. LeMay was – and remained – supremely confident of SAC’s capabilities during the 1950s. In a 1988 interview, LeMay argued that “there was a time in the 1950s when we could have won a war against Russia. It would have cost us essentially the accident rate of the flying time, because their defenses were pretty weak.” One of LeMay’s subordinates from SAC days concurred,

LeMay's command grew rapidly. Between December 1948 and June 1950, the number of nuclear-capable SAC aircraft increased from 60 to 250; by the end of 1953, the command had some 1,000 nuclear-capable bombers.³⁰

The Canadian refuelling base programme owed its origins to subsequent mid-1950s changes in Strategic Air Command's planning. From 1946 to 1953, SAC's planning and training was based on the forward use of overseas facilities, and billions of dollars of supplies were stockpiled in foreign locations. Three overseas SAC air divisions existed: in the United Kingdom, North Africa, and Guam. All had bases and facilities for medium bomb wings, using propeller-driven B-29s and B-50s, aircraft of limited range that had their origins in the Second World War. These bases, however, became politically and strategically vulnerable, and in response SAC developed measures that would reduce its reliance on overseas basing. The plans, ready by 1954, involved the modernization of the Command's medium bombers with the deployment of the groundbreaking jet-powered B-47 medium bomber, and also incorporated significant recent improvements in air refuelling technology. With these changes, targets in the Soviet Union and elsewhere would be attacked directly from bases the continental United States, referred to as the "Zone of the Interior" or "ZI", soon after what SAC described as "the initiation of hostilities."³¹

arguing that he didn't think "we ever had any great concern about being able to execute the mission from the standpoint of enemy action throughout the 1950s. We were quite confident that we could do that. Our problems were more operational, rather than the threat of being shot down by flak or fighters." Kohn and Harahan, "U.S. Strategic Air Power," 86-87.

³⁰ Rosenberg, "The Origins of Overkill," 19, 29.

³¹ *History of the Canadian Refueling Base Program*, 1; Richter, *Avoiding Armageddon*, 30-32; Minutes of the 110th meeting of the Cabinet Defence Committee, 13 June 1956, 5, LAC, RG2, vol. 2749, file "Cabinet Defence Committee - Volume VII". Rosenberg, "Smoking Radiating Ruin," 9. As Smith notes in his history of aerial refuelling, "in the early 1950s, the swept-wing, jet-powered B-47 was something quite different. At the end of the twentieth century, when practically all airline equipment resembles a B-47, it may be hard to imagine, but in 1953 the sight of a B-47 almost overwhelmed the imagination: it was a

This concept, which SAC called FULLHOUSE, required the construction of additional bases and support facilities on the route from American bomber bases to the Soviet targets. In the northwestern area of North America, American bases in Alaska could serve this purpose, but in the central northern and northeastern area of the continent, such bases would have to be located in Canada. Some already existed prior to 1954 – Goose Bay, in Labrador, Thule Air Force Base in Greenland, and Harmon AFB in Newfoundland. At that time, they were seen as support bases for the pre- and post-strike staging of the Command's giant globe-spanning B-36 bombers, but FULLHOUSE meant that these bases, and the entire Northeast Air Command (NEAC) became an area for staging and refuelling medium-range jet-powered B-47s before their attacks. In order to support such activities, which included the operations of KC-97 tankers, the bases would require considerable development, especially the provision of in petroleum, oil, and lubricant (POL) facilities.³²

Although SAC had operated piston-engine B-29 and B-50 bombers and their accompanying tankers from bases in England since 1948, SAC war plans incorporated aerial refuelling for the first time in 1952. By that point, its tanker strength had grown rapidly – from 6 squadrons, most only partially equipped, in 1949, to 20 squadrons with 318 tankers in 1952 to 32 squadrons with 683 tankers by the end of 1954, ultimately

200,000 pound bomber that looked like a fighter; even while parked on the tarmac it seemed to be in motion; it was the United States' new *Wundervogel* and it attracted attention anywhere it touched down." Richard K. Smith, *Seventy-Five Years of Inflight Refueling: Highlights, 1923-1998*, (Air Force History and Museums Program, 1998), 37-38. See also Earl G. Peck, "B-47 Stratojet," *Aerospace Historian*, 22:2 (Summer/June 1975), 61-64. One of the major plot elements in the 1955 movie *Strategic Air Command*, involves the replacement of the older and much larger piston-engined B-36 with the smaller, faster, jet-engined B-47.

³² *History of the Canadian Refueling Base Program*, 1-2. North East Air Command had been created on 1 October 1950 under the USAF as a unified command for US armed services in Newfoundland, Labrador, and Greenland. Bercuson, "SAC vs. Sovereignty," 214.

reaching a peak of 1,095 tankers by the end of 1961.³³ The importance of aerial refuelling was well understood by SAC. In 1954 alone, SAC bombers completed some 142,000 in-flight refuellings and crossed the planet's oceans some 3,400 times.³⁴ SAC also disclosed at a 1954 briefing that the availability of tankers for its B-47 medium bombers and of warning of attack were determining factors in Strategic Air Command's ability to react and carry out its operational plans for attacking the Soviet Union.³⁵ The dependence on tankers grew throughout the 1950s; in 1956 a senior SAC commander advised SAC's Commander-in-Chief, Curtis LeMay, that the command was building its strategy around refuelling, and that as a result "the tail...[was] wagging the dog."³⁶

Initial testing of the tanker-dependent FULLHOUSE plans in May of 1954 proved successful, but SAC argued that more bases were required in addition to those at Goose Bay and Harmon, both to support refuelling activities and to recover bombers returning from their missions. The following month, the Command began considering Canadian bases, with initial interest in the Nova Scotia and Ottawa-Montreal areas. While the first plans called for 22 single-squadron bases north of the Canadian border, this was later scaled back to 12 and presented to the USAF in September of 1954.³⁷ Initially, only one,

³³ Smith, *Seventy-Five Years of Inflight Refueling*, 37, 30-31, 47.

³⁴ Clearwater, *U.S. Nuclear Weapons in Canada*, 67.

³⁵ The previously quoted report on a March 1954 SAC briefing noted that "the scope of a strategic air attack on Russia from ZI [Zone of the Interior, now known as CONUS] bases would be determined primarily by the number of tankers available to accomplish in-flight refueling." A similar dependence on tankers held true for bombers operating from "intermediate" bases in locations such as Goose Bay, Alaska, Guam, and Thule, Greenland. One of USN Captain William B. Moore's general impressions from the briefing was that "SAC must now rely heavily on much in-flight refueling to carry out his strike plans." Moore's report also noted that LeMay had stated that the Command's ultimate goal was to develop "a true inter-continental bombing capability so that overseas bases and support will be unnecessary." Rosenberg, "Smoking Radiating Ruin," 25, 28, 9. Rosenberg's article is an introduction and assessment of a USN report March 1954 briefing at SAC headquarters. *ibid.*, 5-6.

³⁶ Quoted in Smith, *Seventy-Five Years of Inflight Refueling*, 31.

³⁷ The twelve proposed base locations were Frobisher Bay (now Iqaluit), Coral Harbour, Fort Chimo, The Pas, Cold Lake, Great Whale River, Namao, Knob Lake, Winisk, Churchill, Saglek, and Sondrestrom. *History of the Canadian Refueling Base Program*, 2, n.2.

base in Greenland, at Sondrestrom, received construction funding, leaving SAC with unrequited plans for another eleven bases. SAC argued that these were the minimum necessary for its role as a deterrent force and to execute its war plans. Goose Bay, Harmon, and Thule were seen as lucrative targets vulnerable to Soviet attack, and the provision of additional bases would reduce SAC's vulnerability in this respect, as well as providing increased operational flexibility and greater effectiveness of tanker aircraft, which could fly more frequent and shorter missions with a greater load of fuel for the bombers.³⁸ Increased fuel loads for the bombers would result in increased range, which not only meant that more targets inside the USSR could be attacked³⁹ but that the weight of the attack could be increased, its tactical flexibility would be improved, and more American bombers could return to the US without having to pass through overseas bases – assuming, of course, that such bases survived.⁴⁰

SAC described its initial requirements for Canadian facilities under this plan as “modest.” Bases would be used by its KC-97 and KC-135 tankers in wartime.⁴¹ Tankers could either take off with and fly along with the bombers before refuelling them, or be

³⁸ *Ibid.*, 2-3; Minutes of the 110th meeting of the Cabinet Defence Committee, 13 June 1956, 5.

³⁹ Depending on the various operational techniques used, forward bases for tankers could substantially increase the range of SAC bombers. A KC-135 tanker operating from Churchill, Manitoba could allow a B-52 operating from South Dakota to reach some 1,000 km further into the USSR, while a KC-97 tanker operating from Frobisher Bay (Iqaluit) could allow a B-47 operating from Missouri to reach some 1,400 km further into the USSR and afterwards land in the UK, again assuming that any forward bases (or North American bases, for that matter) survived Soviet attack. *History of the Canadian Refueling Base Program*, 3; Moore, “Briefing,” in Rosenberg, “Smoking Radiating Ruin,” 20.

⁴⁰ *History of the Canadian Refueling Base Program*, 3. In a briefing to the Cabinet Defence Committee on 13 June 1956, the Minister of National Defence noted that not only would SAC bombers gain increased range, but that “the bomber need not be held on the ground while the slower tanker was proceeding to the refuelling rendezvous.” Minutes of the 110th meeting of the Cabinet Defence Committee, 13 June 1956.

⁴¹ Given that in March of 1954 SAC had between thirty and forty operational and staging bases in the United States and overseas for some 2000 aircraft, the description of requirements for Canadian bases as “modest” becomes more understandable. Moore, “Briefing,” in Rosenberg, “Smoking Radiating Ruin,” 22. The tankers would use “YO-YO” tactics, which involved launching the tanker from a forward location, refuelling a bomber, and then returning to base, as many times as was required. “YO-YO” was also the name given to the programme in some Canadian documents.

based ahead and refuel them at a given point; the latter was preferred because it gave the tanker more fuel to transfer to the bomber. In the mid-1950s SAC began to deploy most of its tankers to the northeastern United States, within the Northeast Air Command, an area that became known to SAC as the "Northeast Corridor." The bases in Canada were a further extension of this strategy, and by 1957 SAC would assume responsibility for NEAC bases in the United States, Canada, and Greenland.⁴²

To support aerial refuelling operations, facilities for some forty tankers would be required at each Canadian base, which would provide parking space, refuelling equipment, and limited maintenance facilities. In times of low tension, a small personnel detachment would be left in place to keep the base in readiness for immediate use. Various mobilization exercises, including a large-scale annual event, would be carried out through these locations. SAC believed that the additional strength and flexibility these bases would provide for what was at the time a limited tanker capability justified the cost of the bases.⁴³

As mentioned above, American plans for the construction of new refuelling bases formed only part of the expansion of Strategic Air Command's refuelling capacity from Canadian bases. On 26 January 1955, Cabinet discussed an American proposal to increase the number of personnel at Goose Bay to provide for an aerial refuelling squadron, the rotation of four additional squadrons, and the basing of one medium bomber wing. These plans would result in an additional 400 US servicemen stationed permanently at Goose Bay, and the presence of up to 3,600 more at any one time. The

⁴² Smith, *Seventy-Five Years of Inflight Refueling*, 45-46; Clive Archer, "The United States Defence Areas in Greenland," *Cooperation and Conflict*, 23 (1988): 131; Sheila MacBain Meldrum, *Frobisher Bay: An Area Economic Survey, 1966-1969*, A.E.S.R. #66/3, (Ottawa: DIAND, 1975), 34-35.

⁴³ *History of the Canadian Refueling Base Program*, 4-5.

Cabinet Defence Committee had discussed the issue on the 24th, and according to the discussions in Cabinet “was of the view that, since Canada had an obligation to support the Strategic Air Operations conducted by the U.S., there was no alternative but to recommend acceptance of this request. It was noted that there would probably be requests for the establishment of other refuelling bases in the Canadian north in support of S.A.C. operations.”⁴⁴ No formal approach was made for the storage of weapons in Canada “and it was possible that the provision of refuelling facilities would make this unnecessary.”⁴⁵ In the end, cabinet approval was given for the basing of the tanker and bomber squadrons.

By March 1955, Secretary of State for External Affairs Lester B. Pearson had discovered the informal discussions between the RCAF and SAC about the refuelling bases, and raised the issue with U.S. Secretary of State John Foster Dulles, noting that the stationing of additional US military personnel in Canada could raise “some political and psychological problems,” and suggesting that as many of the ground personnel as possible be provided by Canada.⁴⁶ Pearson’s statement was yet another acknowledgement

⁴⁴ Cabinet Conclusions, 26 January 1955, 12, LAC, RG2, series A-5-a, vol.2657. Emphasis added. The CDC discussions had noted that “the proposal appeared to be the first of a series for the establishment by SAC in the northern parts of Canada of other bases for refuelling and support of their aircraft, and such proposals, if acceded to, would imperil more and more Canadian sovereignty over its own territory. So far there were no requests for stockpiling atomic and thermo-nuclear weapons on Canadian soil but this might follow. On the other hand, the provision of refuelling facilities could mean that such requests would not be made because aircraft carrying these weapons would be refuelled in the air and would not have to land.” Minutes of the 103rd meeting of the Cabinet Defence Committee, 24 January 1955, 6, LAC, RG2, vol.2749, file “Cabinet Defence Committee – Volume VII”.

⁴⁵ Cabinet Conclusions, 26 January 1955, 12. Although no formal request for the stockpiling of nuclear weapons at Goose Bay was made at this time, both the SSEA and MND expected that one would soon be forthcoming. Clearwater, *U.S. Nuclear Weapons in Canada*, 129-131. On the possibility that Canadian territory could be offered for SAC bomber bases or territorial waters offered for use by American ballistic missile carrying submarines, McLin’s comment in 1966 was that “there is no evidence that the Canadian government’s failure to make such an offer caused any concern to U.S. administrations. ... It is probable that U.S. officials did not regard the military value of such bases in Canada as worth the political cost they would entail.” McLin, *Canada’s Changing Defence Policy, 1957-1963*, 129.

⁴⁶ Clearwater, *U.S. Nuclear Weapons in Canada*, 68.

by a senior Canadian official that the presence of large numbers of American service personnel in Canada was a source of growing discomfort for Ottawa, which accordingly sought to mitigate this state of affairs.⁴⁷ A survey of potential locations and planning for their construction would require the cooperation of the RCAF, and a formal proposal was made by USAF headquarters at the beginning of February 1956, although informal consultations and conferences between the two services had been occurring from an early stage. The RCAF urged caution in the promotion of the programme because the Canadian government might be reluctant to approve it on political grounds, and wanted full details of the role the bases would play, but the USAF insisted that a survey of the sites was required before all the questions could be answered. While the funding required for such a programme was not immediately forthcoming, by early 1956 some financial commitments had been made by the Secretary of the Air Force and a survey of the eleven locations was being planned. The USAF wanted to avoid delays, and as a result sought to carry out surveys during the forthcoming summer so that it could obtain a better estimate of the programme's costs.⁴⁸

After considerable discussion on 13 June 1956, the Cabinet Defence Committee recommended that Cabinet approval be given for the site surveys.⁴⁹ Canada's stated commitment to supporting SAC operations was raised at the meeting, as were concerns that permitting refuelling facilities might lead to American requests for bomber bases.

⁴⁷ John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, (Montreal & Kingston: McGill-Queen's University Press, 1994), 196-199.

⁴⁸ *History of the Canadian Refueling Base Program*, 4-5; Minutes of the 110th meeting of the Cabinet Defence Committee, 13 June 1956, 5. Hints of the forthcoming USAF request emerge from COSC minutes. Minutes of the 592nd meeting of the Chiefs of Staff Committee, 12 April 1956, 2-3, DHH 73/1223, series 3, box 62, file 1308A.

⁴⁹ Clearwater, *U.S. Nuclear Weapons in Canada*, 69; Minutes of the 110th meeting of the Cabinet Defence Committee, 13 June 1956, 5-7. Even at this date, it appeared likely that SAC's request would be scaled back from the eleven bases it sought at the time. *ibid.*, 6.

Further concerns that the bases would lead to an influx of thousands of U.S. personnel across the country – an echo of Pearson's 1955 concerns – were also raised. "It seemed necessary," the minutes recorded, "to make a choice between maintaining the effectiveness of the deterrent and a serious domestic political problem arising from a large increase in U.S. facilities in Canada. There would be serious consequences if Canada contributed to a lessening of the free world's strength."⁵⁰ The committee agreed to recommend that a joint Canada-US investigation of existing airfields be made, and that any preliminary arrangements for the construction of new airfields and related facilities should not proceed until the initial survey was completed. This recommendation was, the minutes openly admitted, a way of postponing the difficult decision between the deterrent and the political liability of increasing numbers of American facilities in Canada. While the initial surveys were being undertaken, the reaction of the United States authorities to Canadian concerns could be obtained through service channels.⁵¹

Cabinet examined the issue on 14 June 1956, and agreed to have Canada investigate, in cooperation with the USAF, which existing fields might be usable. No surveys of new fields for refuelling were to be made that year, and a decision was deferred on a related proposal to permit the stationing of USAF personnel at Frobisher until the problems involved in the Department of Transport takeover of the site from the RCAF had been fully examined. As it did on a number of other occasions, DCL would play a minor advisory role in later discussions on the second topic.⁵² The Advisory

⁵⁰ *Ibid.*, 7. Emphasis added.

⁵¹ *Ibid.*, 6-7.

⁵² Cabinet Conclusions, 14 June 1956, 6, 10, LAC, RG2, series A-5-a, vol.5775. The report to Cabinet also noted that the CDC had "agreed to recommend that the U.S. Air Force be allowed to continue to station forces at the R.C.A.F. establishment at Frobisher Bay for ten years or such shorter period as might be mutually agreed, subject to a reconciliation of this proposal with the previous decision of the Cabinet regarding the operation of Frobisher airport by the Department of Transport." On 10 January 1957, Cabinet

Committee on Northern Development was advised of the refuelling base plans in late June 1956, and a survey of potential sites was undertaken the following month by a joint USAF-RCAF team, which visited or attempted to visit some fifteen sites. A number of locations were considered unsuitable, however, leaving nine under consideration.⁵³ The USAF also pressed ahead on other fronts. Arnold Heeney was Canada's ambassador in the United States at the time, and in his memoirs he recalled an October 1956 visit to SAC Headquarters that left him

sure that one of the reasons for the warmth of my welcome was that the United States at that period wanted permission to establish tanker bases in Canada which would provide a ten-fold increase in the range of their B-47s and a four hour saving on operations. The briefings were slanted in that way and there was little question of the value they set upon a northern facility.⁵⁴

At the end of November 1956, the Chiefs of Staff Committee was updated on the programme by the Chief of the Air Staff, who "reported...the importance and urgency which the Strategic Air Command place on early finalization of some agreement for the

agreed to the transfer of responsibility for the airport at Frobisher from the RCAF to the DOT on 1 September, and to the negotiation of an agreement with the United States about the establishment, operation, and use of facilities at Frobisher. The SSEA had prepared draft conditions by March, and these were passed to DCL President R.G. Johnson for review of its construction and procurement clauses for other than electronic equipment shortly thereafter. Johnson concurred, with some comments. Memorandum, USSEA to DM/DND, DM/DoT, DM/DDP, DM/NANR, DM/Department of National Revenue (Customs and Excise Division), "Frobisher Airport," 14 March 1957; Memorandum, W.H. Huck to R.G. Johnson, "Re: Frobisher Airport," 19 March 1957; R.G. Johnson to W.H. Huck, ADM/DDP, "Re: Frobisher Airport," 25 March 1957, DCC in-house file "Use and Operation of Facilities by USAF at Frobisher Airport". For a summary of the Canadian and American presences at Frobisher during the time under discussion, see Meldrum, *Frobisher Bay*, 34-37.

⁵³ Minutes of the 35th Meeting of the ACND, 25 June 1956, 3, LAC, RG2, series B2, vol.6183, pt.3. The team visited Frobisher Bay, Fort Churchill, Cold Lake, Namao, Coral Harbour, Knob Lake, Great Whale River, The Pas, Fort Chimo, Winisk, Saglek (fly-over only), Hall Lake (DEW Line Site 30), and Fort McMurray. DEW Line sites 31 at Rowley Island and 32 at Bray Island were considered but not visited because of poor weather conditions. The sites eliminated from consideration were Winisk, Saglek, and the three DEW Line sites. The SAC history of the programme lists fifteen base locations under initial consideration, then names five that were later dropped, but then mentions nine as suitable for development – there is a minor discrepancy in numbers here. *History of the Canadian Refueling Base Program*, 5-6.

⁵⁴ Arnold Heeney, *The Things that are Caesar's: Memoirs of a Canadian public servant*, (Toronto: University of Toronto Press, 1972), 142. James Eayrs quotes more extensively from this passage, but incorrectly states that "in the event, the United States did not avail itself of this 'northern facility'." Eayrs, *In Defence of Canada, Volume IV*, 247.

use of RCAF bases in northern Canada for refueling.” At the Chairman’s suggestion, the Chiefs agreed that the CAS would prepare a paper on the issue as part of a briefing on air defence for the CDC.⁵⁵ COSC again discussed the USAF request for tanker facilities at a special meeting on 28 January, 1957, and agreed that the submission to CDC “be amended to include a statement that a condition of the agreement should meet with the requirements of Canadian procurement and construction.”⁵⁶ Such requirements would inevitably involve DCL, and made this another persuasive instance of Ottawa’s use of the corporation as an instrument for ensuring that Canada received as full a measure of benefits as possible from such projects.

At this stage, DCL was drawn directly into the discussions surrounding the refuelling bases and a number of other projects. On 29 January 1957, DCL president R.G. Johnson met with W.H. Huck, the Assistant Deputy Minister of Defence Production, to discuss USAF construction projects in Canada – specifically the SAC refueling programme, TACAN installations, and the DEW DROP communications link from Greenland to Cape Dyer.⁵⁷ At a meeting of the Advisory Committee on Northern Development on the 28th, Huck had noted that the USAF had agreed that any construction in Canada for the refuelling bases “should be handled by Canadian agencies using Canadian contractors.”⁵⁸ A meeting of DCL, Department of Transport, and US officials on the 30th clarified the anticipated structure for the funding and supervision of the

⁵⁵ Minutes of the 602nd meeting of the Chiefs of Staff Committee, 29 November 1956, 5, DHH 73/1223, series 3, box 62, file 1309.

⁵⁶ Minutes of a Special meeting of COSC, 28 January 1957, 3, DHH 73/1223, series 3, box 64, file 1313. The meeting had been held to review papers prepared for the CDC and to finalize the brief that the CAS would present to that committee on air defence. *ibid.*, 2.

⁵⁷ Memorandum for Record, 5 February 1957, “Meeting with Mr. Huck, 29 January 1957 – USAF Construction Projects in Canada,” DCC In-house file “All USA Programs – General Data”. As Assistant Deputy Minister, Huck was also a member of DCL’s Board of Directors.

⁵⁸ Minutes of the 39th Meeting of the ACND, 28 January 1957, 4, LAC, RG2, series B2, vol.6183, pt.4.

refuelling base construction programme. SAC was to have officials working with the RCAF in Ottawa, and funds for the project would be made available by the USAF to the RCAF. The RCAF in turn would process the funds, plans and specifications to DCL in the normal manner. SAC would work with the RCAF rather than the US Army Corps of Engineers. DOT would carry out runway construction, while DCL would carry out building construction.⁵⁹ An initial and unofficial agreement of sorts had thus been reached in fairly short order between the agencies most directly involved in the projects, and DCL would play its conventional role in ensuring that construction, as far as possible, was carried out by Canadian contractors and workers. By the mid-1950s, this had become a familiar *modus operandi* for Canada in the Cold War. Arriving at an official agreement on the matter, however, would prove a more difficult and lengthy process than could have been imagined at the time.

The Cabinet Defence Committee received the refueling base proposal on 6 February 1957. For financial reasons, the USAF planned to build only the first four bases, (Frobisher Bay, NWT, Churchill, Manitoba, and Cold Lake and Namao, Alberta) but still sought permission to undertake engineering studies of the remaining five sites (Coral Harbour, NWT, Knob Lake, Great Whale River, and Fort Chimo, Quebec, and The Pas, Manitoba) in order to form more accurate estimates for future construction. Engineering contracts for the first four bases were scheduled to be let in the forthcoming summer, with construction taking place in 1958 and the bases ready by 1959. Three of the five

⁵⁹ N.J. Smith to R.G. Johnson, 4 April 1957; "Special Meeting Held on January 30, 1957, at 11 A.M. to discuss U.S.A. Programmes," DCC In-house file "USAF Programmes".

additional bases were to be built in 1959 and the remaining two in 1960.⁶⁰ The committee's extensive discussions revealed concerns about the presence of additional American personnel, particularly at Namao, near Edmonton, along with the possibility that in the eyes of the Soviet Union Canada would become more closely linked with the American nuclear threat. A Canadian construction condition was also suggested. "It would be desirable," the minutes note, "to make a condition of meeting the request that procurement and construction would be undertaken through Canadian departments and agencies employing Canadian contractors and not leave this to be the subject of further negotiation."⁶¹ The procurement of Canadian equipment for the project was also of concern; while the United States "was anxious to effect greater integration with Canada in fields such as this and in operational control... [they] did not appear able to extend integration into the field of defence production. Canada should press the U.S. authorities to adopt equipment we produced."⁶² The CDC recommended that the USAF be authorized to establish the bases at the RCAF airfields at Frobisher, Churchill, Cold Lake, and Namao "on the understanding that procurement and construction would be undertaken through Canadian government departments and agencies employing Canadian contractors" and that detailed engineering studies for a further five sites also be authorized.⁶³ Unspoken but understood was DCL's role as a government agency that would employ Canadian contractors for the construction of these bases.

⁶⁰ *History of the Canadian Refuelling Base Program*, 5-6; Minutes of the 113th meeting of the Cabinet Defence Committee, 6 & 7 February 1957, 2, LAC, RG2, vol. 2749, file "Cabinet Defence Committee – Volume VII".

⁶¹ *Ibid.*, 3.

⁶² *Ibid.*

⁶³ *Ibid.*, 4. When discussing the decision at a subsequent meeting of the ACND, General McNaughton (Chairman, Canadian Section, PJBD) noted that "Strategic Air Command placed the highest priority on the establishment of these bases which would give a very high benefit/cost ratio." Minutes of the 40th Meeting

of the ACND, 4 March 1957, 3-4, IAC, RG2, series B2, vol.6183, pt.4. The ACND minutes appear to provide an incorrect meeting date for the CDC - 8 February 1957 rather than 6-7 February 1957.

Figure 7: Map of Sites Evaluated and Selected for Strategic Air Command Refuelling Bases

Selected: 1 – Frobisher Bay; 2 – Churchill; 3 – Cold Lake; 4 – Namao
 Visited/Evaluated: 5 – Coral Harbour; 6 – Knob Lake; 7 – Great Whale River; 8 – The Pas; 9 – Fort Chimo;
 10 – Winisk; 11 – Saglek; 12 – Hall Lake; 13 – Fort McMurray; 14 – Rowley Is.; 15 – Bray Is.

Source Map: Natural Resources Canada. Source Data: History of the Canadian Refuelling Base Program, 5-6.

Following extensive Cabinet discussion and approval of the recommendation on 14 February, the USAF was notified through the Permanent Joint Board on Defence that it had been authorized to build tanker facilities at Frobisher, Churchill, Cold Lake and Namao, and that it could proceed with engineering studies for the possible construction of such facilities at Coral Harbour, Knob Lake, Great Whale River, The Pas, and Fort Chimo. A formal diplomatic request was then expected from the Americans.⁶⁴ The insistence on the use of Canadian contractors at the first four bases was again accepted by the Americans; at a PJBD meeting held before May of 1957, it was agreed that Canadian contractors would carry out all of the construction at existing Canadian stations. While this argument ensured that DCL and Canadian construction firms would be involved in the building of the first four bases, it would appear to have left unresolved the construction requirements for some of the additional installations being considered.⁶⁵

The PJBD would subsequently discuss the broader issues of construction programmes in Canada. In early July, for instance, Johnson provided Huck with DCL's views on the issue for discussion at an upcoming PJBD meeting.⁶⁶ The corporation's views were consistent and clear, since later in the year, in another letter to Huck, Johnson explicitly stated that the Canadian construction industry should be supported by provisions in Canada-US construction agreements.⁶⁷ Unfortunately, while the general nature of these discussions at the PJBD can sometimes be determined, their details

⁶⁴ *History of the Canadian Refueling Base Program, 5-6; Clearwater, U.S. Nuclear Weapons in Canada*, 69.

⁶⁵ Minutes of the 41st Meeting of the ACND, 6 May 1957, 2, LAC, RG2, series B2, vol.6183, pt.4.

⁶⁶ R.G. Johnson to W.H. Huck, "Re: Construction Provisions in US - Canadian Agreements covering Construction Projects in Canada," 9 July 1957, DCC in-house file, unlabelled folder.

⁶⁷ R.G. Johnson to W.H. Huck, "Re: (1) Revised Draft of Memorandum to Cabinet Defence Committee on Construction Provisions in Canada-United States Agreements; (2) Construction Provisions in Draft Note on USAF Refuelling Facilities in Canada; (3) Draft Letter from the Secretary of the Air Force to the Minister of Defence Production," 9 September 1957, DCC in-house file, unlabelled folder.

remain virtually unknown due to the steadfast refusal of the Canadian and American authorities to declassify the journals of PJBD meetings from 1952 onwards. The occasional excerpts and references to details of discussions that do appear in other documents strongly suggest that the Board's discussions, if they are ever made available, will shed considerable light on this and many other subjects.

In any event, the February 1957 Cabinet authorization had specifically stated that "procurement and construction would be undertaken through Canadian Government Department Agencies, employing Canadian contractors."⁶⁸ It had also become clear in meetings about the project that the methods previously used by the Americans in construction of the Pinetree Line sites and the air bases in Newfoundland and Labrador were unacceptable to other organizations and people, including Air Commodore R.B. Whiting, Chief of Construction Engineering, RCAF. He presented staff studies showing that the RCAF could build comparable facilities for less than the USAF, and proposed to his SAC counterpart that RCAF and Canadian government policies and methods be used.⁶⁹

Even before Cabinet had reached its decision, SAC took the Canadian proposals to USAF headquarters, which was convinced by them, and then proposed to the US Secretary of Defense that the USAF be designated as the construction management agency for design and construction and that responsibility for the project be delegated to SAC. SAC would be the administrative agent for USAF and the RCAF would act as the actual construction agent or representative in Canada. This plan differed from the normal American scheme, which, as discussed in previous chapters, required that the Army's

⁶⁸ A/C J.A. Easton, RCAF, to MGen R.C. Lindsay, USAF member of PJBD, 22 February 1957, quoted in *History of the Canadian Refueling Base Program*, 6.

⁶⁹ *Ibid.*, 7.

Corps of Engineers or the Navy's Bureau of Yards and Docks act as the USAF's construction agent unless the Secretary of Defense specified otherwise.⁷⁰ The USAF's rationale was that since some of the bases represented an extension of existing RCAF bases rather than the construction of new facilities, it would be reasonable for the USAF to make use of RCAF engineering facilities. Since the Corps of Engineers was not involved, the US Secretary of Defence appointed Strategic Air Command as the design and construction agency for the programme. SAC then set up a Project Office as part of the RCAF's organization in Ottawa, and arranged to carry out all the necessary contracting through DCL, in the same way that RCAF programmes would be handled.⁷¹

This new arrangement was approved by Washington in August of 1957, and four members of SAC, two officers and two airmen, were designated to provide observation of design and construction in Canada. It is worth noting that the USAF believed that success in this project could allow it to handle more of its own construction projects outside of the United States. Such freedom from Army or Navy involvement was likely one of the motives for its initial support of the Canadian approach to the undertaking. An intricate game indeed was being played at the Pentagon. The RCAF delegated one officer to work in conjunction with the SAC liaison office in Ottawa. The office's first task consisted of administering feasibility studies for the nine base locations, USAF money for the initial studies having been released in early 1957.⁷²

Direct administration of the programme was carried out from the liaison office in Ottawa, using RCAF and DCL services to the maximum possible extent. USAF funds

⁷⁰ The messages on this subject referenced in the SAC history of the programme date from December 1956 and January 1957. *Ibid.*, 7, 48 n.18.

⁷¹ "General Outline of U.S. Military Construction Activities in Canada," 4.

⁷² *History of the Canadian Refueling Base Program*, 7.

were released through SAC to the Canadian government, which then worked through DND, DCL and the Department of Transport. At all stages of negotiation, the SAC liaison officer was required to approve the bid. The liaison office dealt directly with architects and engineers in the planning and design phase, a procedure which the US felt was responsible for effectiveness and cost savings in the programme.⁷³

By May, the USAF had already sent payment to the RCAF to cover the cost of engineering consultants, even though a formal request to establish the bases had not yet been received. In addition to its usual role in the construction of the bases, arrangements had also been made for DCL and the RCAF to pass on information about runway work from SAC to the Department of Transport. In the meantime, the RCAF had informed the USAF that the Canadian government was agreeable to the refuelling base programme, and the United States prepared a draft diplomatic note on the issue which was subsequently delivered to Ottawa in early August of 1957. Acceptance of the note would constitute an agreement, but a quick reply was not forthcoming.⁷⁴

Negotiations for the refuelling base treaty, and for the treaty covering the TACAN aerial navigation installations as well, were delayed by two significant obstacles. The first was the change in Canadian governments. In a June election, Louis St. Laurent's Liberals had been defeated by Diefenbaker and his Conservatives, a defeat due in part to C.D. Howe's conduct when dealing with the Trans-Canada Pipeline debate and other issues. Ironically, given Howe's role in the creation of DCL, the company was involved in the construction of the pipeline that contributed to his downfall. After twenty-two years of Liberal governments, some time was naturally required for Diefenbaker and his cabinet

⁷³ *History of the Canadian Refueling Base Program*, 9-11.

⁷⁴ Minutes of the 41st Meeting of the ACND, 6 May 1957, 2; Clearwater, *U.S. Nuclear Weapons in Canada*, 69-70; *History of the Canadian Refueling Base Program*, 11.

to come to grips with all the issues they faced, including the pressures being brought to bear on them on defence issues by the military. Diefenbaker's mistrust of the civil service in Ottawa, particularly in External Affairs, must also have contributed to the delay.⁷⁵

The second impediment to the refuelling base treaty was the US State Department. It objected to the Canadian demand that only Canadian contractors be employed on the programme. Concerns about domestic politics, especially the opinions of certain members of Congress, made such a condition unpalatable, but an accommodation was eventually reached whereby the formal treaty specified only that the construction procedures would be as arranged between the agencies of the two countries. In private, however, the Secretary of the Air Force wrote to the Minister of Defence Production, agreeing that the Canadian condition would be followed.⁷⁶

Despite these delays, planning continued within the Ottawa bureaucracy. By the beginning of October 1957, DCL was already considering the appropriate guidelines for the levying of taxes on the refuelling base programme, which included an evaluation of the methods used in previous projects for providing the tax and duty exemptions on construction materials and other equipment.⁷⁷ At a mid-October meeting, the Deputy

⁷⁵ J.L. Granatstein, *The Ottawa Men: The Civil Service Mandarins, 1935-1957*, (Toronto: Oxford University Press, 1982), 263-272; John Hilliker and Donald Barry, *Canada's Department of External Affairs, Volume II: Coming of Age, 1946-1968*, (Montreal and Kingston: McGill-Queen's University Press, 1995), 133-143; Ken Rasmussen, "Bureaucrats and Politicians in the Diefenbaker Era: A Legacy of Mistrust," in *The Diefenbaker Legacy: Canadian Politics, Law and Society since 1957*, Donald C. Story and R. Bruce Shepard, eds., (Regina: Canadian Plains Research Center, University of Regina, 1998), 155-167.

⁷⁶ "General Outline of U.S. Military Construction Activities in Canada," 3. Concerns about domestic American reaction were not unfounded; in June of 1958, for instance, two Republican members of Congress protested the possible award of a \$750,000 contract for radomes to a Canadian company. "Protest U.S. Order Going to Canadians," *Globe and Mail*, 5 June 1958, 1.

⁷⁷ D.W. Laird, Engineer i/c Special Projects (Radar) to C. Maxwell, Assistant Chief Engineer, "Taxes - Refuelling Facilities," 1 October 1957, DCC in-house file "All USA Programs - General Data". Materials and equipment imported for US defence projects in Canada were usually not subject to taxes or charged duty, although the observance of these conditions sometimes encountered problems. See, for instance, "Fraser-Brace Overseas Corp. v. St. John," *The American Journal of International Law*, 52:3 (July 1958):

Minister of Defence Production brought the issue of planning the base construction programme to the attention of the Advisory Committee on Northern Development, calling for closer liaison between DDP, DCL, and Northern Affairs.⁷⁸ By December, detailed RCAF-USAF engineering studies were nearing completion, and the preliminary studies of other locations authorized by Cabinet had been completed. While the airfields at Coral Harbour, Knob Lake, and The Pas were considered suitable for expansion, similar work on the existing airfields at Great Whale River and Fort Chimo was believed to be too expensive. Cabinet had also authorized engineering studies at Winisk and Esker Lake; if either or both of these sites were unsatisfactory, a preliminary survey for alternative sites would be made in the Hudson Bay-Ungava region, with Cabinet approval required for further action.⁷⁹

Construction of the first phase of the project – Frobisher, Churchill, Cold Lake, and Namao – was expected to cost some \$47 million Canadian. Finalization of the plans was anticipated for later in October and Churchill, Cold Lake, and Namao were expected to be available for partial use by the fall of 1958. All four would be completed by the fall of 1959, including five million gallons of fuel storage at each site, and large transmitting and receiving installations at Cold Lake. The second phase would involve the establishment of the five additional sites. A co-ordinating committee with representatives from various departments had been established to handle the daily matters related to the project, and DCL President R.G. Johnson had been chosen as its chair. The ACND also

529-531, which discusses a case concerning the NEAC extension of the Pinetree Line, discussed in Chapter Two.

⁷⁸ Minutes of the 43rd Meeting of the ACND, 16 October 1957, 6, LAC, RG 2, series B2, vol. 6183, pt. 4.

⁷⁹ Minutes of the 44th Meeting of the ACND, 2 December 1957, 5, LAC, RG 2, series B2, vol. 6183, pt. 4. These and other minutes often refer to "Knob Lake (old site)," which appears to be a reference to the earlier airstrip created to serve iron ore exploration and exploitation that was supplanted by the newer airfield built for the Mid-Canada Line.

asked to receive reports on the programme at each of its future meetings until the work was completed.⁸⁰

Cabinet discussed the refuelling bases on 22 and 24 January 1958, and the preservation of the Canadian construction requirements in the revised agreement occupied a considerable amount of its attention. The primary, if not the sole criterion, appeared to be economic benefit. On the 22nd, the Secretary of State for External Affairs reviewed the situation, noting that the previous government had agreed to authorize Frobisher, Churchill, Cold Lake, and Namao, "on the understanding that procurement and construction would be undertaken through Canadian government departments and that Canadian contractors would be employed."⁸¹ An extensive discussion of construction requirements followed. "One of the most important provisions of the proposed agreement," Cabinet conclusions noted,

concerned construction and procurement of equipment. Up to a year ago, Canada U.S. defence agreements normally made provision for "equal consideration" to Canadian and U.S. contractors. The decision of the previous government with respect to the four bases mentioned involved a trend away from this formula to a firm requirement that construction be done by Canadian contractors. Since then, U.S. authorities on a number of occasions had expressed concern over this development. Some Canadian officials believed that a strong stand in principle on this matter might result in U.S. acceptance of the necessity of employing Canadian contractors on almost every project of importance, although there might be occasions when such a stand would run into firm U.S. resistance and thus have a bad effect on Canadian U.S. relations. Other officials felt that insistence on spelling out the principle in the proposed agreement would result in U.S. resistance now, and that it might not be desirable to press the U.S. too strongly, provided that the Canadian objective of having the work done by Canadian contractors, except in very special cases, was achieved.⁸²

While there was agreement on the requirement that Canadian contractors be used, there were differences of opinion on how such a condition should be enforced. It emerged in

⁸⁰ Minutes of the 44th Meeting of the ACND, 2 December 1957, 5-6.

⁸¹ Cabinet Conclusions, 22 January 1958, 3, LAC, RG2, series A-5-a, vol.1898.

⁸² *Ibid.*

the discussions that the US draft of the agreement did not specifically state that Canadian contractors would be used, but that the USAF would be asking DND to act as its agent and was aware that Canadian contractors would therefore be employed. The government, it was suggested, might wish to insist that the agreement specify Canadian contractors "as the previous government had in principle decided" if these provisions for ensuring Canadian participation were not accepted.⁸³

Cabinet also noted that if an agreement using the usual "equal consideration" clause were accepted, US-financed construction would begin very soon, and provide Canadians with jobs. The conclusions noted that with the exception of the leased bases and leased territory at Goose Bay "the U.S. had always been prepared to use Canadian contractors employing Canadian labour in the past on their defence projects here, and would do so in this case."⁸⁴ Despite this American willingness, however, the present situation had arisen because the Department of Defence Production had been made aware of cases where the United States had not used Canadian contractors or equipment procured in Canada when it would have been "quite possible." As a result, the St. Laurent government had then made the specification of Canadian contractors a condition for the start of construction of facilities at the first four bases, and "it would be most embarrassing for the present government to go back to the old position."⁸⁵ "It would be equally, if not more embarrassing," the Cabinet conclusions noted, "if the U.S. were to bring in many workers for these projects at a time when there was so much unemployment in Canada. Before considering the matter further, assurances should be

⁸³ *Ibid.*

⁸⁴ *Ibid.*

⁸⁵ *Ibid.*, 4.

sought from the U.S. that Canadian workers would be employed.⁸⁶ Cabinet deferred decision pending a further report on the assurances that the US was prepared to give on the employment of Canadian contractors using Canadian workers.⁸⁷ This focus on jobs was a consequence of the first significant economic downturn since the Second World War. Unemployment was a pressing subject for Cabinet; the subsequent issue it discussed at this meeting was an employment programme, and the issue would be discussed again as part of the refuelling base programme.⁸⁸

Two days later, on the 24th, Minister of National Defence George Pearkes reported to Cabinet that the United States would immediately make \$42 million available for construction and related work on the facilities at the four sites once an agreement had been reached. He noted, however, that the US

would not go ahead...if Canada stipulated in the note that contracts must be given to Canadian contractors. However, he understood they would be quite willing to give an assurance in writing, separately, that this would in fact happen so far as these particular bases were concerned. Employment would be provided for 1,500 men in the very near future. Unless the work got under way by April 15th, the projects might be cancelled and dropped for good. In these circumstances, Mr. Pearkes recommended that the U.S. be authorized to proceed in accordance with the terms originally proposed, i.e. procedures for awarding contracts would be determined by agreement between the two governments.⁸⁹

Howard Green, the Acting Minister of Defence Production, stated that "it would not be too embarrassing to allow the U.S. to go ahead" if a formal note on the issue could not be

⁸⁶ *Ibid.*

⁸⁷ *Ibid.*

⁸⁸ Unemployment in Canada sat at between 6 and 7.1 per cent between 1958 and 1961, a sharp change from previous years, when it had stood at between 2.2 and 4.6 per cent. Canada, Statistics Canada, *Historical Statistics of Canada*, 2nd ed., F.H. Leacy, ed., (Ottawa: Minister of Supply and Services Canada, 1983), series D223-235. For a brief discussion of government attempts to manage the economy during the Diefenbaker years, see Robert Bothwell, Ian M. Drummond, and John English, *Canada Since 1945: Power, Politics and Provincialism*, rev. ed. (Toronto: University of Toronto Press, 1989), 198-219.

⁸⁹ Cabinet Conclusions, 24 January 1958, 2, LAC, RG2, series A-5-a, vol.1898.

obtained, but worried that a precedent would be set for other projects.⁹⁰ “They were going to insist on the “equal consideration” provision,” Green noted,

and, if they succeeded in gaining acceptance of it, would then want the construction work to be done by U.S. personnel and the equipment procured in the U.S. Mr. Green emphasized again that the previous government had agreed to the construction of the refuelling facilities at the four bases on the understanding that the work would be done by Canadian contractors. To change now would be politically dangerous.⁹¹

In his arguments, Green was laying out what had by now become the standard departmental point of view on this issue, particularly the belief that the Americans could not always be trusted to agree to the Canadian construction requirements that had gradually become a standard condition required by Ottawa. The persistence of this view also points to the administrative continuity provided by senior civil servants in Ottawa, even early in the Diefenbaker years when such their relationship with the government was notoriously strained.⁹²

Cabinet noted in its discussion that given the current employment situation, the American terms might be accepted for the first four bases, since most of the work was for construction and very little equipment was involved; as a result, procurement from US sources was not likely to be a problem. This was a contrast with a number of other major projects, such as the Distant Early Warning Line, where the American procurement of

⁹⁰ At the time, Green was Minister of Public Works and Acting Minister of Defence Production. At this point, approximately one sentence of text has been removed from the Cabinet Conclusions under section 15(1) of the *Access to Information Act*, which exempts material covering international relations. The exempted material possibly refers to the decision to delay discussions of an agreement on TACAN installations (see below), or to the Ballistic Missile Early Warning (BMEWS) project. Other references to BMEWS from 1958 Cabinet conclusions have been completely exempted; see Cabinet Conclusions, 23 April 1958, 5, 29 April 1958, 3-4, LAC, RG2, series A-5-a, vol.1898; Cabinet Conclusions, 12 November 1958, 18, LAC, RG2, series A-5-a, vol.1899. The BMEWS project is discussed in Chapter Six.

⁹¹ Cabinet Conclusions, 24 January 1958, 2.

⁹² This continuity held true for many departments, including Defence Production, where David Golden had been Deputy Minister since 1954. Granatstein, *The Ottawa Men*, 263-272; Rasmussen, “Bureaucrats and Politicians in the Diefenbaker Era,” 155-6. Rasmussen notes that Diefenbaker did not act to replace the senior civil service, and that among Conservative Prime Ministers, both R.B. Bennett and Joe Clark made more changes at the deputy ministerial level and to the machinery of government than did Diefenbaker.

electronic and other equipment to furnish the structures built by Canadians often resulted in expenditures far greater than those for the Canadian construction work, and where this disparity, and the extensive use of American equipment, was a significant concern for Canadian government agencies, including the Electronics Division of the Department of Defence Production.⁹³ Diefenbaker and his ministers were getting a lesson in the pragmatics of dealings with Uncle Sam.

Cabinet agreed that permission be given to the United States to proceed with construction of the four bases on the understanding "that an assurance was received from the U.S. that the construction and the procurement of related equipment, supplies, and technical services, except for special items, be undertaken through Canadian government departments and agencies and that the work would be done by Canadian contractors."⁹⁴ Reflecting Defence Production's concerns about setting precedents for future construction, the note agreeing to these conditions was to apply only to these bases and was not to be a precedent for the construction of subsequent American defence installations in Canada, while the "substance of the formula" for construction and equipment provisions submitted by the US would be accepted for this project only. Changes to other aspects of the proposed note suggested by departments would be submitted to the Americans for consideration. Finally, no American workers were to be allowed to participate in construction unless they were specialists unavailable in Canada, a condition which reflected the government's concern about unemployment. Federal construction projects were seen as one possible remedy for this situation; later in the year,

⁹³ Cabinet Conclusions, 24 January 1958, 3; Danford W. Middlemiss, "Defence Co-Operation," in *Partners Nevertheless: Canadian-American Relations in the Twentieth Century*, Norman Hillmer, ed., (Toronto: Copp Clark Pitman, 1989), 172-175.

⁹⁴ Cabinet Conclusions, 24 January 1958, 3.

for instance, Cabinet would urge departments to proceed with their construction programmes, and to plan further projects to help alleviate winter unemployment.⁹⁵

These winter works formed part of the government's response to the 1957-1961 recession, and similar programmes had been undertaken in earlier years in order to maintain employment. Speeches by DCL's president to the Canadian Construction Association's annual meetings during these years discussed the corporation's role in encouraging winter work. In 1957, Johnson stated that "I believe that winter construction, promoted by us for reasons of the urgency of our programme, and by others because of problems of seasonal employment, is here to stay"; in 1958, he noted that in promoting winter construction to meet the urgent demands of the defence programme, "we found common interests with the Department of Labour, which for the past three years has been leading a campaign aimed at promoting winter work... All maintenance and repair jobs which can be executed in winter and which do not require immediate attention are, as a matter of policy, deferred until winter."⁹⁶ Given the large proportion of federal government construction contracts handled by DCL, and the urgency of many of the projects, the corporation's resultant role in facilitating winter work to meet defence and employment policy needs was significant but hardly surprising.⁹⁷

⁹⁵ *Ibid.*; Cabinet Conclusions, 24 July 1958, 3-4, LAC, RG2, series A-5-a, vol.1899; Bothwell *et. al.*, *Canada Since 1945*, 202-204. In the July discussions, a figure of 600,000 unemployed was mentioned.

⁹⁶ Kenneth Norrie and Douglas O'ram, *A History of the Canadian Economy*, (Toronto: Harcourt Brace Jovanovich, 1991), 569-572; R.G. Johnson, "Defence Construction Programme and Practices," *Proceedings of the 39th Annual General Meeting of the Canadian Construction Association, 1957*, 99-100; Johnson, "D.C.L. at Home and Abroad," 114; "Defence Construction (1951) Ltd.," *Proceedings of the 41st Annual General Meeting of the Canadian Construction Association, 1959*, 121.

⁹⁷ DCL president R.G. Johnson, for instance, was among the government officials attending a national conference on winter employment in July of 1958. "National Winter Employment Conference: Organization etc. Representation," 3, appended to Memorandum, Minister of Labour to Cabinet, "Re: National Winter Employment Conference," 5 August 1958, Cabinet Document 227/58, LAC, RG2, series B2, vol. 2741.

If the state of the national economy and unemployment levels was one of the broader concerns affecting Cabinet discussions, so was a growing focus on northern Canada. At the time of these discussions, the Diefenbaker government was between its June 1957 defeat of the Liberals and the 1958 election that confirmed its political ascendancy. The 1958 campaign was also characterized by the emergence of a new line on relations with the United States that played on a stronger sense of Canadian nationalism, along with the articulation of Diefenbaker's "Northern Vision," which proposed the development of the Canadian north. Both of these concerns would bear directly on the refuelling base programme, and echoes of the "Northern Vision" can be seen in DCL's implementation of this project, which ultimately became involved with ambitious plans for Frobisher Bay.

While Cabinet discussions demonstrate that the Canadian construction conditions now formed part of a clearly articulated policy, the United States remained unwilling to sign any agreement that openly guaranteed that construction would be carried out through Canadian agencies – i.e., DCL – using Canadian firms. In July of 1958, for instance, while discussing the TACAN facilities, Sidney Smith, Secretary of State for External Affairs, noted that "employment of Canadian contractors for construction in the refuelling agreement was only provided for in an exchange of letters. The U.S. did not want to put such a thing in an exchange of notes which could be published."⁹⁸ A year earlier, when discussing the DEW DROP communications link between Thule and Baffin Island, Davie Fulton, as the Acting Secretary of State for External Affairs, explained that the United States, with its many overseas bases, was concerned that any public agreement on construction favouring Canadians "would set an example to other countries where the

⁹⁸ Cabinet Conclusions, 12 July 1958, 13, LAC, RG2, series A-5-a, vol. 1898.

U.S. had facilities and where it was not possible to have the work done by the country concerned because competent and reliable contractors were lacking,” a comment which may have been intended in part to flatter Canadian bureaucrats.⁹⁹ Many of these arguments would also be raised during the negotiations surrounding the TACAN programme.

Shortly afterwards, the Advisory Committee on Northern Development was informed that Canadian comments on the US draft note would soon be passed to the Americans, and that it “would contain a neutral clause on construction, which would be supplemented by informal assurances by the United States that Canadian contractors would be employed.”¹⁰⁰ Plans to share costs on construction at Namao were dropped, since the RCAF no longer required that the airfield there be expanded. The programme had received detailed consideration at the January meeting of the PJBD, and the American representatives at that level of discussions had “fully accepted the principle that construction at established R.C.A.F. or D.O.T. airfields should be by Canadian contractors,” although this applied only to the four bases contained in the draft note and not to any other bases that might be considered.¹⁰¹ By March, the United States had agreed to most of the Canadian conditions, with the exception of the disposal or use of the facilities for commercial purposes, although this objection was withdrawn at a PJBD meeting sometime before mid-May.¹⁰²

⁹⁹ Cabinet Conclusions, 18 July 1957, 10, LAC, RG2, series A-5-a, vol. 1893.

¹⁰⁰ Minutes of the 45th meeting of the ACND, 27 January 1958, 1, LAC, RG2, series B2, vol.6183, pt.4. This comment came from a representative of External Affairs.

¹⁰¹ *Ibid.*

¹⁰² According to the ACND minutes, the appropriate procedure for the disposal was contentious because the United States was concerned that the facilities for which it had paid might be used to benefit the commercial air operations of other countries. Various departmental representatives on the ACND took issue with this argument. Minutes of the 46th meeting of the ACND, 3 March 1958, 1; Minutes of the 47th meeting of the ACND, 20 May 1958, 1, LAC RG2, series B2, vol.6183, pt.4.

The refuelling base programme had survived the change of governments in Ottawa and the objections from Washington, providing in the process an early case study of the Diefenbaker government's relations with Washington. It would, however, face a further and more fundamental challenge as a result of technological changes that had made possible the development of the intercontinental ballistic missile (ICBM). The advent of the ICBM led to a drastic reduction in the amount of warning of an enemy attack – from hours to minutes – and prompted the United States to extensively revise its plans for the basing of tankers in Canada. Under SAC's new alert plans, the decreased warning time meant that tankers could not be kept in the United States and deployed to forward bases before they were needed. As a consequence tankers would be needed on stand-by alert at the bases at all times. Despite these changes, the bases would still be useful since they would still provide increased bomber range, increased flexibility in the use of the bomber force, increased coverage of Soviet targets, and an increase in the bomb load that could be delivered on the targets. Another result was that only the first four bases would be needed, with six tanker aircraft on "Reflex" alert at all times in peacetime and with deployment rights for twenty aircraft at each base in emergency. Alert parking for the aircraft at the end of the runway to minimize the time required to become airborne would also be required, as would a personnel alert readiness building. At Frobisher Bay, for instance, the construction requirements would ultimately be increased by the addition of "hangar aprons and one additional [fuel] tank."¹⁰³

¹⁰³ *History of the Canadian Refueling Base Program*, 12-13; Minutes of the 621st meeting of the Chiefs of Staff Committee, 7 May 1958, 1-3, DHH 73/1223, series 3, box 62, file 1309; Minutes of the 47th meeting of the ACND, 20 May 1958, 1. SAC now wanted to have one third of its force on ground alert status by 1961, and was pursuing a number of actions to meet this requirement – the relocation of its bomber and tanker squadrons north of the 40th parallel, especially in New England, an increase in the number of KC-135s and B-52s, and an increase in missile strength. The one-third ground alert posture was achieved by May 1960. SAC continued to grow in strength throughout the Eisenhower administration, and by the time

In early 1958, the USAF thought that these revisions might be “a matter of concern” to the Canadian military and government, and was not mistaken. On 27 April 1958 SAC briefed A/V/M Dunlap, Vice-Chief of the Air Staff, on the revised plans. SAC’s official history of the refuelling base programme describes the RCAF’s reaction to the changes as “very cool.”¹⁰⁴ The RCAF was also concerned that it had not been informed of the changes at earlier meetings, and its initial reaction was that the new basing rights they required would entail extensive negotiations. Nevertheless, the USAF decided to pursue the peacetime basing rights in addition to the wartime rights. It would cancel the programme, however, if permission was not obtained in time to award contracts between November 1958 and January 1959. This provided some measure of the urgency of the programme, but may also have been intended to stampede Canadians into agreement and action. Both air forces agreed, however, that the RCAF would present this programme to the government after additional explanation was received from the Americans. The USAF briefing was followed by two Chiefs of Staff Committee meetings in early May 1958 which devoted considerable time to these changed plans.¹⁰⁵

The proposed timeline for the concluding of a diplomatic agreement was laid out at the committee’s meeting on 7 May. Expectations were that all arrangements would be approved by December 1958 and that all contracts would be awarded by the end of

Kennedy took office, it had 538 B-52s, 1,292 B-47s, 19 B-58s, and 1,094 tankers. Additional to this might were 12 Atlas ICBMs in the United States, 60 Thor IRBMs in Britain, 30 Jupiter IRBMs being deployed to Italy, and additional Jupiters on their way to Turkey. Over 650 additional ICBMs, including the Titan and Minuteman, had been authorized, and the United States Navy was to receive fourteen Polaris ballistic missile-carrying submarines, each with sixteen missiles; the first of these left on patrol in November of 1960. Rosenberg, “Origins of Overkill,” 66; Clearwater, *U.S. Nuclear Weapons in Canada*, 72-73.

¹⁰⁴ Clearwater, *U.S. Nuclear Weapons in Canada*, 73-74; *History of the Canadian Refueling Base Program*, 13-14.

¹⁰⁵ *Ibid.*; Minutes of the 621st meeting of the Chiefs of Staff Committee, 7 May 1958, 1-3, DHH 73/1223, series 3, box 62, file 1309.

January 1959 so that work could begin during the 1959 construction season.¹⁰⁶ Already, the schedule for construction had slipped by one year compared to earlier plans. If the schedule was not met, the committee was advised, the USAF had emphasized that the program would have to be abandoned since it was only an interim measure for the period during which the B-47 remained the major element of SAC's striking force.¹⁰⁷ The committee agreed that there was a compelling military reason for the provision of such facilities, that the RCAF would seek clarification from the USAF that the "emergency" mentioned in the proposals meant a genuine alert, and that the RCAF would prepare a submission to the Cabinet Defence Committee seeking approval in principle of the American proposals.¹⁰⁸

A few days later, the Chiefs met again, and considered the draft submission to the Cabinet Defence Committee. Reporting on his discussions with USAF representatives, the Vice Chief of the Air Staff noted that the previous characterization of the proposals as short-term was inaccurate – the date for phasing out the medium-range B-47 was indefinite, while the introduction of a supersonic bomber with restricted range (the B-58) was likely. Tankers would therefore be needed as long as the B-47s were in service, and would also be needed for the B-58.¹⁰⁹ The USAF wanted its refuelling bases widely dispersed for operational reasons, was prepared to employ as many Canadians as possible on the bases, and explained its view of "emergency" deployment, all of which were concerns for COSC, and all of which were Canadian concerns that had been expressed at

¹⁰⁶ *Ibid.*, 3.

¹⁰⁷ A number of other issues, including the possibility of Canadian operation of the tankers, and the best means of presenting the proposals to the government, were discussed. *Ibid.*

¹⁰⁸ *Ibid.*, 4.

¹⁰⁹ Minutes of the 622nd meeting of the Chiefs of Staff Committee, 13 May 1958, 2, DHH 73/1223, series 3, box 62, file 1309. The letter sent as clarification may be William H. Tunner, Deputy Chief of Staff, Operations, USAF, to CAS, "Aerial Refueling Base Requirements in Canada," 14 May 1958, DHH 73/1223, Series 1, file 465.

earlier stages of the project.¹¹⁰ The committee agreed that the RCAF would prepare a memorandum for the Cabinet Defence Committee outlining US proposals as well as a short oral briefing for the CDC and the Deputy Ministers of the departments that would be involved in the project.¹¹¹

These changes required a new submission to Cabinet, which was discussed on 20 May 1958. The delays this entailed, coupled with the time taken to resolve American concerns about the ultimate disposal of the facilities, delayed construction. By the time Cabinet discussed the new plans, it was already too late for construction preparations to begin for Frobisher, although some building materials could be delivered to the site during the summer navigation season. As a result, the Department of Transport advised the United States through DCL that arrangements for stevedoring and the chartering of ships for 1958 construction work at Frobisher Bay were being cancelled.¹¹²

At a 26 May meeting, the Cabinet Defence Committee undertook a lengthy discussion of the revised refuelling base plan, after being informed by the Minister of National Defence that “new factors had now emerged of such significance that, in order to retain the deterrent capability of SAC, an “immediate readiness” concept had become a vital necessity. This concept altered the conditions and requirements under which the U.S. was previously authorized to proceed with refuelling facilities at the four bases

¹¹⁰ General Foulkes, the chairman of the committee, was particularly concerned that a clear understanding of “alert” and procedures for consultation needed to be established. COSC was also concerned that US personnel at the bases be minimized in favour of Canadians since it believed that the government wanted to keep the number of American service personnel in Canada to a minimum. *Ibid.*

¹¹¹ *Ibid.*, 3.

¹¹² As a result of these changes, the only major construction for Frobisher during the summer of 1958 would be temporary buildings for some departments and the building of a causeway and wharf for the unloading of vessels. Minutes of the 47th meeting of the ACND, 20 May 1958, 1-2.

mentioned.”¹¹³ The minister was referring to the ICBM, and the committee was informed of SAC’s new plans. In the discussion that ensued many earlier themes – including concerns about the possibility of SAC requesting bomber bases in Canada – emerged again. The CDC concluded by recommending that the new American refuelling plans be authorized, subject to the appropriate exchange of notes, and that the decision be announced by the Prime Minister in the House during the debate on the NORAD agreement.¹¹⁴

Surprisingly, the expected delay in negotiations did not occur. The tanker base programme was approved in principle by Parliament on 19 June 1958 as part of the NORAD agreement, and was formalized on the following day by an exchange of diplomatic notes. Accompanying these notes was an exchange of letters. One set forth the American agreement to the use of Canadian contractors, government departments, and agencies, which by definition included DCL, while two others clarified the American requirements under SAC’s revised basing plan. Contractual and fiscal responsibilities for the programme were also arranged in June and July.¹¹⁵ Given the attention the original NORAD agreement received in Parliament and in the press, the plans for the refuelling bases seem to have passed by almost unnoticed.¹¹⁶

¹¹³ Minutes of the 118th meeting of the Cabinet Defence Committee, 26 May 1958, 2, LAC, RG2, vol.2749, file “Cabinet Defence Committee – Volume VIII”.

¹¹⁴ *Ibid.*, 3-5.

¹¹⁵ *History of the Canadian Refueling Base Program*, 14-15. Copies of the letters can be found as attachments to CAS to VCGS, “USAF Refueling Facilities in Canada,” 30 July 1958, DHH 112.3M2.009 (D151); they are Merchant to Leger, 20 June 1958; Leger to Merchant, 20 June 1958, and Merchant’s reply to Leger, 20 June 1958.

¹¹⁶ The only significant contemporary reference to the programme in the *Globe and Mail*, for instance, appears to be a paragraph in a report by the paper’s Ottawa correspondent. Even in this instance, the bases are discussed in the context of the NORAD agreement. Robert Duffy, “The Tie That Binds,” *Globe and Mail*, 19 July 1958, 19. Much the same appears to hold true for historical examinations of these issues; James Eayrs, for instance, mistakenly asserts that the bases were not built, while Basil Robinson’s examination of Diefenbaker and foreign policy appears to make no mention whatsoever of the refueling

This acquiescence seems at odds with Diefenbaker's insistence on Canadian sovereignty and what became his infamous penchant for indecision. A number of possibilities offer themselves as explanations. The first is that the larger and more significant NORAD agreement simply led to the significance of the refuelling bases being eclipsed. Furthermore, given the Chairman of the Chiefs of Staff Committee Charles Foulkes' later admission that the military had "stampeded" the incoming Diefenbaker government on the NORAD agreement, it remains quite possible that the government was likewise "stampeded" on the issue of refuelling bases, although in this instance, as Cabinet conclusions reveal, pressure may also have been exerted by senior officials in the Department of Defence Production.¹¹⁷ Furthermore, the tanker bases did not represent as significant a break with previous continental defence arrangements as did NORAD; since 1950 the US base at Goose Bay, Labrador, had served as a forward basing and support station for the bombers that carried the American nuclear deterrent.¹¹⁸ In this context, the provision of additional bases to support SAC refuelling might well have seemed a relatively innocuous step that seemed in keeping with previous arrangements. Furthermore, these bases did not involve the acquisition of nuclear weapons for Canadian forces or the further basing of American nuclear weapons in Canada, which was soon to become a contentious issue and a significant liability for the Diefenbaker government. Related to this point is the composition of Cabinet at this time; Sidney Smith was Secretary of State for External Affairs, and had not yet been replaced

bases. Eayrs, *In Defence of Canada, Volume IV.*, 247; H. Basil Robinson, *Diefenbaker's World: A Populist in Foreign Affairs*, (Toronto: University of Toronto Press, 1989).

¹¹⁷ Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987), 104-117; Cabinet Conclusions, 24 January 1958, 2.

¹¹⁸ Clearwater, *U.S. Nuclear Weapons in Canada*, 123-154.

by Howard Green, whose staunch support of nuclear disarmament would subsequently play a central role in the Diefenbaker government's crisis over the acquisition of nuclear weapons.¹¹⁹ Finally, the prospect of Canadian construction jobs at a time of national recession must also have served to clinch the deal. NORAD certainly offered no immediately comparable benefits.

Regardless of the reasons for the Canadian government's accession to this agreement, shortly thereafter correspondence between Washington and Ottawa and within Ottawa itself began discussing the procedures for construction and payment for the programme. As part of these measures, the Department of National Defence was authorized to act on behalf of the United States – more specifically, the RCAF on behalf of the USAF. Funds for the construction project were finally released by the Americans at the end of July 1958, when some \$47,392,725.00 US (\$45,571,067.13 Canadian) was allocated, but actual obligation of funds had to await the signing of a formal diplomatic agreement. This limit on funding was made particularly clear. In a letter to the Chief of the Air Staff, the Deputy Minister of National Defence concluded by stating that “it is most important that all concerned ensure that claims, if any, arising from contract terminations or amendments, do not result in any obligation beyond the amount of appropriated funds available for this project. Accordingly, all contract demands shall clearly indicate the limitation on available funds for the purpose of the contract.”¹²⁰ In

¹¹⁹ Hilliker and Barry, *Canada's Department of External Affairs, Volume II*, 148-154, 237-246; Robert H. Clark, “Canadian Weapons Acquisition: The Case of the Bomarc Missile,” (M.A. Thesis, Royal Military College of Canada, 1983), 105-136, Erika Simpson, “New Ways of Thinking About Nuclear Weapons and Canada's Defence Policy,” in *The Diefenbaker Legacy: Canadian Politics, Law and Society since 1957*, Donald C. Story and R. Bruce Shepard, eds., (Regina: Canadian Plains Research Center, University of Regina, 1998), 29-34.

¹²⁰ F.R. Miller, DM/DND to SecDef for Air, Department of the Air Force, Washington, DC, 24 June 1958; US SecDef to F.R. Miller, DM/DND, 22 July 1958; F.R. Miller, DM/DND to Chief of the Air Staff, “Re: USAF Refuelling Facilities,” 28 July 1958, DCC In-house file “All USA Programs – General Data”; PC

addition to the challenges posed by construction in Canada's north, DCL and other agencies would find themselves working within this further constraint.

These contract arrangements reflected the Canadian government's success in obtaining preferential treatment for Canadian construction contractors and suppliers in the building of American and joint Canadian-American defence projects on Canadian territory. Thus, the agreement on refuelling bases was not an isolated success story, but was instead built on the precedents established by earlier programmes, most notably the Distant Early Warning Line, where comparable "behind-the-scenes" provisions had been used for the first time. If officials in Ottawa were insistent on Canadian construction conditions, their counterparts in Washington, with its extensive network of overseas bases and where politicians had more extensive influence on military programmes than their Canadian counterparts, was likewise insistent that such conditions not be made public.¹²¹ As Cabinet discussions revealed, the construction conditions laid out in this agreement also reflected the established belief within the Department of Defence Production that the United States still sought "equal consideration" provisions that would set a precedent undoing earlier Canadian gains in this respect. These construction conditions, now that they had been obtained, had to be fiercely guarded.¹²² DCL had played an important role in helping to establish such gains, and would also help to guarantee their implementation as part of the actual construction of the refuelling base programme. To some extent, Canadian success in this area was also a reflection of the

1958-24/955, 10 July 1958 (T.B. Minute 534578), LAC, RG2, Series A-1-b, vol. Z-336, microfilm reel T-5310; *History of the Canadian Refueling Base Program*, 12. The funds were released on 31 July 1958.

¹²¹ Aronsen, "Canada's Postwar Re-armament: Another Look at American Theories of the Military-Industrial Complex," 193. See also the more extensive discussion of American perceptions of this issue as part of BMEWS and NSC 5822/1 in Chapter Six.

¹²² Cabinet Conclusions, 24 January 1958, 2.

new Diefenbaker government's insistence on Canadian prerogatives that would manifest itself as the "Northern Vision." In this respect, however, the government was also building on earlier awareness of such matters; as seen in the previous chapter, the creation of the Department of Northern Affairs and National Resources in 1953 represented not only an effort on the part of Ottawa to expand its involvement and control into the Canadian north, but was also a consequence of an emerging Canadian interest in the Arctic, especially a growing awareness of northern sovereignty and the potential threat of American activities to Canada's hold on its far northern reaches.¹²³

Building the Bases

Compared to the political and diplomatic obstacles, building the bases proved to be relatively straightforward. Not surprisingly, given their widely separated locations, the task of construction at the four bases varied considerably.¹²⁴ Cold Lake and Namao had rail links to the south, and had construction seasons that in comparison with the other two locations were relatively long. Churchill's season was shorter, but it also had a rail link to the south. Frobisher Bay, however, had an even shorter season and would rely on ocean transport for the necessary materials. Construction of the base at Frobisher Bay was expedited by DCL, which, acting under the authority of the Defence Appropriation Act of 1950, made expenditures from unappropriated monies in the Consolidated Revenue Fund

¹²³ Zaslow, *The Northward Expansion of Canada*, 308-331; Robertson, *Memoirs of a Very Civil Servant*, 107-127.

¹²⁴ Some DCL status reports on the refuelling base contracts can be found in LAC, RG83, vol.86, file 122-7-120-C6, "General File". Updates on the project can also be found in the minutes of the Advisory Committee on Northern Development from 20 October 1958 to 14 December 1959 (the end of the volume), LAC, RG2, series B2, vol.6183, pt.4. Detailed break-downs of the elements of the construction projects and the value of the contracts awarded can be found in copies of the "Federal Government's Proposed Building Programme for Northern Canada, 1959-60," in LAC, MG32 B40, Roy Faibish sub-series, vol.19, file 19-1, "Advisory Committee on Northern Development," 1959.

and advertised for bids for Frobisher in June of 1958, allowing materials to arrive on site and for some construction to begin that year. Had the tender calls been delayed until the arrival of US funds, the shipping of construction materials would have been postponed and a year of construction would have been lost.¹²⁵ By January of 1959, the USAF's deadline to avoid cancellation of the project, all of the contracts for the programme had been let, and the RCAF expected that the completion dates in late 1960 would be met.¹²⁶ At a time when other major projects had just been completed, the refuelling base project brought DCL increased activity. At a 4 November 1958 meeting of its board of directors, the growth in business due to SAC bases and other projects was acknowledged, and the creation of imprest accounts for work at Frobisher and Churchill was authorized.¹²⁷

SAC's history of the refuelling base construction programme notes that while conditions at Frobisher and Churchill were similar, the construction challenges encountered were different.¹²⁸ Permafrost problems were met and overcome, and both bases also required considerable grading work: some two million cubic yards of rock were moved at Frobisher to eliminate a hill north of the existing runway, while at

¹²⁵ *History of the Canadian Refueling Base Program*, 16; Copy of Minute of Meeting of Treasury Board, approved by Cabinet 10 July 1958, PC 1958-24/955, DCC in-house file "All USA Programs – General Data"; *Globe and Mail*, 23 June 1958, 25, 24 June 1958, 26. The SAC history refers to the tender calls as having taken place in July of 1958. The 1958 shipping season was used to advantage by the contractors; the ACND was informed that by the end of shipping on 15 October, the contractor responsible for the buildings had shipped in some 8,000 tons of material and carried out some preliminary work, while the contractor responsible for the runways had brought in most of its equipment. Minutes of the 48th meeting of the ACND, 20 October 1958, 1; Minutes of the 49th meeting of the ACND, 24 November 1958, 1, LAC, RG2, series B2, vol.6183, pt.4. The use of unappropriated monies from the Consolidated Revenue Fund was recommended by TB 534578 and authorized as part of PC 1958-24/955 on 10 July 1958. LAC, RG2, Series A-1-b, vol. Z-336, microfilm reel T-5310.

¹²⁶ Minutes of the 50th meeting of the ACND, 12 January 1959, 1, LAC, RG2, series B2, vol.6183, pt.5; Clearwater, 73-74; *History of the Canadian Refueling Base Program*, 13-14.

¹²⁷ Imprest accounts are used to provide funds for payments in case of emergencies or exceptional circumstances, and were often created for major projects in which DCL was involved, such as Camp Gagetown. The imprest account for Frobisher was created by late November 1958, while the corresponding account for Churchill was not expected to be created before the spring of 1959. Minutes of meetings of the Board of Directors of Defence Construction (1951) Limited, 4 November 1958, 20 November 1958, DCL in-house file.

¹²⁸ *History of the Canadian Refueling Base Program*, 46.

Churchill the runway fill alone amounted to 1.8 million cubic yards.¹²⁹ At Frobisher, contracts were let for the construction of a 9,000 by 200 foot runway, associated lighting and taxiways, an apron for twenty aircraft, a sea unloading facility for petroleum, oil, and lubricants (POL), two aircraft maintenance docks, commonly known as “nose hangars”, a facility for TACAN navigational equipment, a dam and reservoir for water supply, a liquid oxygen/demineralization plant, and a 180,000 square foot three storey composite building, which was quite possibly the largest building erected in the Canadian north to that date. The use of a composite building for the necessary accommodation, support, and operational facilities resulted in a savings of some forty percent over the cost of separate structures for the same purposes.¹³⁰ Problems with abrasive sand and gravel in the permafrost, as well as poor soil conditions for bonding to permafrost presented problems for the construction of pile foundations for the composite building, but these difficulties were eventually overcome.¹³¹ Problems with the paving plant that required the air delivery of some seventy thousand pounds of additional parts also threatened to interfere with the completion schedule. Despite these obstacles, USAF personnel began arriving at Frobisher in June 1960, and the base became operational at the end of November of the same year, when six KC-97s were placed on alert. Total costs at Frobisher amounted to \$20,847,614.05, more than double the costs at Churchill, the next most expensive tanker

¹²⁹ JHP Scullion, “A Compended History of Defence Construction (1951) Limited, also known as Defence Construction Canada (DCC),” June 1988, 7; *History of the Canadian Refueling Base Program*, 16-30.

¹³⁰ *Ibid.*, 18, 11; Johnson, “Defence Construction (1951) Ltd.,” 120-121 A detailed accounting of the various contracts forms an appendix to SAC’s history of the programme.

¹³¹ Pile foundations were already an accepted Arctic construction technique. The permafrost could not be excavated, and any attempt to clear off the soil above it would lead to melting and unstable foundations. The solution was to bore holes in the permafrost, then set piles into the holes and fill around them with sand and water which would then freeze and hold the pile in place. Air space was usually allowed between the floor of the building and the ground below in order to avoid the transmission of heat to the ground and the risk of melting the permafrost.

base.¹³² These costs reflect one of the fundamental constraints of Diefenbaker's ambitious "Northern Vision"; the expenses of transportation and construction that affected every undertaking, including the ambitious plans for model settlements and resource development.¹³³

At Churchill, construction had the benefit of a rail link to the south, which greatly facilitated the transportation of personnel and materials. Runways had initially been built to support the Crimson staging route during the Second World War, and cold weather testing facilities had been maintained there since 1947.¹³⁴ The RCAF also operated a detachment for search and rescue and to provide air support to the DEW and Mid-Canada Lines. The main facilities required at Churchill were an addition of 5,200 feet to the existing 6,000 foot runway, taxiways, an alert apron, POL facilities, alert crew facilities and quarters for personnel, two aircraft maintenance docks, a liquid oxygen facility, storage buildings, a fire station and a TACAN facility.¹³⁵

In addition to considerable fill work for the runway extension, construction crews also had to contend with permafrost in layers, a condition unknown at Churchill prior to construction, which presented a problem for the drilling of holes and placement of piles for building foundations. In a 1959 speech to the Canadian Construction Association, R.G. Johnson noted that in addition to the wintertime problems of limited daylight hours at Churchill, the dark also brought polar bears that roamed around the construction site

¹³² *History of the Canadian Refueling Base Program*, 19-23; Minutes of 54th meeting of ACND, 1 June 1959, Appendix "A", "Progress of U.S.A.F. Refuelling Bases in Canada." Meldrum claims that personnel and aircraft began arriving at Frobisher in 1959. Meldrum, *Frobisher Bay*, 35.

¹³³ Robertson, *Memoirs of a Very Civil Servant*, 200-201; Zaslow, 332-340; Bothwell, Drummond, and English, *Canada Since 1945*, 186-188.

¹³⁴ Zaslow, *The Northward Expansion of Canada*, 219-221. For a brief history of the establishment of Frobisher Bay as part of the Crimson Route, see Meldrum, *Frobisher Bay*, 29-33; For a discussion of the northern aircraft ferrying routes during the Second World War, see Carl Christie, *Ocean Bridge: The History of RAF Ferry Command*, (Toronto: University of Toronto Press, 1995), 122-146.

¹³⁵ *History of the Canadian Refueling Base Program*, 24.

and forced a halt to work in the dark. Tanker alert duty at Churchill began on 18 November 1960, making this the last of the four bases to become operational. Total construction cost had been \$10,151,850.67, divided roughly into one-third for the runways and lighting and two-thirds for the structures and their associated utilities. The runway contract and one of the building contracts had been awarded to joint ventures composed of more than one construction firm, a practice that had been used on previous DCL contracts including a radar station in British Columbia and one of the large hangars built for the RCAF earlier in the decade.¹³⁶ Such an approach had been used by American contractors, and had also been suggested by DCL during planning for DEW Line construction; at that time Johnson himself had supported joint ventures as a means of allowing smaller Canadian firms to compete for larger contracts.¹³⁷

Although the Americans had an on-site representative for the construction work at Frobisher, SAC experienced considerable difficulty in finding a representative from its headquarters for the project at Churchill. Faced with a two-year assignment with little or no prospect of family visits, two officers resigned from the service, one joined an operational air crew, and a fourth returned to university. In the end, an RCAF officer already on site in a different supervisory role had to assume the posting, and he was assigned an assistant to help deal with his new duties. SAC representatives were more easily obtained for the other bases; the proximity of Cold Lake and Namao allowed a single officer to deal with both bases.¹³⁸

¹³⁶ *Ibid.*, 30; "\$1 Billion Defence Contracts Provided Jobs Here, Abroad," *Financial Post*, 21 February 1959, 54; Johnson, "Defence Construction (1951) Ltd.," 121.

¹³⁷ See, for instance, R.G. Johnson to J.A. Teeter, 15 December 1954, DCC in-house file 122-25-3. In this letter, Johnson also noted that he had discussed the issue with Western Electric's project manager for the DEW Line.

¹³⁸ W/C N.C. Brown, RCAF, to DCL, "Site Representatives of SAC Liaison Office," 15 April 1959. DCC in-house file "Agreement Between US and DCL for Refuelling Facilities".

Cold Lake and Namao were located close to one another in Alberta. Cold Lake, discussed in Chapter Two, was a relatively new RCAF station, dating from the early 1950s, whose main purpose was as a training base for RCAF CF-100 all-weather fighter crews. RCAF Station Namao, located just north of Edmonton and some 120 to 140 miles southwest of Cold Lake, was another wartime ferry route field, this time for the Northwest Staging Route for aircraft headed to Alaska, and, somewhat ironically in view of its Cold War role with Strategic Air Command, to the Soviet Union.¹³⁹ The RCAF began to modernize the base in 1951 in order to use it as a military transport and supply centre for its activities in western Canada. Cold Lake and Namao both required runway work; at the former, an extension of the existing runway from 10,000 to 12,000 feet was required, while at Namao a 14,000 foot facility was needed. Both locations also required taxiways and an alert apron, POL facilities, an alert building, a dorm for enlisted personnel and officers' quarters, TACAN, maintenance docks, and a composite industrial building containing various maintenance shops, storage, and a fire station.¹⁴⁰

Construction at both bases was considerably easier than at Frobisher and Churchill, since there was no permafrost with which to contend, although due to soil conditions and poor drainage both locations had a tendency to turn into "mud holes" when wet. The soil problems delayed construction schedules for about one month, but six KC-97 aircraft arrived at Namao on 26 August 1960, making it the first of the Canadian bases to receive a SAC alert posting, while Cold Lake received its first mission on 5 October. Costs at

¹³⁹ For some reason, the SAC history of the refuelling base programme fails to mention that many of the aircraft headed to Alaska during the Second World War were Lend-Lease aircraft being delivered to the Soviet Union. SAC had a rather different purpose in mind when using Namao to help send aircraft to the same destination.

¹⁴⁰ *History of the Canadian Refueling Base Program*, 31.

Cold Lake amounted to \$5,110,962.79, and to \$8,389,997.13 at Namao. Jointly, their cost was less than that of the work at Frobisher.¹⁴¹

All of the contracts were finished within the stipulated deadline of the second quarter of the 1960-61 fiscal year.¹⁴² The one universal shortcoming that SAC acknowledged was the absence of base housing for families and dependents, something that had not been an issue for the original concept of emergency-only bases and their small complement of twenty-five to thirty permanent personnel, but which became a significant issue when the change to alert basing of tankers required between one hundred and sixty and one hundred and seventy personnel. SAC, at least in the first years of the bases' operations, was unable to provide any sort of housing, even if it only consisted of mobile homes, and was concerned because absence of family housing led to shorter tours of duty and thus reduced mission effectiveness.¹⁴³ In some ways, the refuelling bases were a kind of microcosm of the difficulties facing efforts to "develop" the North in general.

SAC described its work with the RCAF on the refuelling bases as an "abnormal but, as it proved, highly effective collaborative effort."¹⁴⁴ Such a comment may seem unusual at a time when Canadian-American relations were falling into disarray, but it is

¹⁴¹ *Ibid.*, 32-25. The soil problems may have been offset to some degree by the early spring in 1959 that allowed ground clearing at Cold Lake to take place earlier than expected, although later reports to the ACND noted that the weather had delayed progress at Cold Lake and Namao. Minutes of the 52nd meeting of the ACND, 20 April 1959, 1; Minutes of the 55th meeting of the ACND, 9 November 1959, 1, and Appendix "A", "Status of Refuelling Base Project," LAC, RG2, series B2, vol.6183, pt.5.

¹⁴² As mentioned above, the American fiscal year differed from its Canadian counterpart, starting on 1 October of the preceding calendar year and ending on 30 September of the given year.

¹⁴³ The USAF allowed no extra funding for such housing, and the bases at Frobisher and Churchill offered no opportunity of "living on the economy" – in other words, of seeking accommodations from civilian sources. Cold Lake, with its absence of civilian housing in the area was no better, but Namao at least offered the advantage of civilian housing in nearby Edmonton. The RCAF could provide little housing, and were not under any obligation to do so as part of the base agreements, although some family housing was provided for senior officers at each base. *History of the Canadian Refueling Base Program*, 36-37.

¹⁴⁴ *Ibid.*, 44.

worth remembering that much of SAC's experience had been of its dealings with the RCAF and DCL. Service relationships between the two countries, especially between the RCAF and the USAF, were generally much closer and smoother than their political counterparts. The SAC history, while undated, was also written before the Cuban Missile Crisis of October 1962, which not only highlighted strains in Canadian-American diplomatic relations, but which also strained military relations, particularly within NORAD, where the Canadian decision not to promptly match American alert levels proved a significant strain within the organization.¹⁴⁵ In their allocation of praise, the Americans also acknowledged DCL's role in the programme in a July 1962 letter accompanying a copy of the SAC history of the programme, which stated that "a great deal of the credit for the accomplishments and economies realized within this program is attributable to the efforts and diligence displayed by your staff during all phases of the Refueling Base development."¹⁴⁶ Canadian contractual policies allowed the construction of the four tanker bases at a lower cost than had been anticipated, with final construction costs of \$44,500,424.64 coming in at some \$2 million less than the funds allocated to the project. The work on the bases also brought benefits for DCL, which had cut back its personnel by over one third in 1957 following the end of DEW and Mid-Canada Line construction. Coupled with the Continental Air Defence Integration North (CADIN)

¹⁴⁵ Ann Denholm Crosby, *Dilemmas in Defence Decision Making: Constructing Canada's Role in NORAD, 1958-96*, (New York: St. Martin's Press, 1998), 19-55; Richter, *Avoiding Armageddon*, 39-47; Bruce-Briggs, *The Shield of Faith*, 73-75, 178; Kevin S. Gloin, "Canada-US Relations in the Diefenbaker Era: Another Look," in *The Diefenbaker Legacy: Canadian Politics, Law and Society since 1957*, Donald C. Story and R. Bruce Shepard, eds., (Regina: Canadian Plains Research Center, University of Regina, 1998), 1-14.

¹⁴⁶ MGen J.B. Knapp, Director of Engineering, SAC, to R.G. Johnson, "History of the Canadian Refueling Base Program," 24 July 1962, DCC in-house file "Agreement Between US and DCL for Refueling Facilities," 1957-1958."

projects, the refuelling bases helped bring about an increase in DCL's contract awards and workload from 1958 onwards.¹⁴⁷

After all this effort, in the end, more time was spent negotiating for and building the bases than was spent using them. Due to SAC's increasing reliance on ICBMs and the phasing-out of the B-47 bombers and the KC-97 tankers that supported them, the command's need for the Canadian bases gradually decreased. Beginning with Frobisher on 1 July 1963 and ending with Namao a year later, the Strategic Air Command tankers and their crews departed, and the almost-new facilities reverted to the Canadian government.¹⁴⁸ At Frobisher Bay, these facilities would form an important part of the planning for a new arctic community, a process in which Defence Construction Limited would become involved because of its important role in the construction of the refuelling bases. The story of the corporation's involvement in these ambitious but ultimately unfulfilled plans suggests that the militarization of the Canadian arctic, while not the only feasible way for Ottawa to extend Canadian sovereignty further northward, was certainly the most affordable given the fiscal and economic conditions at the time.

Defence Construction and Frobisher Bay

The most expensive of the four Strategic Air Command refuelling bases had been built at Frobisher Bay in the North West Territories, now the town of Iqaluit, the capital of Nunavut. This settlement owed its origins to the establishment of an airbase at that site

¹⁴⁷ Meeting of the Board of Directors of Defence Construction (1951) Limited, 12 December 1957; Meeting of the Board of Directors of Defence Construction (1951) Limited, 4 November 1958, DCC in-house file, Minute book, 1955-1970; Johnson, "D.C.L. at Home and Abroad," 116; "Defence Construction (1951) Ltd," 120.

¹⁴⁸ Clearwater, *U.S. Nuclear Weapons in Canada*, 83-86, 255-258; Cabinet Conclusions, 15 May 1963, 13-14, LAC, RG2, series A-5-a, vol. 6253.

by the United States in 1942, and an American presence would be maintained intermittently until the closure of the SAC aerial refuelling facilities in 1963. From roughly 1953 onwards, Canadian government agencies also began to use the settlement for their own purposes, and from 1963 were the primary drivers of activity in the area, since Frobisher Bay was seen as a regional administrative centre for government activities. In the 1950s and early 1960s, Frobisher's economic life was dependent almost entirely upon the activities of both the Canadian and American governments. Unlike other settlements in the Canadian Arctic, the site had no pre-existing settlements, trading posts, or facilities for resource exploitation, and in contrast with Inuvik in the Western Canadian Arctic, the initial establishment and expansion of the settlement involved no master planning process. By the end of the 1950s, however, Frobisher Bay and Inuvik would be the only settlements with more than two hundred inhabitants north of the Arctic Circle in Canada.¹⁴⁹ Their creation was strongly symbolic to many in southern Canada, especially among civil servants in Ottawa; as Gordon Robertson notes about Inuvik in his memoirs, "the name and the town became accepted symbols of social, political, and economic change in the north."¹⁵⁰

Surprisingly, given its atypical origins, rapidly developing significance for the Canadian Arctic and present status as capital of Canada's newest territory, almost no attention appears to have been paid to the early years of Frobisher Bay's history.

Frobisher is not alone in this respect, however; historian Charlene Porsild has recently noted that "the history of northern Canadian communities, Native and newcomer alike, is

¹⁴⁹ Meldrum, *Frobisher Bay*, xi-xiii, 29-37; E.B. White, "A Tough Assignment," *Northern Affairs Bulletin*, 6:5 (November-December 1959) 17-20; "Cities in the North," *Globe and Mail*, 24 November 1959, 6.

¹⁵⁰ Robertson, *Memoirs of a Very Civil Servant*, 136. See also "New Arctic Capital," *Time* (Canadian Edition), 29 September 1958, 13-14.

appallingly small,” and identifies Iqaluit as one of the many places deserving of further studies.¹⁵¹ A variety of sources do prove helpful, however, and passing mentions of the community’s creation can be found in a number of histories of northern aviation, while Morris Zaslow’s *The Northward Expansion of Canada* makes occasional references to the early days of the settlement, largely examining the problems experienced by Inuit attempting to adjust to life in a new and very foreign environment, and makes some mention of the ambitious plans for the settlement and the consequences of American withdrawal.¹⁵² More recent work includes Mélanie Gagnon’s 2001 study of Inuit reactions to the establishment of the original airbase in the 1940s.¹⁵³ Gordon Robertson, who as Deputy Minister of Northern Affairs and National Resources was directly responsible for the administration of Canada’s northern territories and thus for the planning of the new town, makes some limited mention of the programme in his memoirs.¹⁵⁴ The most accessible general accounts of the early administrative and institutional history of Frobisher Bay appear to be Sheila Meldrum’s area economic survey performed in the mid-1960s for the Department of Indian Affairs and Northern Development and her MA thesis from 1970. Some other roughly contemporaneous studies examined the consequences of the establishment of the new settlement.¹⁵⁵ Graham Rowley’s 1992 study of the ACND has also proved useful in providing some general

¹⁵¹ Charlene Porsild, “Creating New Angles of Repose: Northern Canadian Communities in a National Context,” in *Northern Visions: New Perspectives on the North in Canadian History*, Kerry Abel and Ken S. Coates, eds., (Peterborough, ON: Broadview Press, 2001), 118-119.

¹⁵² Zaslow, *The Northward Expansion of Canada*, 291-292, 343, 351-355.

¹⁵³ Mélanie Gagnon, « Les militaires américains à Crystal 2, Frobisher Bay, dans les années 1940: perspectives Inuit, » (MA thesis, Laval University, 2001)

¹⁵⁴ Robertson, *Memoirs of a Very Civil Servant*.

¹⁵⁵ Meldrum, *Frobisher Bay*; Sheila Keith MacBain, “The Evolution of Frobisher Bay as a Major Settlement in the Eastern Canadian Arctic,” (MA Thesis, McGill University, 1970); John J. Honigmann, and Irma Honigmann, *Eskimo Townsmen*, (Ottawa: Canadian Research Centre for Anthropology, University of Ottawa, 1965).

details, while readily accessible archival resources include the minutes of the Advisory Committee on Northern Development and their supporting documents, as well as the minutes of the Frobisher Development Group.¹⁵⁶ Given this wide diversity of unconsolidated sources, DCL's role in the planning and making of this northern community is therefore worthy of attention.

The uncoordinated growth of the settlement, as well as its increasing importance for a number of government activities, prompted Ottawa planners to begin discussing the future of Frobisher Bay in the mid-1950s. By October of 1953 a long-term policy of developing Frobisher as an important centre for Inuit on Baffin Island had already been established, and a survey team had examined its potential and made recommendations.¹⁵⁷ As a result of events at Frobisher Bay, including the 1 September 1957 takeover of responsibility for airfield operations by the Department of Transport, the use of the airport as a technical stop by two new transpolar air services, the significant USAF plans that led to the refuelling bases, and the increasing use of the town as an administrative centre, plans were made for "extensive work...involving many government departments and other agencies." According to an October 1957 ACND memorandum,

since it appeared that these plans were being made independently by the departments concerned without consultation with the Department of Northern Affairs and National Resources, and since the Department of Northern Affairs and National Resources is responsible for the co-ordination of federal government activities in the north, the department recently convened a meeting to discuss requirements and to arrange co-ordination of the various plans in order to assist the orderly and efficient development of the area.¹⁵⁸

¹⁵⁶ Rowley, *The Role of the ACND*; Minutes and supporting documentation for the ACND, LAC, RG2, Series B2, vol. 6182, 6183; Minutes of the Frobisher Development Group, 1958-1960, LAC, MG32 B40, vol.19, file 19-11, "19-1-2, Frobisher Bay Development Group, 1958-1960".

¹⁵⁷ Minutes of the 12th Meeting of the ACND, 19 October 1953, 3, LAC, RG2, series B-2, vol.6183, part 1; ACND Document ND-64, "Eskimo Settlement at Frobisher Bay," 13 October 1953, LAC, RG2, series B2, vol. 6181, pt. 2; Meldrum, *Frobisher Bay*, 45.

¹⁵⁸ ACND Document ND-225, "Development of Frobisher," 10 October 1957, LAC, RG2, series B2, vol.6182, pt.2.

The ACND appears to have first officially heard of the refuelling programme in late June of 1956, when General Charles Foulkes, Chairman, Chiefs of Staff Committee, reported on the American request for the bases.¹⁵⁹ The ACND began to receive updates on negotiations and planning from January of 1957 onwards, and from December of that year it began to receive regular reports on the project.¹⁶⁰ At the same meeting, the ACND was brought up to date on the planning of Frobisher Bay; a committee composed of representatives from various departments had already held two meetings on the issue. A decision was reached at this ACND meeting to plan for a future population of 4,500, although this estimate would be progressively reduced over the following years.¹⁶¹

Frobisher Bay at this time was the focus of *two* developmental strategies from the south – one military, the other civilian. In an almost reflexive move, the Ottawa bureaucracy sought to co-ordinate the two undertakings. An interdepartmental committee with representatives from Northern Affairs and National Resources, Public Works, National Defence, and Finance had already met on 7 January, and recommended that a Frobisher Development Group be established to co-ordinate development in the area. Chaired by the Director of Northern Affairs' Northern Administration and Lands Branch, the group included members from National Defence, Transport, Public Works, Finance, and the National Research Council. Its role was to co-ordinate information relating to government and other agencies' plans in the Frobisher area. A Frobisher Project Office

¹⁵⁹ Minutes of the 35th Meeting of the ACND, 25 June 1956, 3.

¹⁶⁰ See Minutes of the 39th Meeting of the ACND, 28 January 1957, 4; Minutes of the 44th meeting of the ACND, 2 December 1957, 2-3.

¹⁶¹ Minutes of the 44th Meeting of the ACND, 2 December 1957, 2-3; ACND Document ND-231, "Development of Frobisher Bay, N.W.T.," 23 January 1958, LAC, RG2, series B2, vol.6182, pt.2. The Frobisher Bay committee consisted of representatives from the Central Mortgage and Housing Corporation, the Treasury Board, the Department of Northern Affairs and National Resources, the Department of National Health and Welfare, the Department of Public Works, and the Department of Transport.

was also established within NANR with the primary goals of producing a development plan and of centralizing information and bringing about co-ordination. The Project Office would not make decisions on policy proposals or plans of a department where that department's responsibilities were concerned. It would draw technical support from departments and agencies involved in the development of the area, a mandate that by definition included DCL, and would have a common secretariat with the Frobisher Development Group.¹⁶²

At the January 1958 meeting of the ACND, the Deputy Minister of Defence Production suggested that Defence Construction Limited be represented in the Frobisher Development Group. While the minutes do not elaborate on the reasons for his suggestion, the company's involvement in the SAC refuelling base project and its prior experience in dealing with other government agencies and the Canadian construction industry would have been strong arguments in favour of DCL's inclusion. This development would appear to have been under discussion for some time, since the following morning DCL president R.G. Johnson would mention the corporation's involvement in the Frobisher Development Group to the Canadian Construction Association's annual convention. "Because of the variety of development, civil and military, which may take place in the next few years," Johnson stated, "the Department of

¹⁶² The Frobisher Development Group's tasks, more specifically, were to prepare studies on economic and social development that would lead to plans to guide construction and other developments; to ensure consistency of policy in administration and development; to arrive at general development priorities; and to ensure that physical development in the Frobisher area was consistent with the group's plans. ACND Document ND-231, "Development of Frobisher Bay, N.W.T.," 23 January 1958, LAC, RG22, series B2, vol.6182, pt.2. Graham Rowley's history of the ACND notes that in 1957, "it also appeared that departments had been making plans for developments at Frobisher independently rather than through the Committee, and the Department of Northern Affairs and National Resources had therefore convened an interdepartmental committee to coordinate their activities." Rowley, *The Role of the ACND*, 16. According to Meldrum, consultants also formed part of the Frobisher Development Group, but she does not specify when their involvement began. Meldrum, *Frobisher Bay*, 47.

Northern Affairs and National Resources has organized a Frobisher Development Group in which D.C.L. participates.” Johnson provided this explanation while mentioning the corporation’s relationship with NANR; given the increasing government involvement in northern development, and the attention that Diefenbaker’s “Northern Vision” would soon attract, highlighting DCL’s place in these undertakings was an astute move.¹⁶³ Johnson would place the corporation and the Canadian construction industry at the leading edge of northern development and “progress” the following year, pointing to projects such as the Mid-Canada Line, work on the North West Highway System, the construction of a new Peace River Bridge and the refuelling programme. “Perhaps some day,” he noted, “these projects will find a place in history books telling future generations of the role played by Canadian engineers and construction men in the conquest of the north.”¹⁶⁴

By January of 1958, a memorandum to Cabinet was already being prepared within NANR at the request of the Treasury Board, outlining the developments to date and projecting future expenditures. A number of crucial decisions, including the location of any new construction and its relation to the refuelling installation, had yet to be made. Future meetings of the ACND were also to receive reports on Frobisher development plans.¹⁶⁵ J.P. Stirling, DCL’s Chief Engineer, had already attended at least one meeting of the Development Group by this point, and senior DCL personnel would attend its subsequent meetings until at least 1960.¹⁶⁶ While the minutes for the meetings are generally quite brief, the general impression provided is that the contributions by the

¹⁶³ Minutes of the 45th meeting of the ACND, 27 January 1958, 1-2; Johnson, “D.C.L. at Home and Abroad,” 114; Zaslow, *The Northward Expansion of Canada*, 332-335

¹⁶⁴ Johnson, “Defence Construction (1951) Limited,” 120.

¹⁶⁵ Minutes of the 45th meeting of the ACND, 27 January 1958, 1-2.

¹⁶⁶ See LAC, MG32 B40, vol.19, file 11 “19-1-2, Frobisher Bay Development Group, 1958-1960,” *passim*.

corporation's representatives were centered on the co-ordination of the various projects, based on DCL's central role in the refuelling base programme. At a May 1958 meeting, for instance, Johnson noted that since revised USAF plans for the refuelling base now called for a small construction programme that year, NANR should take advantage of the shipping capacity for its own programmes, because the anticipated 1959 demands for shipping capacity "could cut Northern Affairs construction to a minimum."¹⁶⁷

Minister of Northern Affairs and National Resources Alvin Hamilton would inform Cabinet of the new measures for planning Frobisher Bay in February 1958. The records of the meeting discuss the town in detail, including optimism about the growth of Frobisher Bay as an airport, a base for mineral exploration, and as a centre for administrative purposes. At that time, Northern Affairs thought it "prudent" to plan for non-military population of 4,500. Furthermore, Hamilton noted,

in order to avoid piecemeal building and costly overlapping of services at Frobisher Bay, an interdepartmental committee had been set up, with the agreement of the departments principally involved, as an advisory group on planning. A Frobisher Project Office had also been established within his department to carry out the technical functions required to co-ordinate construction.¹⁶⁸

Cabinet agreed that the department should proceed with the planning of Frobisher, subject to comments from DND and Finance.¹⁶⁹ By March 1958, the Foundation Company, which had made preliminary site surveys for the USAF at Frobisher and which had also been retained as a consultant on engineering aspects of the development of Inuvik, had been engaged to perform a site feasibility study for the new town. A preliminary report was expected by the middle of the month. Plans would depend in part

¹⁶⁷ Minutes of meeting of Frobisher Development Group, 16 May 1958, 5, LAC, MG32 B40, vol.19, file 19-11, "19-1-2, Frobisher Bay Development Group, 1958-1960".

¹⁶⁸ Cabinet Conclusions, 5 February 1958, 3-4, LAC, RG2, series A-5-a, vol. 1898.

¹⁶⁹ *Ibid.*, 5.

on the negotiation of a new agreement with the United States on its tenure at Frobisher Bay and the boundaries of the property that such an agreement would cover.¹⁷⁰

Ambitious plans were afoot. The Canadian government had tremendous expectations for the development of Frobisher Bay. In June of 1958, Cabinet had approved the location of a new townsite adjacent to the airfield.¹⁷¹ Later that month, A/C Whiting, the RCAF's Chief of Construction Engineering and a member of the Frobisher Development Group's Executive Committee, emphasized the importance of the Frobisher Project Office, since the volume of construction at the site was increasing very rapidly, and the committee agreed to regular meetings for the Project Office with agencies involved in construction in the Frobisher area.¹⁷² Administrative arrangements forged ahead, and by October, arrangements were being made for consultants to lay out the design of the new town, although their selection would prove to be more difficult than anticipated.¹⁷³

Plans for the new town were truly ambitious. In November 1958, *The Canadian Architect* argued that "Frobisher Bay promises to be a town which will make all Canada – all the world, probably – think again about living and working in the north."¹⁷⁴ Preliminary plans for the new townsite featured in an amply illustrated article in the same issue proposed "a tightly-planned town centre totally enclosed within a large protective dome, and surrounded by 36 apartment towers. The towers would be in 12 groups of

¹⁷⁰ Minutes of the 46th meeting of the ACND, 3 March 1958, 1-2; Robertson, *Memoirs of a Very Civil Servant*, 135.

¹⁷¹ Cabinet Conclusions, 19 June 1958, 5-6, LAC, RG2, series A-5-a, vol. 1898; Minutes of the 48th meeting of the ACND, 20 October 1958.

¹⁷² Minutes of 1st meeting of Executive Committee of the Frobisher Development Group, 30 June 1958, 3, LAC, MG32 B40, vol.19, file 19-11, "19-1-2, Frobisher Bay Development Group, 1958-1960".

¹⁷³ Minutes of the 48th meeting of the ACND, 20 October 1958, 1-2; Minutes of the 50th meeting of the ACND, 12 January 1959, 1-2.

¹⁷⁴ "The North," *The Canadian Architect*, November 1958, 3(11): 39.

three, each group of three serviced by an elevator shaft discharging into the town centre. The towers are 12 stories high.”¹⁷⁵ The Frobisher Development Group later argued that the development’s “permanence would be symbolic of Canada’s determination to develop and use her northland. Its efficiency would be pattern-setting for other government departments and promote installations in Arctic locations.”¹⁷⁶ Historian Morris Zaslow summarizes the plans as a “dramatic program” that included the use of a nuclear reactor to provide electricity and steam heat, although that particular aspect later fell by the wayside.¹⁷⁷ Intended to shelter the inhabitants from the environment, the architectural and engineering blueprint for Frobisher Bay presented in the November 1958 article have since become a caricature of 1950s modernism and technological

¹⁷⁵ “Frobisher Bay, N.W.T.: Federal Government Project for a New Town,” *The Canadian Architect*, November 1958, 3(11): 46.

¹⁷⁶ “Statement of the Conclusions of the Frobisher Development Group,” 8 February 1961, 1, part of memorandum for the ACND, 9 March 1961, appended to Minutes of the 59th Meeting of the ACND, 20 February 1961, DHH 73/1223, series 3, subseries X, box 89, file 1804.

¹⁷⁷ Zaslow, *The Northward Expansion of Canada*, 343. The Frobisher Development Group discussed the use of a nuclear reactor on at least two occasions in 1958. Both Canadian General Electric and Westinghouse were given information to prepare reports on the subject, but the report from Westinghouse’s reactor division concluded that for a community of 1,500 the annual operating costs of the reactor would be 22% higher than those of an oil-fired thermal generating plant, in part because the latter could also provide heat as well as electricity. In March of 1960, Cabinet agreed to the establishment of an electrical utility operation by the Northern Canada Power Commission that would operate on a self-liquidating basis. Minutes of Frobisher Development Group meetings, 19 March 1958; Minutes of 2nd meeting of Executive Committee of Frobisher Development Group, 17 July 1958, LAC, MG32 B40, vol. 19, file 19-1-2, Frobisher Bay Development Group, 1958-1960”; Memorandum, Minister of Northern Affairs and National Resources to Cabinet, “Research into Nuclear Power for Northern Canada,” 8 April 1959, Cabinet Document 108/59, LAC, RG2, series B2, vol. 2742; “Role of Atom Power Complements Hydro, Canadian Tells UN,” *Globe and Mail*, 1 September 1964, B05; Cabinet Conclusions, 15 March 1960, 11, LAC, RG2, series A-5-a, vol. 2746. For a brief discussion of the Northern Canada Power Commission, see C.A. Ashley and R.G.H. Smails, *Canadian Crown Corporations: Some Aspects of Their Administration and Control* (Toronto: Macmillan, 1965), 123-125, and Zaslow, *The Northward Expansion of Canada*, 342. As early as the mid-1950s the United States had been considering the use of nuclear reactors to supply power and heat to its DEW Line stations, but these plans were ultimately abandoned when the prototype of the reactor exploded, killing its three operators. Minutes of the 24th meeting of the ACND, 7 March 1955, 7, LAC, RG2, series B2, vol. 6183, pt. 3; Susan M. Stacy, *Proving the Principle*, (Idaho Falls, Idaho: Idaho Operations Office of the Department of Energy, 2000, DOE/ID-10799), 138-157. The March 1955 ACND minutes erroneously mention “thermonuclear” reactors, which is possibly a reference to reactors providing both electricity and heat. The Soviet Union undertook a far more extensive programme of using nuclear reactors to supply electricity and heat for Arctic regions; see Paul R. Josephson, *Red Atom: Russia’s Nuclear Power Program from Stalin to Today*, (New York: W.H. Freeman, 2000), especially 134-145.

triumphalism that would have isolated the town dwellers from their environment as well. The energetic sketches convey a vision of Le Corbusier's "Radiant City" transplanted to the Canadian Arctic, but the premises for this undertaking – the settlement of 5,000 people in a northern community – proved ambitious, misguided, and ultimately false.¹⁷⁸

As mentioned above, the first ground for optimism about Frobisher Bay in the late 1950s was its potential as a stopping-off point for long-distance aircraft.¹⁷⁹ Because it had originally been chosen as part of a great circle route between North America and Europe, the airport at Frobisher could serve the same purpose for the rapidly growing trans-Atlantic airliner traffic. Use of this route saved some 1,000 miles in the trip to Europe, and the Scandinavian Airline System (SAS) pioneered flights along the Northern Great Circle route in November of 1954. Canadian Pacific and Trans-World Airlines subsequently joined SAS in flying this route, and by September of 1957 when the Department of Transportation assumed responsibility for operations at Frobisher, all three airlines were ready to make use of the airfield as a refuelling stop and alternate destination for aircraft with mechanical difficulties or that were kept away from their primary destinations due to bad weather.¹⁸⁰ Within the first week of civilian operation of the field, all three airlines made landings, although Pan Am was the first airline to schedule service into the field later in the month. Other airlines soon began to enquire

¹⁷⁸ *Time* magazine described it as a "new dream town [that] may prove the prototype for next-century towns across the North," complete with the amenities of southern life, including a funeral parlour. Inhabitants would travel the muskeg in special buggies, which would provide "a means to make today's muskeg wastelands bloom with oil derricks, grainfields, mines and forests." Submarine freighters and tankers would cruise beneath the ice "from atom-blasted harbours created anywhere on the shores of the Arctic Sea." Minister of Northern Affairs and National Resources Alvin Hamilton is quoted as claiming that the below-ice travels of the American submarines *Nautilus* and *Skate* "shattered the illusion of an impenetrable polar sea. They demonstrated that the Arctic may become the Mediterranean of this modern world." "Reveille," *Time* (Canadian Edition), 29 December 1958, 6-7.

¹⁷⁹ Cabinet Conclusions, 5 February 1958, 3-4; Meldrum, *Frobisher Bay*, 45-46; "Frobisher," *Aircraft*, May 1959, 21(5): 32; "Next Stop: Frobisher Bay," *Time* (Canadian Edition), 24 June 1957, 19.

¹⁸⁰ Meldrum, *Frobisher Bay*, 46; "Frobisher Basking in Luxury," *Globe and Mail*, 1 March 1958, 18.

about making use of the airfield. In 1959, Minister of Transport George Hees noted that following the handover from the RCAF, “practically overnight” Frobisher became the department’s fourth-busiest airport. These demands brought about the construction of special facilities for the aircraft and their passengers.¹⁸¹ Expectations of considerable traffic led to plans for significant facilities at Frobisher, including a terminal building “with floor space similar to Quebec or Windsor airports,” aircraft servicing facilities, and accommodations for airline personnel and passengers. Growth of the airport was expected to prompt the development of related service industries and commercial activities.¹⁸² One commentator in 1957 would speculate that “as the refueling point for air-cruisers flying the new polar route from [the] western United States to Europe, drab, desolate little Frobisher may some day be one of the world’s busiest crossroads,” while in a January 1958 speech DCL President R.G. Johnson also noted the airfield’s growing importance to civil aviation.¹⁸³

These ambitious plans would never be realized. The introduction of long-range jet airliners capable of non-stop intercontinental flights led to a rapid decline in Frobisher’s significance as a refuelling and maintenance stop-over.¹⁸⁴ At a July 1960 meeting of the Frobisher Development Group, a *Montreal Gazette* article suggesting that jets would not land at Frobisher due to poor runways was dismissed by Air Commodore Whiting, Chief

¹⁸¹ “Frobisher,” *Aircraft*, Meldrum, *Frobisher Bay*, 46; “Frobisher Basking in Luxury.” The newspaper article claims that the first Pan Am flight was a DC-7C that arrived on September 11th; Hees’ comments refer to the 18th.

¹⁸² “Frobisher,” *Aircraft*, 32; Meldrum, *Frobisher Bay*, 46.

¹⁸³ Derm Dunwoody, “Arctic Crossroads of the Air,” *Imperial Oil Review*, December 1957, 41(6): 20; Johnson, “D.C.L. at Home and Abroad,” 114. The final report of the Royal Commission on Canada’s Economic Prospects also suggested that growing trans-polar air service between North America and Europe would be profitable to landing points including Yellowknife and Frobisher Bay. Canada, Royal Commission on Canada’s Economic Prospects, *Final Report of Royal Commission on Canada’s Economic Prospects*, November 1957, (Ottawa: Supply and Services Canada, 1958), 415.

¹⁸⁴ Meldrum, *Frobisher Bay*, 50.

of Construction Engineering for the RCAF, who noted that the real reason for the reluctance was the range of jet aircraft, which allowed them to overfly Frobisher, while piston-engined aircraft had greater reliance on the site. By November of 1960, the ACND was advised that “no international airlines were now intending to use the airfield as a regular stop.”¹⁸⁵ Frobisher had become available as a civilian stop-over at the time when airlines were making the transition from the last generation of long range piston-engined airliners to the even longer-range jet airliners. The new generation of jets that made Frobisher obsolete as a stop-over for airliners was epitomized by the Boeing 707 which was, ironically, a close relative of the Boeing KC-135 tanker aircraft that helped make Strategic Air Command’s KC-97 and its Canadian refuelling bases obsolete.¹⁸⁶

The second ground for ambitious plans for Frobisher had seen the settlement as a base for mineral exploration and development, ambitions that formed part of Diefenbaker’s “Northern Vision” articulated during his successful 1958 election campaign. An ambitious development programme for Frobisher Bay also formed part of the vision the Prime Minister laid out for the Canadian public. In a 12 February speech in Winnipeg, Diefenbaker had made several references to northern development, including road construction, arctic research, and the development of Frobisher Bay.¹⁸⁷ Alvin Hamilton’s biographer describes the objectives outlined in this speech as “the substance

¹⁸⁵ Minutes of meeting of Executive Committee of the Frobisher Development Group, 6 July 1960, 6, LAC, MG32 B40, vol.19, file 19-11, “19-1-2, Frobisher Bay Development Group, 1958-1960”; Minutes of the 58th Meeting of the ACND, 5 December 1960, DHH 73/1223, series 3, subseries X, box 89, file 1804. The article discussed by the FDG was published in the 4 July 1960 issue of the *Gazette*.

¹⁸⁶ At least one journalist had foreseen this change in airliner requirements, but believed that piston-engined airliners would continue to use Frobisher for refuelling stops. Dunwoody, “Arctic Crossroads of the Air,” 20. See Ronald Miller and David Sawers, *The Technical Development of Modern Aviation*, (London: Routledge and Kegan Paul, 1968), 217-219, for a brief discussion of the consequences of increased aircraft range for flight times and intermediate stops.

¹⁸⁷ Meldrum, *Frobisher Bay*, 45-46; Zaslow, *The Northward Expansion of Canada*, 332-340; Bothwell *et al.*, *Canada Since 1945*, 186-188; Patrick Kyba, *Alvin: A Biography of the Honourable Alvin Hamilton, P.C.*, (Regina: Canadian Plains Research Center, 1989), 118-121; Minutes of the 46th meeting of the ACND, 3 March 1958, 5.

of the Vision of the North and the New National Policy as they had evolved to date and they were sufficient to capture the electorate's interest and imagination."¹⁸⁸ The Northern Vision marked a change from the Liberals' focus on human development to Conservative plans that included resource development, best remembered as the "Roads to Resources" programme.¹⁸⁹ While members of Diefenbaker's cabinet continued to portray Frobisher as a base for mineral exploration and development of the surrounding area, these plans were ultimately frustrated by the results of exploration, which revealed that the southern part of Baffin Island had few commercially significant mineral deposits.¹⁹⁰ Once more, it seems, plans had been laid for developing the North under false premises.

The third ground for planning, and the only one that would come to pass, saw Frobisher Bay as a government administrative centre for the Eastern Arctic. While the Frobisher Development Group planned the new town, the Department of Northern Affairs and National Resources designated Frobisher Bay as a regional headquarters for much of the Eastern Arctic. In addition to the settlement's accessibility by air and water, previous departmental programmes in the community, including a rehabilitation centre and related projects, made the choice of Frobisher Bay as a regional headquarters a foregone conclusion. As Gordon Robertson notes in his memoirs, "with the excellent airfield and buildings that could be turned to domestic uses when they were no longer needed for continental defence, Frobisher Bay was the obvious place to establish an operational centre for the eastern Arctic of the kind Inuvik was to be for the west."¹⁹¹ A

¹⁸⁸ Kyba, *Alvin*, 119-120.

¹⁸⁹ *Ibid.*, 117-130. Cabinet discussed "roads to resources" in the provinces in June of 1958, for instance, and in November 1958 *The Canadian Architect* listed a \$100 million "development roads" programme and a \$150 million "roads to resources" programme. Cabinet Conclusions, 24 June 1958, 5-6, LAC, RG2, series A-5-a, vol. 1898; "The North," 41.

¹⁹⁰ "Frobisher," *Aircraft*, 32; Meldrum, *Frobisher Bay*, 50.

¹⁹¹ *Ibid.*, 45-48; Robertson, *Memoirs of a Very Civil Servant*, 159.

long-term policy of establishing Frobisher Bay as an important centre for the Inuit of Baffin Island had been established in October of 1953, and construction of the first step, consisting of a small community with a school, "512" houses (named after their square footage), and other facilities was begun in 1955.¹⁹²

More ambitious construction by NANR and other departments was soon postponed in anticipation of new plans for Frobisher Bay. Despite some initial disagreements between various committees and the Treasury Board, the consultants had been chosen by February 1959, and the terms of reference for a planning study had been laid out.¹⁹³ The consultants ultimately produced a \$27 million plan based on the assumptions outlined above, but after the Frobisher Development Group learned that the airport was unlikely to receive heavy use, it recommended that construction be scaled back to meet known government requirements. The revised programme that resulted carried with it the much lower price tag of \$12.67 million, with plans for Frobisher Bay to become the administrative headquarters for the administration of the Eastern Arctic, serving much the same function as Inuvik did for the Western Arctic. The issue was the subject of considerable discussion at a 13 April meeting of Cabinet, and a special committee was struck to study and make recommendations on policies for the development of the Eastern Arctic and the construction of government facilities there, "with particular but not exclusive reference to Frobisher Bay."¹⁹⁴ On 27 June, Cabinet

¹⁹² Minutes of the 12th Meeting of the ACND, 19 October 1953, 3; ACND Document ND-64, "Eskimo Settlement at Frobisher Bay," 13 October 1953, LAC, RG2, series B2, vol. 6181, pt. 2; Robertson, *Memoirs of a Very Civil Servant*, 159; E.B. White, "A Tough Assignment," *Northern Affairs Bulletin*, November-December 1959 6(5); 17-20.

¹⁹³ Minutes of the 50th meeting of the ACND, 12 January 1959, 1-2; Minutes of the 51st meeting of the ACND, 23 February 1959, LAC, RG2, series B2, vol. 6183, pt.5.

¹⁹⁴ Cabinet Conclusions, 14 March 1961, 12; 13 April 1961, 2-4, LAC, RG2, series A-5-a, vol. 6176. The memorandum discussed in Cabinet on 14 February is Memorandum, Minister of Northern Affairs and National Resources to Cabinet, "Development of Frobisher Bay, N.W.T.," 14 February 1961. A copy of

approved the limited development programme for Frobisher Bay, and decided to retain the consultants who had prepared the more extensive plan to prepare the new version.¹⁹⁵

Frobisher needed a federal office building, school, hospital, and other facilities to fulfill its function as administrative headquarters for the Eastern Arctic.¹⁹⁶ Houses were intended for government employees and for those Inuit making transition from "hunting existence to wage employment at the base," as well as for Inuit families using the rehabilitation centre that had been created to help fight the tuberculosis that was widespread amongst the Inuit. The rehabilitation centre was intended to prepare patients to return to what NANR considered "a normal and useful life," sometimes on the land, and in conjunction with the hospital was intended to provide facilities and staff in order to help TB patients adjust to some sort of independent life. The provision of Inuit housing, along with other aspects of the proposed new settlement, was in keeping with government plans to draw people in from the land, both to facilitate the provision of services and to convert their lifestyles to wage employment.¹⁹⁷

By mid-1961, plans for the new town of Frobisher Bay were complete and delivered to the government, but like other ambitions for the settlement they would also encounter significant problems. The decline in the importance of the airfield and the failure to locate significant mineral resources in southern Baffin Island called plans for settlement into question, and the 1961 Federal Government economy drive prompted by

this memorandum and its supporting documentation, including the conclusions of the Frobisher Development Group, can be found as a memorandum for the ACND, 9 March 1961, appended to Minutes of the 59th Meeting of the ACND, 20 February 1961, DHH 73/1223, series 3, subseries X, box 89, file 1804.

¹⁹⁵ Cabinet Conclusions, 27 June 1961, 5-6, LAC, RG2, series A-5-a, vol. 6176.

¹⁹⁶ Cabinet Conclusions, 13 April 1961, 2.

¹⁹⁷ Robertson, *Memoirs of a Very Civil Servant*, 159-160; Zaslow, *Northward Expansion of Canada*, 284-292, *passim*. Robertson claims that at this time about 7 per cent of the total Inuit population was in southern hospitals as a result of TB. For a general discussion of these issues, see Zaslow, 271-305.

national economic problems led to cutbacks in NANR's development plans, including those for Frobisher Bay.¹⁹⁸ A scaled-back plan was developed and approved by the end of 1961, and at the start of February 1962 the government announced that work "to create a permanent capital of the Eastern Arctic at Frobisher Bay" would begin on 1 April.¹⁹⁹ Tenders for the first phase of the work were called in late May, and contracts were let shortly afterwards, with the anticipation that the entire project would be completed in a little more than three years.²⁰⁰

Even this reduced programme would soon be set aside, however; the 1963 American decision to withdraw from Frobisher led to the temporary suspension of the development programme. While an American withdrawal had been foreseen, no plans had been made to deal with the eventuality. In the face of an austerity programme, however, the withdrawal was a serendipitous cost-saving measure. The large compound building that had been built for SAC was taken over by the government and renamed the Federal Building; following remodeling by Public Works, it housed offices for all of the government agencies in Frobisher and accommodation for their single employees. Plans for a vocational school, student residence, and staff housing were cancelled, and NANR began a re-evaluation of its plans for the development of Frobisher Bay.²⁰¹ The costs associated with the abandoning of this modified development programme and its related construction work were subsequently the subject of criticism from the Auditor General.²⁰²

¹⁹⁸ Meldrum, *Frobisher Bay*, 47, 50.

¹⁹⁹ *Ibid.*, 50; Walter Gray, "Ottawa Plans April Start on Arctic Town," *Globe & Mail*, 2 February 1962, B02.

²⁰⁰ Meldrum, *Frobisher Bay*, 50-51; "Good-By Astro Hill, Hello Town," *Globe and Mail*, 25 May 1962, 8.

²⁰¹ Meldrum, *Frobisher Bay*, 51; Zaslow, *The Northward Expansion of Canada*, 355; Walter Gray, "Frobisher Bay Boom Ordered Suspended," *Globe & Mail*, 13 June 1963, 3.

²⁰² Canada, Office of the Auditor General, *Report of the Auditor General to the House of Commons for the Fiscal Year ended March 31 1964*, (Ottawa: Queen's Printer, 1964), 174; *Report of the Auditor General to the House of Commons for the Fiscal Year ended March 31 1966*, (Ottawa: Queen's Printer, 1967), 79;

By this time, Defence Construction's involvement with Frobisher Bay appears to have come to an end, and further work on planning and building this northern town falls outside of the scope of this dissertation.²⁰³

This work on the development of Frobisher Bay therefore marked a third phase in DCL's late 1950s involvement in the North. The first had been the Mid-Canada Line and the Distant Early Warning Line, while the second was the Strategic Air Command refuelling bases. The high costs of the projects in all three phases – the product of distance, terrain, climate, and a small, widely dispersed population – had been notable, as had the fundamental challenges facing transportation and construction in far northern latitudes. While Diefenbaker's "Northern Vision" could point to a few success stories of northern development, those that did succeed were centered on resource exploitation, and benefited from unusual circumstances or heroic efforts to make them viable, such as the Pine Point railway.²⁰⁴

The modernist vision of Frobisher Bay as a town of 5,000 failed to materialize on Baffin Island for a number of reasons, many of which were also directly related to the inherent limitations of the "Northern Vision." Commercial aviation, which had facilitated the expansion of southern influence into northern Canada and had held out the promise of Frobisher as a major stopover, developed so quickly that by 1960 the town could serve only as an emergency landing point that was otherwise overflowed by the ever growing number of airliners on their routes over the Arctic. Plans for Frobisher as a centre for

Report of the Auditor General to the House of Commons for the Fiscal Year ended March 31 1967, (Ottawa: Queen's Printer, 1968), 103.

²⁰³ The date at which DCL's involvement with Frobisher planning and construction came to an end is unclear. Possibly it was related to the end of construction in 1960 and the completion of the first development plan in mid-1961, but DCL file holdings do not cover this area, and the ACND minutes at LAC and DHH do not provide any definite evidence on the matter.

²⁰⁴ Bothwell, Drummond, and English, *Canada Since 1945*, 186-187; Zaslow, *The Northward Expansion of Canada*, 340-350; Robertson, *Memoirs of a Very Civil Servant*, 132, 176-178.

mineral exploration and development also failed to pan out and in doing so underlined a fundamental characteristic of much of the development that was produced by the "Vision" and its accompanying "roads to resources"; northern economic development at that time almost always required the presence of tremendously valuable natural resources to make such undertakings viable. Ultimately, many of the premises for the development of Frobisher Bay had proven false, and not even the ambitious plans for government administrative centres could support the large settlement that had once been planned. At the same time that DCL's involvement with the abortive plans for Frobisher Bay was coming to an end, however, one more round of American plans for expanded military installations in the Canadian north would come to occupy its attention. Many of the same themes that had emerged in the planning of the Strategic Air Command refuelling bases would be underlined in the negotiations for the TACAN programme that occupied much of the late 1950 and extended into the early 1960s.

TACAN

The construction of TACAN (TACTical Air Navigation) installations in Canada to provide radio air navigation information for military aircraft was another American programme involving DCL whose progress ran afoul of the 1957 election and of Ottawa's insistence on the use of Canadian contractors and government agencies. The stations, according to DCL documents, were intended primarily for the use of military air transport flights to various northern installations, and although provided for the benefit of American aircraft, would also be useful to Canadian aircraft operating in the Arctic.²⁰⁵

²⁰⁵ "TACAN"; Cabinet Conclusions, 11 August 1960, 2, LAC, RG2, series A-5-a, vol. 2747. TACAN was developed as a more accurate military version of civilian radio navigation equipment, and was designed to

Following discussions with the RCAF and the Department of Transport, in early 1955 the United States requested and received Canadian government authorization for site surveys at a number of locations in Canada. The surveys were completed in April of 1956, after which the US then began negotiations for the installation of TACAN facilities.²⁰⁶

DCL involvement in the project dated back to at least January of 1957 when a number of meetings were held with Canadian and American officials to investigate how the DEW DROP, SAC refuelling, and TACAN programmes could be handled, and what role DCL and DDP would play in their implementation.²⁰⁷ At a meeting of Defence Construction, Department of Transport, and United States officials on 30 January 1957, it was agreed that the procedure for the TACAN programme would be the same followed for the 1955 Radar Augmentation Programme. The Corps of Engineers would deal with DCL for construction, while the USAF would deal with DDP for the installation of equipment. While the Corps of Engineers assumed responsibility for the TACAN stations, it was understood that DCL, acting for the Eastern Ocean District of the Corps, would supervise construction through a management contract with the Americans, much as they had with the Pinetree Line and other projects. DCL discovered, however, that the West Coast stations had become the responsibility of the Corps' Alaska District, and in what appears to have been a measure to ensure Canadian involvement in all of the sites,

provide properly equipped aircraft with information on their range and bearing from the TACAN installation.

²⁰⁶ Cabinet Memorandum from SSEA, "Installation of TACAN Facilities," 5 June 1958, 1, Cabinet Document 174/58, LAC, RG2, series B2, vol. 2741, file C-20-5.

²⁰⁷ N.J. Smith to R.G. Johnson, 4 April 1957; "Special Meeting Held on January 30, 1957, at 11 A.M. to discuss U.S.A. Programmes," DCC in-house file "USAF Programmes". DEW DROP provided a tropospheric scatter communications link from Thule in Greenland to Frobisher Bay, and is briefly discussed in Chapter Six.

the corporation asked the USAF to transfer these stations to the Corps' Eastern Ocean District.²⁰⁸

Formal discussions of the TACAN programme with the United States began with the submission of a draft American note in March of 1957.²⁰⁹ On the west coast, stations were to be located at Port Hardy, Sandspit, and Fort Nelson, British Columbia, and at Whitehorse in the Yukon. On the east coast, stations were to be located at Sept-Isles, Quebec, St. Anthony's, Newfoundland, Cutthroat Island, and Saglek, Labrador, and at Cape Christian, on Baffin Island in the North-West Territories. In many cases, these were already the sites of airfields, radar installations, or, as in the case of Cape Christian, an existing station for a radio navigation aid. The proposed TACAN installations were not extensive – they consisted of a small building to house the transmitting and receiving equipment essential to providing navigational information, a diesel power plant, a tower for the antenna, as well as some other necessary equipment.²¹⁰

Like the SAC tanker bases, however, this project fell afoul of the change in Canadian federal governments in 1957, Ottawa's insistence on the use of Canadian contractors and agencies, and the objections of the US State Department to Canadian demands. Actions by Canadian officials, however, served to further link the two projects, and also demonstrated the strength of their support for the Canadian construction provisions. At an October 1957 meeting, senior officials from the various departments concerned with the project decided "that it would probably be best if this project were not put to Cabinet until agreement had been reached on the USAF Refuelling Facilities

²⁰⁸ "General Outline of U.S. Military Construction Activities in Canada," 3. The Radar Augmentation programme is discussed in Chapter 2.

²⁰⁹ Cabinet Memorandum "Installation of TACAN Facilities"; "TACAN."

²¹⁰ *Ibid.* Cape Christian was located on Baffin Island's east coast, well north of Cape Dyer.

Project.”²¹¹ Unfortunately, records do not reveal whether this was a pressure tactic, an effort to minimize bureaucratic workload, or a decision to wait until a definite approach to construction had been worked out through the refuelling base negotiations. What is clear is that this decision affected the timeline for the installation of TACAN equipment. In November of 1957, for instance, a report to the Advisory Committee on Northern Development noted that although a new aircraft communication system had been installed at Cape Christian and a 2,500-ft. landing strip had been built, plans for the TACAN project had been postponed.²¹² By mid-April of 1958, however, External was suggesting that despite the lack of a final agreement on the SAC refuelling bases, “it would seem desirable to seek Cabinet approval of the TACAN project.”²¹³ The suggestion appears to have had the desired effect; minutes from a May 1958 ACND meeting contain the secret External Affairs appendix to the annual report on government activities in the north, which notes that pending a final agreement, the Canadian government had granted interim authority for surveys by architects and engineers at some unspecified sites.²¹⁴

Significant decisions on this matter would be reached by Cabinet in July of 1958.

In the weeks preceding this meeting, various departments sought clarification of the

²¹¹ USSEA to CCOS, DM/Transport, DM/DDP, DM/NANR, “Installation by the USAF of TACAN Facilities in Canada,” 18 April 1958 DHH 73/1223, series 1, file 465.

²¹² ACND Document ND-228, “Activities at Cape Christian, N.W.T.,” 26 November 1957, LAC, RG2, series B2, vol.6182, pt.2; Minutes of the 44th meeting of the ACND, 2 December 1957, 1.

²¹³ USSEA to CCOS, DM/Transport, DM/DDP, DM/NANR, “Installation by the USAF of TACAN Facilities in Canada,” 18 April 1958 DHH 73/1223, series 1, file 465.

²¹⁴ Minutes of the 47th meeting of the ACND, 20 May 1958, Appendix “A”, Department of External Affairs. In his history of the ACND, Rowley notes that the Report on Government Activities in the North, begun in 1954, “was a comprehensive report listing for each agency its responsibilities, long-term plans, review of operations during the previous year, and plans for the current year. The format was followed in later reports which were prepared by the [ACND’s] Secretariat early each calendar year. The reports were classified as they included secret material, but this was omitted in unclassified versions which were distributed more widely to show the broad scope of Canadian government activities in the north. They are still frequently used for reference by historians and others interested in northern development.” Rowley, *The Role of the ACND*, 13.

status quo with respect to American defence projects in Canada, as well as information on the American experience with bases in other countries. Alvin Hamilton, for instance, sought information from External Affairs on American bases in other countries, and his questions imply an interest in pushing for terms more advantageous to Canada. Hamilton, as Minister of Northern Affairs and National Resources, was particularly interested in northern installations, noting that it seemed

desirable to review them in the light of present government policies and commitments. Also it may well be that the United States will be seeking extensions to its present operations, either as additions to existing stations or as new establishments. In considering the relationships between the United States military and civilian administration in the north I would find it very helpful to know a little more of the experience with United States installations in other parts of the world. ...It may well be that there are other countries far removed from the north where the United States has installations under terms quite different from those in northern Canada, and possibly more liberal in some respects to the host country.²¹⁵

Hamilton was therefore asking for External to prepare a paper summarizing these positions, and concluded by noting that "we should be particularly interested in those where the United States appears to have terms somewhat less favourable than they enjoy in the Canadian north."²¹⁶ External Affairs' reply, delayed until late July, stated that "from the information this Department has, we would judge that, generally speaking, the United States has not found it necessary to accept provisions in defence agreements less favourable to the United States than those applying to projects in the Canadian North."²¹⁷

The Department of Defence Production also sought information on TACAN and its precedents in the lead up to the Cabinet discussions, and naturally turned to DCL for answers. While Hamilton's letter was in its final draft stages, DCL was providing DDP

²¹⁵ Alvin Hamilton to Sidney Smith, SSEA, 23 May 1958, DHH 73/1223, series 1, file 465.

²¹⁶ *Ibid.*

²¹⁷ Smith to Hamilton, 25 July 1958, DHH 73/1223, series 1, file 465.

with information on the proposed TACAN agreement and condensed summaries of the agreements for previous projects including the Pinetree and DEW Lines. In his cover letter to the Assistant Deputy Minister of Defence Production, R.G. Johnson stated that "this material was prepared with the idea of gathering together the basic information, any editing and redrafting to take place after you have had an opportunity to see it along with the material being prepared by your Electronics Branch."²¹⁸

The 12 July Cabinet meeting discussed the proposed TACAN installations and their construction provisions at some length.²¹⁹ Minister of Defence Production Raymond O'Hurley was prepared to agree that, in view of the urgency of the programme, TACAN equipment from existing USAF stocks could be used, since Canadian equipment would not be available before early 1960. Undoubtedly drawing on his department's prior experience in these matters and the information that had been received from DCL, he

considered that any construction involved and procurement of non-electronic equipment should be undertaken through Canadian government departments or agencies and that Canadian contractors should be used, but was prepared to give special consideration to the particular conditions at the four sites...which were operated by U.S. personnel.²²⁰

Sidney Smith, the Secretary of State for External Affairs, recommended approval in principle of an exchange of notes allowing the use of American equipment but containing the Canadian construction provisions, although "he did not know if the U.S. would agree to the procurement and construction proposals. Employment of Canadian contractors for

²¹⁸ R.G. Johnson to W.H. Huck, ADM/DDP, 21 May 1958, "Re: Construction Arrangements on Construction Programmes in Canada Paid for in Whole or in Part by the United States," DCC in-house file, "US-CDN Diplomatic Agreements affecting DCL". DCL would also respond to further DDP enquiries, providing additional information about contracts on Baffin Island. Drafts of letter, R.G. Johnson to Raymond O'Hurley, Minister of Defence Production, possibly July 1958, DCC in-house file "USAF Programs - General Data". Johnson's letter was a response to an enquiry from O'Hurley dated 19 June that does not seem to have survived in this file.

²¹⁹ Cabinet Conclusions, 12 July 1958, 12-14, LAC, RG 2, series A-5-a, vol. 1898.

²²⁰ *Ibid.*, 12.

construction in the refuelling arrangement was only provided for in an exchange of letters. The U.S. did not want to put such a thing in an exchange of notes which could be published.”²²¹

If Smith’s observations echoed American concerns expressed during the negotiations for the refuelling bases, the reaction of other Cabinet members reflected Canadian concerns that had been raised by the SAC project and were aggravated by the proposed TACAN installations. At one point, the basic premises of the agreement were questioned, and concerns were raised about sovereignty and the growing American military presence on Canadian territory. “Why could Canada not put in these facilities herself?” the conclusions record. “This was just another case of American facilities on Canadian territory. There were too many U.S. personnel now involved in such installations and Canadians were getting disturbed. These facilities should be fully constructed and operated by Canada, even if electronic equipment had to be purchased from U.S. sources.”²²² In other discussions reminiscent of the refuelling base discussions, some ministers thought Ottawa should insist on the explicit statement of Canadian construction provisions in any agreement, while others argued that “the U.S.A.F. could not get Congress to vote money for them if such an arrangement was made public in an exchange of notes and there had to be some give and take. It should be enough to say that Canadian interests were fully protected.”²²³ Cabinet subsequently gave approval in principle to the establishment and operation of the twelve TACAN installations, with

²²¹ *Ibid.*, 13.

²²² *Ibid.*

²²³ *Ibid.*

construction and provision of non-TACAN equipment to be undertaken through Canadian government departments and using Canadian contractors.²²⁴

While approval in principle had now been given, the delays in diplomatic negotiations meant that no tangible actions on the TACAN stations were taken until April 1959, and the issue was not resolved until an exchange of diplomatic notes on 1 May, 1959.²²⁵ As with the refuelling base programme, Canadian politics – the defeat of the St. Laurent government by Diefenbaker's Conservatives – had delayed talks on the matter as the changeover was made between the two governments. Furthermore, the US State Department objected to the Canadian condition that only Canadian contractors be employed, since it was felt that such requirements would prove unpopular in the United States. Even under the Diefenbaker government, however, it would seem that there was still a willingness to find a way on these issues of cross-border cooperation. In a pattern that had by now become familiar, a compromise was eventually reached whereby the formal treaty required that construction procedures would be those arranged by the appropriate agencies of both governments, but the Minister of Defence Production received written assurances from the US Secretary of the Air Force that the restrictions on contractors would be honoured by the Americans. In what had by then emerged as the typical solution, the exchange of notes on the stations stated that "procedures for awarding contracts for construction of the TACAN facilities and for the procurement of construction equipment, construction supplies, and related technical services shall be

²²⁴ *Ibid.*, 13–14.

²²⁵ ACND Document ND-272, "Report on Government Activities in the North, 1958," Department of External Affairs section, 14 April 1959, LAC RG2, series B2, vol.6182, part 3; "General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961," 3; "TACAN."

determined by agreement between appropriate agencies of the two Governments.”²²⁶ One of the agencies to be employed, was, of course, DCL, which once again was able to demonstrate its utility as an instrument of government policy, providing Ottawa with an unobtrusive yet effective way of dealing with the construction of American defence projects in Canada. The agreement also divided responsibility for the installations following their completion; while financial responsibility for all nine installations lay with the United States, at five locations it worked through Canadian agencies for the operation and maintenance of the installations. At the four others, where US personnel already operated other facilities, operation and maintenance would remain an American responsibility.²²⁷

Although an agreement had finally been reached, the delay in approval meant that the original design for the stations was obsolete. In April 1959, DCL and the Corps of Engineers’ Eastern Ocean District made preliminary arrangements for the redesign work.²²⁸ In conjunction with the RCAF, the USAF’s joint Strategic Air Command/Air Defence Command Liaison office in Ottawa served as the design and construction agency. DCL acted as the contracting agency for the two air forces, while the Department of Defence Production concerned itself with representing Canadian interests in supplying and installing electronic equipment. The Department of Transport was also involved, largely because of the siting of some of the TACAN equipment at civil airfields. DCL’s

²²⁶ “General Outline of U.S. Military Construction Activities in Canada,” 3; “Exchange of notes between Canada and the U.S.A. concerning the establishment in Canada of short range tactical air navigation facilities at nine sites (TACAN),” 1 May 1959, 1, Canada Treaty Series 1959, No. 10.

²²⁷ Annex to “Exchange of notes between Canada and the U.S.A. concerning the establishment in Canada of short range tactical air navigation facilities at nine sites (TACAN),” 1 May 1959, 2, Canada Treaty Series 1959, No. 10; Cabinet Conclusions, 11 August 1960, 2. See also the division of responsibilities proposed in “Installation of TACAN Facilities,” Cabinet Document 174/58.

²²⁸ “Exchange of notes between Canada and the U.S.A. concerning the establishment in Canada of short range tactical air navigation facilities at nine sites (TACAN);” “General Outline of U.S. Military Construction Activities in Canada,” 5.

role involved the calling of tenders, the awarding of contracts, and the supervision of construction. The bidding was to be initially restricted to Canadian contractors, but if the low bids were considered to be too high, there was the possibility that the policy would be reviewed. By July of 1959, in addition to the USAF Liaison Office in Ottawa having been given design and construction responsibility for eight TACAN stations, contractors were preparing tenders, while work on the sites was to begin that summer.²²⁹

The diplomatic agreement, however, had specified nine TACAN stations. The ninth, to be installed at Cape Christian, Baffin Island, was particularly important to air traffic between Canada and Greenland, and became the sole exception to the agreed-upon procedures. The remote location of the site, on the east coast of Baffin Island and well north of Frobisher Bay, coupled with the relatively small size of the project meant that contractor costs would exceed the available funds. In May 1959 the USAF assigned its liaison office in Ottawa the responsibility of handling the work through Canadian government agencies. The work there consisted largely of alterations to an existing building, and the installation of a generator, tower, and power cable installation. As with a number of other urgent projects in Canada, construction was carried out by a detachment from the RCAF's Number 2 CMU (Construction and Maintenance Unit), an organization that had specialized in work in remote Canadian locations since 1949.²³⁰

The arrangements for Canadian agencies to handle TACAN construction work took place against a broader background of United States Air Force efforts to bypass the Army Corps of Engineers for its work in Canada. This interrelationship of factors and

²²⁹ "TACAN"; Minutes of the 54th meeting of the ACND, 6 July 1959, 1, Appendix "A".

²³⁰ "TACAN"; *History of the Canadian Refueling Base Program*, 40, 42-43. The SAC history also notes that the total cost for labour, materials, rations, etc., using the CMU came to just over \$84,000, while the Corps of Engineers found that the work could not be done by normal construction methods at over \$200,000.

events suggests that any attempt to discuss Canada-US relations in these years in simple bilateral terms is naïve and inappropriate. In 1957, the USAF was planning to install family housing at the leased bases of Harmon and Goose Bay, but was dissatisfied with the high bids obtained through the usual Corps of Engineers procedures. The USAF arranged through the RCAF and DCL to have new designs prepared by Canadian architects, and to put the designs to contract through DCL. The USAF was unable to bypass its statutory obligation to use the Corps of Engineers, however, so the designs were turned over to the Corps' Eastern Ocean District for construction. "At this time," a Defence Construction project summary notes,

arrangements were made that DCL on behalf of the US Corps of Engineers would assist in bringing the project to the attention of the Canadian construction industry, and further that the Contracting Officer would receive and open bids in Ottawa under the auspices of DCL. This was a major concession since there was no treaty obligation whatsoever.²³¹

Contractors from both countries placed bids, with contracts awarded within the Corps' estimates. The work at Harmon was awarded to a large American firm, J.A. Jones Construction Company of Charlotte, North Carolina, and the project at Goose was awarded to a Peter Kiewit and Sons Company, the Canadian subsidiary of an American firm.²³²

While there was no treaty obligation, the ability of Canadian agencies and procedures, including DCL, to obtain lower bids on projects than their American counterparts proved useful for American agencies, including the Corps of Engineers. At

²³¹ *History of the Canadian Refueling Base Program*, 38-39; "General Outline of U.S. Military Construction Activities in Canada," 4.

²³² *ibid.*; *History of the Canadian Refueling Base Program*, 39. While the DCL project summary mentions simply that one of the contracts was awarded to a joint venture of Canadian subsidiaries of two American firms, the SAC history identifies the firms. "J.A. Jones FAQ," http://www.fluor.com/about/jajones_faq.asp, 23 May 2004; "J.A. Jones International (A Fluor Company)," http://www.fluor.com/industries/gov_jajones.asp, 23 May 2004; "Kiewit Building Group," <http://www.kiewitbuildinggroup.com/html/company4.shtml>, 23 May 2004.

this time, the Corps' procedures for work at Harmon and Goose Bay was not to seek firm price bids, but to request "proposals" for work, and subsequently attempt to get a lower price from the competitor that had submitted the lowest "proposal," with the result that bidders included a "negotiating cushion" to deal with the Corps' procedures. As can readily be imagined, the proposals submitted by would-be contractors under these conditions were of limited use. At about the time that DCL became involved in the housing projects at the two bases, American agencies had decided to try to seek firm price bids. The result of this confluence was that the Americans obtained lower prices on their contracts than they had in the past, and that Canadian sub-contractors and suppliers were able to obtain more work at these bases than they had before. Contracts for additional work later in 1958 followed the same procedure, and on this occasion a Canadian firm was awarded one of the contracts. One result of these events was that the District Engineer for the Corps of Engineers' Eastern Ocean District agreed that bids for work in Canada that fell under his authority would continue to be handled by DCL in Ottawa on behalf of the Corps. A further benefit of these arrangements was that Defence Construction persuaded the Corps of Engineers to agree that for contracts in Canada, the Corps would accept Canadian Standards Association (CSA) approvals as equivalent to those from the United States' Underwriters Laboratories (UL), an agreement that a DCL document would later describe as removing "what had been an arbitrary and absolute barrier for many Canadian manufacturers trying to sell their products to contractors working for the US Corps of Engineers."²³³ As discussed in Chapter Five, promoting the

²³³ "General Outline of U.S. Military Construction Activities in Canada," 4-5. The text of the quotation was emphasized in the original document by underlining in pen.

use of Canadian suppliers had been one of DCL's concerns during the planning, construction, and maintenance of the Distant Early Warning Line.

DCL and Canadian construction firms gained further access to American contracts in early May of 1959, when the USAF persuaded the Secretary of Defence to bypass the Corps of Engineers for all engineering projects in Canada except work on the DEW Line and at the leased bases at Harmon and Goose Bay. As one DCL project summary noted, "Air Defense Command was named design and construction agency and the SAC Project Office with RCAF became a joint SAC/ADC office. This action made it automatic that all BMEWS construction other than Cape Dyer as well as TACAN and Pinetree work, including engineering, would be contracted to Canadian firms through DCL."²³⁴ Maintenance and minor construction at USAF bases had never had to be handled through the Corps of Engineers, and was instead the responsibility of base procurement and engineering staff. In Canada, this responsibility fell upon the USAF office in Ottawa, which prepared plans and specifications, obtained proposals from contractors, and awarded and administered contracts, although administration of contracts for radar stations in Newfoundland was the responsibility of Harmon AFB, while their counterparts in Labrador were the responsibility of Goose Bay. Canadian consultants were always hired when outside engineering assistance was necessary, and work was also limited to Canadian contractors. DCL assisted with this process by putting interested contractors in touch with the appropriate Americans, by helping the Americans get in touch with suitable Canadian contractors, and by acting as an "interpreter" when differences in Canadian and American construction practices led to misunderstandings.²³⁵

²³⁴ *Ibid.*, 6.

²³⁵ *Ibid.*, 7-8.

In the fall of 1959, DCL was also able to persuade the United States Navy to adopt a similar approach for its construction requirements, although these were largely limited to the USN base at Argentia, Newfoundland.²³⁶

While DCL and the Corps of Engineers negotiated new procedures for American contracts in Canada, plans for a further TACAN installation programme were underway. In November of 1959, the ACND was informed that the USAF was considering the installation of TACAN equipment at main DEW Line sites, but had not yet reached any official decision. The issue was also discussed at a meeting of the DEW Line Coordinating Committee shortly thereafter, which noted that installations were being considered for the four main DEW Line sites in Canada.²³⁷ Sidney Smith's successor as Secretary of State for External Affairs, Howard Green, insisted on referring the American request to Cabinet, which discussed the proposal in August of 1960. By this time, the plans involved the installation of three TACAN short range navigational aids at the DEW Line sites at Hall Lake, Cape Parry, and Cape Dyer. The fourth main station initially under consideration was presumably Cambridge Bay, but the fate of the plans for a TACAN installation at that site is unclear. Cabinet was informed that the TACAN equipment could not be produced in time by Canadian suppliers – the deadline was January 1962 – and as a result DDP agreed that it could be supplied from American sources as long as construction and installation was performed by Canadians, as had been

²³⁶ *ibid.*, 8-9; F.F. Kravath, Captain, Construction Engineering Command USN, Area Public Works Officer, NY, to DCL, "Subj: Cooperation of Defence Construction (1951) Limited with Atlantic Division Bureau of Yards and Docks, Area Public Works Office New York in Advertising and Issuing Bidding Data on United States Navy Construction Projects in Canada; outline of procedure, information on", n.d., but late November 1959–early 1960, DCC in-house file "USAF Programs – General Data". See also the ACND's mid-1959 discussion of the new provisions for construction of the rearward communications upgrades for the BMEWS system. Minutes of the 54th meeting of the ACND, 6 July 1959, 1.

²³⁷ Minutes of the 55th meeting of the ACND, 9 November 1959, 1; DEW Line Progress Report #23, 19 November 1959, 1, LAC, RG24, acc.83-84/167, box 150, file 1279-150, vol.2.

the case for the earlier TACAN sites. Cabinet authorized the American request on this basis.²³⁸

As they had on other occasions, negotiations struck an impasse on the language in the diplomatic notes covering construction and installation, and Cabinet was forced to address the issue once again in August of 1961. "Although the U.S. government had tacitly accepted the Canadian government's view that any defence construction in Canada funded by the U.S. should be carried out by Canadian contractors," the Cabinet conclusions noted,

it resisted the inclusion in any agreement of language making this a requirement on the grounds that to do so would appear to condone discrimination against U.S. contractors. As a compromise, recent agreements on other defence projects had included a phrase to the effect that procedures for awarding contracts would be determined by agreement between the appropriate authorities of the two governments.²³⁹

In the discussion that followed, it was noted that the United States would also continue the practice of having Canadian firms perform the construction and installation work, as had been the case for the SAC refuelling bases, the Ballistic Missile Early Warning System communications installations (discussed in the next chapter), and the earlier TACAN installations. By this date, however, the discussions were making mention only of Cape Dyer, and this change and the construction and installation conditions were reflected in the 1961 agreement on the installation. The agreement also makes reference to a Canadian TACAN programme, which may explain the elimination of Hall Lake and

²³⁸ CCOSC to MND, "TACAN Proposed Additional Installations," 4 July 1960, DHH 73/1223, series 1, file 465; Record of Cabinet Decision, Meeting of August 11th, 1960, "Installation of additional air navigation aid at stations on the D.E.W. line," 18 August 1960, DHH 73/1223, series 3, box 676, file 1342; Cabinet Conclusions, 11 August 1960, 2.

²³⁹ Cabinet Conclusions, 28 August 1961, 10, LAC, RG2, series A-5-a, vol. 6177.

Cape Parry from American plans.²⁴⁰ As with the earlier TACAN programme, Defence Construction's role in this undertaking is not extensively discussed in the available records. However, since the agreement specified that the establishment, operation, and maintenance of the station at Cape Dyer be subject to the conditions of the 1959 agreement, the corporation's involvement must have been comparable. The discussions and negotiations surrounding this second round of TACAN installation, however, only served to reinforce an existing pattern of Canada-US relations in the building of defence infrastructure that had been firmly entrenched as a result of negotiations on the SAC refuelling bases and the earlier work on TACAN.

The history of DCL's involvement in these events deserves attention because it permits an examination of the discussions between Canada and the United States surrounding the establishment of the refuelling bases and the TACAN installations. These discussions, and DCL's role in the negotiations and ultimately in the construction of the projects, are also significant because of the light they can shed on a number of issues. First, an examination of these events demonstrates the widespread support in Ottawa for the American nuclear deterrent – something that would strike many Canadians today as unusual, to say the least. The Strategic Air Command refuelling bases were a notable example of such support, because of the important role they were designed to play in the United States' thermonuclear offensive against the Soviet Union. They also constituted a further militarization of the Canadian north, but this militarization proved fleeting. Within a few years of the bases' completion the SAC tanker aircraft detachments were

²⁴⁰ Cabinet Conclusions, 28 August 1961, 10-11; Canada, Department of External Affairs, *Exchange of notes (September 19 and 23, 1961) between the Government of Canada and the government of the United States of America concerning the addition of Cape Dyer to the annex to the agreement of May 1, 1959 relating to short-range tactical air navigation facilities in Canada*, (Ottawa: Queen's Printer, 1961), Canada Treaty Series 1961, No. 14.

withdrawn, a consequence of the changing nature of the Cold War and of the emergence of the ICBM. Its advent in the late 1950s had already led to the scaling back of the ambitious initial refuelling base plans. While this new weapon posed a new threat to Strategic Air Command – as evidenced by the need to rethink the layout of and deployment of tanker aircraft to the refuelling bases – the continuing growth of its importance as a delivery vehicle led to it progressively supplanting the long-range bomber that had previously been the primary means of carrying out intercontinental attacks. This significant change in weapons technology, and consequently in the nature of the perceived threat to North America, had consequences that stretched far beyond the deployment of SAC bombers and tanker aircraft.

Second, an examination of these programmes demonstrates the further development and emergence of a consistent position on the use of Canadian agencies and contractors for the construction of American and joint Canadian-American projects in Canada. The history of the TACAN installations, while on a smaller scale than the refuelling bases, further illustrates this second point, and underlines the determination of Ottawa to secure these “Canadian conditions.” By May of 1959, Ottawa’s position on construction provisions and the proven record of Canadian agencies, including DCL, and Canadian contractors to fulfill American requirements, often at lower cost, had led to a fundamental change in the procedures for the awarding of contracts for virtually all USAF projects in Canada. With the exception of the leased bases in Newfoundland and Labrador and the DEW Line, all future USAF work would be handled through DCL and awarded to Canadian contractors. One of the Assistant Deputy Ministers of Defence Production commented to the ACND in December of 1960 “on the success of the

arrangements for construction. The procedure of transferring responsibility to the normal Canadian agencies had established a useful pattern. The U.S. authorities appeared satisfied with both the arrangements and the cost.²⁴¹ DCL pointed out in an in-house summary of US military construction projects in Canada that the changes brought about by the DCL assumption of responsibilities for US programmes in Canada were largely procedural, and did little to alter DCL's role in the various programmes. "This arrangement had not been accepted merely on the insistence that it was appropriate that work in Canada be handled by a Canadian agency," it argued.

A more potent argument was that DCL had demonstrated a capability to have such work carried out satisfactorily and economically. From the USAF viewpoint their association with RCAF in operational planning was a strong argument for direct association in planning construction. However if the Corps of Engineers could have said that it was not satisfied with DCL it is possible that it would have a potent argument against the USAF proposal.²⁴²

In some ways, however, these new arrangements were a Pyrrhic victory, since by 1959 expenditures on air defence by both the USAF and the RCAF had already peaked and were beginning their long decline. The advent of the ICBM and the cutback in air defence programmes would have a lasting effect on the defence of North America and consequently on DCL. With the exception of the CADIN programme of the late 1950s and early 1960s, the construction of systems to detect and defend against attacks by Soviet aircraft essentially came to an end.²⁴³ The "bomber gap" fears of the mid-1950s that had helped to drive the North American air defence programmes of the RCAF and USAF disappeared, in part because of more accurate estimates of Soviet strength and in

²⁴¹ Minutes of the 58th Meeting of the ACND, 5 December 1960, 1.

²⁴² "General Outline of U.S. Military Construction Activities in Canada," 7.

²⁴³ CADIN was an acronym for "Continental Air Defence Integration North", and involved the construction command and control, radar, and surface-to-air missile facilities. See the following chapter for further discussion of this programme.

part because of the introduction of the ICBM. American and Canadian concerns about the Soviet bomber threat gradually diminished, and this change in opinions manifested itself in a number of ways, including the progressive reduction in command and control systems, radars, interceptors, and surface-to-air missiles dedicated to air defence.²⁴⁴ Not until the 1980s did the Soviet aerial threat to North America, by then expanded to include long-range cruise missiles as well as strategic bombers, receive serious consideration again to the point that new facilities were built. The North American Air Defence Modernization (NAADM) programme that resulted in the late 1980s and early 1990s would once again find Defence Construction Limited involved in the building of a radar line in northern Canada.

Finally, the history of Defence Construction Limited's involvement in the refuelling base programme can provide some interesting and valuable insights into the views and actions of Canadian politicians and planners concerning northern development at a crucial period in Ottawa's northward extension of its influence and control. In light of the transitory nature of SAC deployments to the refuelling bases, the more lasting consequences of this programme for Canada were the expansion of runways and airport facilities that were paid for by the American military. At sites with substantial Canadian military installations – Cold Lake, Namao, and Churchill – these proved useful, but they probably had their greatest effect in Frobisher Bay. There, the SAC refuelling base interacted with, and ultimately formed a significant element of, the Canadian government's plans to build an administrative centre and ambitious model community in the Arctic. As one of the key federal agencies in the building of the SAC refuelling bases,

²⁴⁴ The "bomber gap" was in essence a fear of a Soviet superiority in strategic bombers, based on incorrect intelligence estimates and the parochial interests of the USAF. Friedman, *The Fifty-Year War*, 202; Rosenberg, "Origins of Overkill," 39-40.

DCL also found itself involved in the planning for the new community of Frobisher Bay. In this respect, the corporation's history proves a useful prism for examining the ambitions of Ottawa politicians and bureaucrats in the era of Diefenbaker's "Northern Vision." The failure of Frobisher Bay to materialize as a modernist enclave of 5,000 townspeople dwelling in massive apartment blocks can be attributed to many of the same factors and mistaken premises that ultimately limited the "Northern Vision" itself. While it had been occupying itself with the refuelling bases and the TACAN installations, however, DCL had also been involved with the last gasp for air defence in the late 1950s and early 1960s, Continental Air Defence Integration North, and one of the first responses to the ICBM, the Ballistic Missile Early Warning System. It is to these events that the following chapter will turn.

Chapter 6

Exit the Bomber, Enter the Missile: A Changing Environment, 1958-1965

At the height of the Cold War in the late 1950s, continental air defence appeared to be in the ascendant. Significant projects, including the Mid-Canada and Distant Early Warning Lines, had just been completed. Ambitious plans for new weapons and more radar systems promised yet more expansion, while American air defence expenditures headed towards their peak.¹ The advent of the Soviet ICBM and the launching of Sputnik in the fall of 1957, however, threw such carefully-laid plans into disarray. The emergence of a new threat that could invalidate the extensive North American air defence system prompted a re-evaluation of defence plans, and ultimately brought an end to new air defence projects and led to cutbacks in existing and planned systems. The late 1950s and early 1960s therefore witnessed the last major continental air defence project that formed part of the once ambitious plans for the defence of North America against Soviet aerial attack. As a result, the outlook for Defence Construction Limited, whose fortunes as a Crown corporation were so closely tied to defence policies and especially to major air defence programmes, grew increasingly doubtful. The fast fade of the bomber threat meant that the very skills – the ability to implement hard, northern construction – that had made DCL a favoured instrument of economic and defence policy in Ottawa were quickly eclipsed by new demands – precision, electronic engineering – by the state for which DCL was not responsible and for which other government agencies had difficulty delivering.

¹ United States expenditures on air defence would reach their peak during the 1958 fiscal year. B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defenses from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 137.

The last of the major air defence programmes to take place in Canada, the Continental Air Defence Integration North or CADIN, programme brought about the automation of aerial defence in Canada as a northward extension of the groundbreaking Semi-Automatic Ground Environment (SAGE) system.² The programme also involved the acquisition of the BOMARC surface-to-air missile, its support and launching facilities, and the further improvement of radar coverage in Canada.³ This planning took place against a backdrop of significant change in Canadian defence policy. The Avro Arrow, an interceptor on which much of Canada's air defence planning and industrial defence policy had been predicated, was, for a variety of reasons, incurring increasing development costs. Consequently, a growing belief was emerging within the Canadian government and the Ottawa bureaucracy that the country could no longer afford to "go it alone" on defence procurement.⁴ While the Arrow was ultimately cancelled in one of the

² The system was "semi-automatic" because its operation required human judgment and intervention; Schaffel notes that "it was designed to combine 'the talents of man with the best aptitudes of machines.'" Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Washington, DC: Office of Air Force History, 1991), 204. In 1983, Robert Everett, who was deeply involved in the creation of SAGE, proudly listed a number of its "firsts": "computer-driven displays, on-line terminals, time-sharing, high-reliability computation, digital signal processing, digital transmission over telephone lines, digital track-while-scan, digital simulation, core memories, computer networking, duplex computers – there is an endless list of things done first by SAGE." Robert R. Everett, "Epilogue," *IEEE Annals of the History of Computing*, 5:4 (October 1983), 403. Paul Edwards notes that those "unfamiliar with computer technology may not appreciate the extreme importance of ...[SAGE's] developments to the history of computing. Suffice it to say that much-evolved versions of all of them remain in use today. Some, such as networking and graphic displays, comprise the very backbone of modern computing." Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America*, (Cambridge, MA: MIT Press, 1996), 100. It should be noted that some of the developments listed by the Everett article quoted above pertain to radar design and operation and not necessarily to computers.

³ BOMARC was in essence a large, pilotless aircraft, and its initial project designation was in fact "GAPA" – "Ground to Air Pilotless Aircraft". "BOMARC" was an acronym that acknowledged the two organizations involved in early experimental work on the concept – "BO" for Boeing, and "MARC" for "Michigan Aeronautical Research Center", the University of Michigan's center at Willow Run. Bruce Briggs, *The Shield of Faith*, 90; Jon B. McLin, *Canada's Changing Defense Policy 1957-1963: The Problems of a Middle Power in Alliance*, (Baltimore, Johns Hopkins Press, 1967), 84.

⁴ Danford W. Middlemiss, "Defence Co-Operation," in *Partners Nevertheless: Canadian-American Relations in the Twentieth Century*, Norman Hillmer, ed., (Toronto: Copp Clark Pitman, 1989), 175-178; McLin, *Canada's Changing Defense Policy*, 171-192. The decision to cancel the Avro Arrow has become mired in controversy and outright myth from its outset in 1959, and has given rise to an active cottage

most controversial decisions in postwar defence and procurement policies, the negotiation of the Canada – US Defence Production Sharing Agreement in 1958 and the Defence Development Sharing Agreement in 1963 provided at least temporary economic survival for the Canadian defence industry.⁵ For DCL, CADIN would provide a last chance to serve Ottawa's early Cold War strategic needs on such a large scale.

In addition to these developments, CADIN also took place against a background of further air defence integration through the North American Air Defence (NORAD) agreement of 1958.⁶ The years that followed the outbreak of the Korean War witnessed the increasing integration of the air defence forces of both Canada and the United States. The NORAD treaty formalized this integration and the necessary command arrangements. Its provisions and the Canadian military's pressure on the incoming Diefenbaker government to sign the treaty would prompt ongoing criticism.⁷ Furthermore, some of the arrangements for the weapons systems that formed part of CADIN and the plans developed by NORAD were predicated on the use of nuclear warheads for air defence. The Diefenbaker government's indecision on this matter promoted internal divisions, infuriated the United States, and ultimately proved to be a

industry obsessed with the aircraft. The most useful and recent academic study of the subject is Russell Isinger, "The Avro Canada CF-105 Arrow Programme: Decisions and Determinants," (MA thesis, University of Saskatchewan, 1997).

⁵ Middlemiss, "Defence Co-Operation," 175-186.

⁶ "North American Air Defence" was changed to "North American Aerospace Defence" in 1981.

⁷ The standard account of these events is Joseph T. Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987). For a more recent and more critical examination of the events, see Ann Denholm Crosby, *Dilemmas in Defence Decision Making: Constructing Canada's Role in NORAD, 1958-96*, (New York: St. Martin's Press, 1998). For a discussion of the bureaucratic maneuvering in Ottawa that led up to the establishment and implementation of NORAD, see Robert D. Allin, "Implementing NORAD, 1956-1962: The Bureaucratic Tug of War for Access and Influence," (MA Thesis, Carleton University, 1998). See also Robert H. Clark, "Canadian Weapons Acquisition: The Case of the Bomarc Missile," (MA Thesis, Royal Military College of Canada, 1983), 59-61.

significant factor in its fall from power in 1963.⁸ The final element of air defence modernization in the early 1960s, the acquisition of F-101 interceptors from the United States to replace Canada's aging CF-100s, would not only become embroiled in the nuclear weapons controversy itself, but would also lead to yet further construction requirements in support of air defence.⁹ The continentalization of North American air defence thus created some residual Cold War applications of the kind of pre-missile defence infrastructure that DCL excelled in supplying.

Although even more extensive proposals for the northward expansion of the interception and aerial combat zones were considered, CADIN would none the less prove to be the last gasp of the ambitious plans for continental air defence that had been formulated in the 1950s.¹⁰ As discussion of the Strategic Air Command (SAC) refuelling base programme in the previous chapter has already noted, the advent of the ICBM in the late 1950s soon put an end to the construction of new systems to detect and counter Soviet bombers, since it brought into question continued expenditures on defence against

⁸ *Ibid.*, 105-136; Jocelyn Ghent "Did He Fall or Was He Pushed? The Kennedy Administration and the Collapse of the Diefenbaker Government," *International History Review*, 1:2 (April 1979), 246-70; Erika Simpson, "New Ways of Thinking About Nuclear Weapons and Canada's Defence Policy," in *The Diefenbaker Legacy: Canadian Politics, Law and Society since 1957*, (Regina: Canadian Plains Research Center, 1998), Donald C. Story and R. Bruce Shepard, eds., 27-41. In his study of the acquisition of the BOMARC, Clark argues that "defence decisions turned out to be low priority items to Prime Minister Diefenbaker" and that "the entire Bomarc acquisition demonstrated the role of Diefenbaker's personality and his tendency to bumble crucial issues. Moreover, it underscored his indecisiveness." Clark, "Canadian Weapons Acquisition," 59, 143. For a discussion of Diefenbaker's philosophy of Cabinet decision-making, and insights into the delays that plagued a number of the programmes discussed in this chapter, see Patrick Kyba, *Alvin: A Biography of the Honourable Alvin Hamilton, P.C.*, (Regina: Canadian Plains Research Center, 1989), 200-208.

⁹ McLin, *Canada's Changing Defense Policy*, 100-105; John Clearwater, *Canadian Nuclear Weapons: The Untold Story of Canada's Cold War Arsenal*, (Toronto: Dundurn Press, 1998), 185-187.

¹⁰ In light of the number of radar installations discussed in this chapter, it is worth noting that both Canadian and American air defence commanders had advocated the northward expansion of the air combat zone through the addition of twenty-six "prime" radar installations similar to those on the Pinetree Line; the costs involved would have been tremendous. Memorandum, Minister of National Defence to Cabinet Defence Committee, "Radar Ground Environment Improvements," 4 February 1958, 2, Department of National Defence, Directorate of History and Heritage (hereafter DHH) 73/1223, series 1, box 1, file 10, "Air Defence Requirements, 1955-1958".

them.¹¹ If these defences could be circumvented by the ICBM, critics argued, what was the purpose of spending further billions on programmes to expand the continent's anti-aircraft capability? Further problems for the defence were that the ICBM was undetectable by the radar networks that had been built up over the previous decade, which opened the possibility that a Soviet attack could be delivered without warning (a nuclear Pearl Harbor, in other words), and that the missiles would travel so quickly that even the best detection systems would offer only a few tens of minutes of warning as opposed to the hours of warning that the DEW Line could provide for bomber attacks.¹² Finally, the very high-speed approach of the ICBM would also make it an extremely challenging target for the anti-ballistic missile (ABM) systems that were under consideration at the time.¹³

The growing threat of the ICBM therefore had a number of profound and lasting consequences for defence policies in North America and thus for Defence Construction Limited but the curtain did not fall that suddenly for DCL. While the ICBM ultimately brought an end to plans for further air defences, it did prompt requirements for new detection systems and led to ambitious but ultimately unsuccessful plans for ABM

¹¹ Schaffel, *The Emerging Shield*, 260-261; Bruce-Briggs, *The Shield of Faith*, 101-104; 134-141; Clark, "Canadian Weapons Acquisition," 42-43. As the previous chapter has already noted, while the USSR first tested the R-7 ICBM in August of 1957, the absence of a successful re-entry vehicle that would allow the delivery of a warhead to its target, along with a number of other problems prevented it from actually entering service until 1960. Even at that time, it was an incredibly expensive weapons system of limited capability that was never deployed in significant numbers. Zaloga, *Target America: the Soviet Union and the strategic arms race, 1945-1964*, (Novato, CA: Presidio Press, 1993), 143-145; Zaloga, *The Kremlin's Nuclear Sword: the rise and fall of Russia's strategic nuclear forces, 1945-2000*, (Washington, DC: Smithsonian Institution Press, 2002), 46-49.

¹² David F. Winkler, *Searching the Skies: The Legacy of the United States Cold War Defense Radar Program*, (United States Air Force Air Combat Command, 1997), 3; Schaffel, *The Emerging Shield*, 259.

¹³ The early development of and planning for American ABM systems has been discussed by a number of authors; two of the most accessible and non-technical accounts are found in David N. Schwartz, "Past and Present: The Historical Legacy," in Ashton B. Carter and David N. Schwartz, eds., *Ballistic Missile Defense*, (Washington: Brookings Institution, 1984), 330-349, and Bruce-Briggs, *The Shield of Faith*,

systems to counter this new threat. At much the same time, Ottawa also sought to provide continuity of government through a nuclear war should one break out; the resulting shelters, including the “Diefenbunker” near Ottawa, were yet another defence initiative with which DCL was involved. All were undertakings in which DCL would be involved in its by now accustomed roles of facilitating the provision of infrastructure, furthering government policy goals, and representing the interests of the Canadian construction industry.

A Last Hurrah for Air Defence: Continental Air Defence Integration North

Continental Air Defence Integration North was a further expansion and upgrading of the North American air defence system undertaken in the late 1950s and early 1960s. Its central elements consisted of SAGE, a new command and control system, the BOMARC surface-to-air missile, a new and ultimately controversial weapons system, additional radars to extend coverage or improve it where it already existed, and upgraded communications to link these various elements together. As a whole, CADIN represented a further northward expansion of radar coverage and the air combat zone, improvement in command and control capabilities, and the addition of new weapon to counter what was seen – until the late 1950s at least – as an increasingly formidable Soviet bomber force.¹⁴ The provision of early warning for Strategic Air Command – whose bombers were at the time the primary means of delivering the American nuclear deterrent – and the defence of

passim, but especially 101-109. For a brief summary of contemporary Soviet ABM efforts, see Zaloga, *The Kremlin's Nuclear Sword*, 98-99.

¹⁴ Norman Friedman, *The Fifty Year War: Conflict and Strategy in the Cold War*, (Annapolis: Naval Institute Press, 2001), 200-202. These concerns were driven in part by fears of a “bomber gap”, with the Soviet Union holding the upper hand in long-range bomber strength. The standard account of the gap can be found in John Prados, *The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength*, (New York: Dial Press, 1983), 38-50.

SAC bases against air attack was also an essential task for CADIN and other elements of the continent's air defences.¹⁵ "Since the principal base of the deterrent forces of the West is on the North American Continent," the Canadian reply to NATO's 1959 annual review questionnaire argued, "it is important that adequate warning systems and defences be maintained to ensure the effectiveness of these forces."¹⁶

"Integration" was an apt term in many respects. Not only did CADIN involve the closer integration of the actual equipment of the air defence systems of Canada and the United States, but the individual elements of the system themselves also became more closely integrated and interdependent. BOMARC, for instance, had been designed from the outset to operate in a SAGE-controlled airspace, which included radar coverage of the entire area within the missile's range.¹⁷ The additions to radar coverage that formed part of CADIN were therefore as necessary as the SAGE installation and the BOMARC launching sites if the entire system was to function to the fullest of its capabilities. Radar coverage is not a two-dimensional quantity, however; depending on the radar equipment, its location, and the surrounding terrain, coverage at high and low altitudes can be compromised if not entirely ineffectual. Consequently, a further element of CADIN involved the upgrading of existing Pinetree Line radars to provide coverage at higher

¹⁵ The Canadian government's acknowledgement that the primary purpose of continental air defence was to provide timely warning to Strategic Air Command is discussed in Chapter Five.

¹⁶ The document also laid out the Canadian government's rationale for CADIN: "The air defence system for the whole of the North American Continent calls for various types of weapons including manned interceptors and surface-to-air missiles. In the field of surface-to-air missiles it has been decided to introduce the BOMARC guided missile. The BOMARC squadrons located in Canada, together with those sited in the United States, will form part of NORAD's mutually supporting surface-to-air missile defence network. To achieve maximum effectiveness in the operation of defensive weapons, SAGE electronic control and computing equipment is being provided. Measures are also being taken to extend and strengthen the Pinetree radar control system by adding several additional large radar stations and a considerable number of gap filler radars. The cost of these improvements is to be shared jointly by Canada and the United States. These new facilities will be manned and operated by the RCAF." "Canadian Reply to ARQ (59): Memorandum, Part I – General Statement," 1-2, appended to minutes of the 62nd meeting of the Panel on the Economic Aspects of Defence Questions, 10 July 1959, DHH 73/1223, series 3, file 2020.

altitudes, as well as the construction of “gap filler” radars designed to detect aircraft at low altitude and guide weapons to attack them.¹⁸

The people operating this equipment would also become more integrated – in this instance, with the air defence system itself. The “Semi-Automatic” in “Semi-Automatic Ground Environment,” after all, involved the closer integration of people and computers. This integration would include the crews of interceptor aircraft on both sides of the border, whose aircraft would be linked into the SAGE system. This pervasive use of connectedness and integration required the installation of new communications links connecting sensors, weapons, and the SAGE centres, and formed yet another part of the CADIN programme.¹⁹

Initial discussions and planning for CADIN took place against a background of yet another form of integration: that of Canada and the United States through the establishment of the NORAD agreement. While it went into operation on 12 September 1957, a formal agreement was not signed by Canada and the United States until 12 May

¹⁷ Bruce-Briggs, *The Shield of Faith*, 91.

¹⁸ Gap-filler radars were short-range installations designed to provide coverage in areas where planners thought aircraft might be able to avoid being detected by flying at low altitudes. Winkler, *Searching the Skies*, 35-36. The United States was well attuned to the low altitude vulnerabilities of air defence systems. During the 1961 Berlin crisis, for instance, one set of American attack plans was predicated on the limited low-altitude capabilities of the Soviet air defence system; twenty-one low-flying bombers, it was anticipated, “might virtually disarm the Soviet Union by destroying forty-two key targets. Few civilians would be killed.... A surprise attack plan was prepared as a response to possible Soviet action over Berlin.” Friedman, *The Fifty Year War*, 273. Keeping in mind the principle of “mirror-imaging”, American air defence planners probably assumed the Soviet Union was considering and was capable of using similar tactics. Bruce-Briggs, *The Shield of Faith*, 44, 56. Note that “gap filler” had two different meanings depending on context; it could mean either an installation meant to fill gaps in low-level coverage, as described above, or an installation meant to fill gaps in standard coverage, such as the “gap filler” installations built along the Labrador coast as part of the Radar Augmentation Programme described in Chapter Two.

¹⁹ Schaffel, *The Emerging Shield*, 204, 209. As Schaffel observes, “A single radar, the basic air defense element, would be replaced by SAGE, now controlling several radars in a single operations center by linking them to a computer through telephone lines or ultrahigh frequency (UHF) radio waves.... The SAGE computer would create a composite picture of the air situation as it developed. Generated radarscope displays would provide information so that controllers could decide how to deploy the various weapons to

1958.²⁰ The agreement, an outgrowth of earlier co-operation for air defence, integrated the United States Air Force and the Royal Canadian Air Force for purposes of continental defence. While it was largely successful in its stated objectives, at the time – and to the present – the NORAD agreement has also been the subject of criticism, focused particularly on its hasty implementation and its implications for Canadian sovereignty.²¹ An integral part of the command were plans for the expansion of North American air defence in systems, numbers, and coverage through the CADIN programme. Canada's involvement in NORAD was also used by the military to support implementation of these plans.²² The equipment for CADIN represented yet another form of integration with the US; as a memorandum considered at the early December meeting the Panel on the Economic Aspect of Defence Questions noted, "the effect of these decisions will be to base Canadian air defence, to an unprecedented extent, on equipment designed and developed in the United States."²³ Thus, the continentalist implications of NORAD

destroy an invader." The semiautomatic system required human judgment; it was designed to combine "the talents of man with the best aptitudes of machines." *Ibid.*, 204.

²⁰ Jockel, *No Boundaries Upstairs*, 109-116. The newly-elected Diefenbaker government, acting on the advice of the military, agreed to NORAD soon after it took office, but concerns about the agreement's implications delayed the final signing.

²¹ Since the late 1980s, the standard account of North American air defence leading up to the creation of NORAD has remained Jockel's *No Boundaries Upstairs*. More recently, Ann Denholm Crosby's *Dilemmas in Defence Decision Making* has taken a more critical view of the creation and subsequent operations of NORAD. See also Allin, "Implementing NORAD."

²² Robert Clark has argued in his study of the acquisition of the BOMARC, one of the central elements of the programme, that "the formation of NORAD turned out to be a key stimulus to the introduction of Bomarc into Canada as defence recommendations now carried the influence and visibility of the joint command." Clark, "Canadian Weapons Acquisition," 64.

²³ Document ED-86-58, "Canada-United States Sharing of Production: Tasks in North American Defence," 2 December 1958, DHH 73/1223, Series 1, Box 1, File 12. This was by no means the only time that this observation was made. In an October 1958 meeting with US representatives on defence production sharing, for instance, Deputy Minister of Defence Production David Golden quoted Diefenbaker's 24 September announcement to the effect that "it now seems evident that in the larger weapons systems now required for the Air Force, Canadian work in the designing, development, and production of defence equipment will have to be closely integrated with the major programs of the U.S." "Minutes of Canada-United States Discussion on Production Sharing," 9 October 1958, *Documents on Canadian External Relations*, (hereafter *DCER*,) Volume 25 (1957-1958), Part II, Greg Donaghy, ed., (Ottawa: DFAIT, 2004), 216.

represented, if not immediately, a significant challenge to the sovereigntist purposes that had served DCL so well in the earlier phases of the Cold War.

The negotiations surrounding the plans for the equipment and other aspects of CADIN, especially for the division of its costs were a matter of considerable attention from the outset of discussions between Canada and the United States.²⁴ A complex subject in and of themselves, they have been the subject of past studies, but warrant further examination in light of the greater current availability of crucial documents on the subject.²⁵ Following the examination of the procurement needs of the project by various committees and formal and informal consultation between Canada and the United States, Minister of National Defence George Pearkes and Minister of Defence Production Raymond O'Hurley on 9 December 1958 recommended acceptance of a 1/3 Canadian – 2/3 American cost sharing procedure. "Because of the precedent set by the Pinetree program," the memorandum to Cabinet noted,

the USAF is disposed to accept a sharing of costs in the ratio of one-third RCAF to two-thirds USAF. It was not possible to arrive at a workable division of costs in this ratio either by dividing each program by sites or by items of equipment. However, a practicable basis for cost sharing which adheres to the desired ratio would be for the RCAF to pay for all construction and unit equipment and for the USAF to pay for all technical equipment. This way of splitting costs gives the

²⁴ The most straightforward of these accounts, with a focus on their significance for the RCAF's acquisition of the BOMARC surface-to-air missile, can be found in Clark, "Canadian Weapons Acquisition," *passim*, but particularly 45-104. See also Danford W. Middlemiss, "A Pattern of Co-Operation: The Case of the Canadian-American Defence Production and Development Sharing Arrangements, 1958-1963," (PhD dissertation, University of Toronto, 1975), 232-242, for an account of the production sharing elements of the CADIN agreement.

²⁵ As a starting point, the relevant volume of *Foreign Relations of the United States* has been available since 1993, while the corresponding volume of *Documents on Canadian External Relations* has been recently published but as-of June 2005 not yet released. Extensive Canadian documentation on the subject has also become available within the past ten to fifteen years, through the declassification of Cabinet Conclusions and supporting documents, and particularly the availability of the Raymont Papers at the Department of National Defence's Directorate of History and Heritage.

further advantage of simplicity, it avoids the danger of differences in technical equipment and it ensures uniformity in construction.²⁶

Both ministers recommended approval for such an arrangement, “on the understanding that both governments recognize the objectives of production sharing and that a reasonable and representative share of defence production will be placed in Canada,” and that “the RCAF (which is responsible for manning and operating the sites in Canada) is to participate in all aspects of the programs from design to installation,” and approval was duly granted.²⁷ Involvement of the RCAF in construction work would require that Defence Construction Limited also be involved. Once again, DCL provided Ottawa with a ready and now familiar tool for the assertion of national interest. Ironically, the same government would, less than two months later, be accused for abandoning this same ploy.

Prime Minister John Diefenbaker’s 20 February 1959 announcement to the House of his government’s policy on air defence, which included the cancellation of the Avro Arrow and its Orenda Iroquois engine, has since become known as the “Black Friday” speech, and discussion of the cancellations has, to say the least, tended to overshadow the portions of the announcement explaining CADIN and its cost sharing arrangements.²⁸ As agreed by Cabinet, the cost of the initial construction and equipment for the CADIN facilities would be shared between Canada and the US in a roughly 1/3 to 2/3 ratio

²⁶ Cabinet Document 352-58, “Joint RCAF-USAF Air Defence Program: Pinetree Extension, SAGE and BOMARC Cost-Sharing,” 2 December 1958, in *DCER*, Volume 25, Part II, 247-248. The memorandum can also be found in DHH 73/1223, Series 1, Box 1, File 12.

²⁷ Cabinet Document 352-58, “Joint RCAF-USAF Air Defence Program: Pinetree Extension, SAGE and BOMARC Cost-Sharing,” 2 December 1958, in *DCER*, Volume 25, Part II, 248; Cabinet Conclusions, 9 December 1958, 6, Library and Archives of Canada (hereafter LAC), RG 2, series A-5-a, vol. 1899.

²⁸ Canada, House of Commons, *Debates*, 20 February 1959, 1221-1224. For a relatively restrained example of “Black Friday” coverage by one of the many Avro Arrow books, see Greig Stewart, *Shutting Down the National Dream: A.V. Roe and the Tragedy of the Avro Arrow*, (Toronto: McGraw-Hill Ryerson, 1997), 252-267.

through the use of the division of responsibilities for construction and equipment.²⁹ Even though a final exchange of notes on the matter did not take place until September of 1961, there was little or no change to the construction provisions; the annex to the agreement provided that "Canada will assume responsibility for the construction of the facilities."³⁰ While the implications of this statement were clear, once again, as with previous agreements, no explicit mention was made that this provision would guarantee that Canadian firms would receive the construction work.³¹ The 1959 draft annex to the note on cost sharing also required that Canadian industry be given "a fair and reasonable opportunity" to share in the technical equipment programme, conditions that also remained unchanged in 1961.³² While these conditions guaranteed the awarding of construction contracts to Canadian firms through DCL, there would be only limited opportunities for Canadian involvement in the technical equipment programme. Thus, while DCL was still an active ingredient in Canada's air defence effort, it found itself in a more tenuous and nervous position in the CADIN era. Times were changing, and this undertaking marked the last of the early Cold War air defence projects. The Arrow had become an early indicator of the ethos of the missile age, one in which Canada had less bargaining power in its relationship with the United States. In the wake of CADIN,

²⁹ Canada, House of Commons, *Debates*, 20 February 1959, 1222.

³⁰ "Defense: Improvements in the Continental Air Defense System," 27 September 1961, *United States Treaties and Other International Agreements*, (hereafter *TIAS*), (Washington, DC: US Government Printing Office, 1962), 1378.

³¹ One of the areas of policy guidance in the recently approved National Security Council Report NSC 5822/1 was that any agreements giving Canadian construction firms conditional preference should be classified. National Security Council Report NSC 5822/1, "Certain Aspects of U.S. Relations With Canada," 30 December 1958, *Foreign Relations of the United States, 1958-1960, Volume VII, Part 1: Western European Integration and Security; Canada*, (hereafter *FRUS*) (Washington: USGPO, 1993), 735.

³² Canada, House of Commons, *Debates*, 20 February 1959, 1222; "Statement of Conditions Governing the Financing, Installation and Operation of Facilities in Canada Required to Strengthen and Extend the Continental Air Defence System," annex to "Draft Canadian Note on Cost Sharing and Related Arrangements with respect to Planned Improvements in the Continental Air Defence System," 28 April

access to Canadian territory for continental defence would become less important to the United States than it had been during the peak of the air defence effort just a few years earlier.

Since the agreement provided that Canadian firms would perform the construction for CADIN, there also appears to have been less DCL involvement in negotiations than with earlier projects. Surviving DCL files show that while the corporation was kept apprised of discussions and negotiations, the cost-sharing provisions that allocated construction to Canada suggest that there was relatively little concern that Canadian firms might not perform the construction work.³³ As events unfolded, the greatest challenge would be the potential cancellation of some projects, most notably BOMARC, due to changing defence priorities and funding. Unlike earlier projects, concern within the Department of Defence Production did not include Canadian access to construction work; the focus was instead on obtaining a share of the more lucrative and higher technology contracts for the equipment, an especially important consideration for the Canadian defence industry in light of the cutbacks and eventual cancellation of the Arrow programme.³⁴ Ottawa, it seemed, was increasingly seeking advantage in the promising realm of high-tech warfare, and was at the same time less fixated on the prospects of “bricks and mortar” defence work.

1959, DCC in-house file “Agreement between US and DCL for Refuelling Facilities”; “Defense: Improvements in the Continental Air Defense System,” 27 September 1961, *TIAS*, vol. 12, pt. 2, 1378.

³³ The file “Agreement – BOMARC, Gap Fillers, Heavy Radar and SAGE,” for instance, consists primarily of copies of memoranda to various government committees summarizing the provisions of the agreements; files on earlier projects often contain extensive correspondence discussing construction provisions. In comparison with many other projects, the elements of CADIN appear to be less well documented by the minutes of interdepartmental bodies like the Advisory Committee on Northern Development whose records are invaluable in examining other undertakings; this may stem in part from the construction provisions that obviated extensive debate and negotiations on the matter, but in the case of the ACND would also be because CADIN projects were situated in southern Canada.

³⁴ Middlemiss, “Pattern of Co-Operation,” 232-237.

In his study of the origins of the defence production and development sharing agreements, Danford Middlemiss emphasizes that the original programme as implemented from the fall and winter of 1958 involved only the elements of CADIN, and that "the major activities of the various joint agencies concerned with production sharing were directed primarily toward the task of formulating procedures to enable Canadian industry to participate more effectively in these production projects."³⁵ Although efforts in this area brought some initial positive results, for a number of reasons, including the late date at which they became involved, meant that Canadian firms derived only limited benefits from these early measures.³⁶ As Middlemiss makes clear, "DDP officials stressed that the sharing principle had to apply to Canadian defence products in the advanced technology field. "Metal-bashing" items of limited engineering content, as well as construction contracts and raw material sales, should be excluded from the statistics of cross-border production sharing trade according to the Canadians."³⁷ In a later article based on this work, Middlemiss records that certain DDP officials "deplored the 'accountant's mentality' which had led to Canada's acceptance of the one-third, labour-intensive construction portion of the air defence package in the early months of production sharing."³⁸ This view was held at the highest levels within DDP; in a meeting with Donald Quarles, the US Deputy Secretary of Defense, in mid-April 1959, for instance, Deputy Minister of Defence Production David Golden

reminded Secretary Quarles that there was an important proviso to the acceptance of this arrangement by the Canadian Government and that was that a reasonable and representative share of the production contracts would be performed by Canadian facilities. He went on to say that it was unthinkable in an arrangement

³⁵ *Ibid.*, 232-233.

³⁶ *Ibid.*, 233-237.

³⁷ *Ibid.*, 236-237.

³⁸ Middlemiss, "Defence Co-Operation," 191, n.49.

where Canada was paying one-third of the cost, that our sole contribution would be in terms of construction and associated activities, while U.S. firms manufactured all the equipment. This was particularly so where this equipment was to be installed in Canada, and would be maintained and operated in Canada, and probably manned as well. He went on that it made sense, in terms of the management of the programs, for Canada to assume the management of the “bricks and mortar” side, and for the U.S. to assume the management of the technical equipment. Despite this management arrangement he emphasized that it was not possible to defend the arrangements for these programs in Canada on the basis of all the technical equipment being produced in the United States.³⁹

Now that construction work on joint defence programmes was virtually guaranteed to be awarded to Canadian firms, the Canadian government and the Department of Defence Production had switched their focus to the provision of equipment and electronics.⁴⁰ These areas had presented challenges in previous agreements, and would do so again as part of CADIN.⁴¹

SAGE and the North Bay Combat Centre

As noted in the discussion above, one of the central elements of CADIN was the provision of a SAGE installation for the Royal Canadian Air Force. The origins of SAGE can be traced to the work of the Valley Committee, whose role in shaping early American thought on air defence has been discussed in Chapter Five.⁴² The most significant

³⁹ “Notes on a Meeting Between the Honorable D. A. Quarles, Deputy Secretary of Defense of the United States and Mr. D.A. Golden, Deputy Minister of Defence Production,” 28 April 1959, 2, DHH 73/1223, Series 1, Box 1, File 12. It is worth noting that Middlemiss uses the same “bricks and mortar” expression in a 1982 article. Middlemiss, “Defence Co-Operation,” 179.

⁴⁰ Canadian concerns were related in part to the desire to hold together the design teams that had recently been thrown out of work by the cancellation of the Arrow’s ASTRA and Sparrow II fire control and weapons programmes. “Minutes of Canada-United States Discussion on Production Sharing,” 9 October 1958, DCER, Volume 25, Part II, 222. For an overview of part of this programme, see RG58, series C1, vol. 260, file 3999-1959-DDP-004, “Historical Files from 1974 and Prior Miscellaneous Files – DDP/DND (Aviation) Retention of Nucleus of Specialists re: Sparrow Program (1958-59)”.

⁴¹ For a brief summary of these problems, see Middlemiss, “Pattern of Co-Operation,” 232-237.

⁴² The Air Defense Systems Engineering Committee, to give it its proper name, was established by the USAF in December of 1949 under the leadership of Dr. George E. Valley of MIT, in response to the explosion of the first Soviet atomic bomb in August of 1949. John F. Jacobs, “SAGE Overview,” *IEEE*

Figure 8: Map of CADIN Installations

● Heavy Radars:	1 – Penhold; 2 – Alsask; 3 – Dana; 4 – Yorkton; 5 – Gypsumville; 6 – Moosonee;
■ SAGE Installation:	7 – Chibougamau
▲ BOMARC Launch Sites:	8 – North Bay
	8 – North Bay; 9 – La Macaza

Source Map: Natural Resources Canada. Source Data: Map, DCC in-house holding.

problem noted by the committee was the existing system of Ground Controlled Interception (GCI), which relied on Second World War methods and was becoming increasingly inadequate in the face of increasing bomber and interceptor speeds.⁴³ Valley suggested that a computer called Whirlwind, developed at MIT's Digital Computer Laboratory in the late 1940s, might be used to provide the speed and data handling necessary for a modern air defence system.⁴⁴ The Valley Committee set the stage for later groups, including Project Charles and the Lincoln Summer Study Group. Both of the latter were also hopeful that digital computers could improve the effectiveness of air defences.⁴⁵ While there were broader concerns within USAF about an emphasis being placed on defence at expense of offence – these were a recurring theme throughout the 1950s – the decision was made to go with SAGE as the system for co-ordinating air defence.⁴⁶ The automation in the “semi-automatic” SAGE was centered on a development of the Whirlwind II computer – the AN/FSQ-7 – the final version of which

⁴³ Schaffel, *The Emerging Shield*, 197-198; Bruce-Briggs, *The Shield of Faith*, 52-53. Some of the central principles of manual plotting for GCI had been established as far back as 1936, during the very early days of British radar development. Brian Johnson, *The Secret War*, (London: BBC, 1978), 77-79. Edwards quotes Valley's memoir of the development of SAGE, with Valley noting that “hundreds, if not thousands of radars would be required to detect low-flying aircraft.... There was no conceivable way in which human radar operators could be employed to make [the necessary] calculations for hundreds of aircraft as detected from such a large number of radars, nor could the data be coordinated into a single map if the operators used voice communications. The...computations were straightforward enough.... It was doing all that work in real time that was impossible.” Quoted in Edwards, *The Closed World*, 91.

⁴⁴ As a result of these and other suggestions, the USAF became the primary supporter of MIT's Lincoln Laboratory, which, as discussed in earlier chapters, had been established in 1951 to study air defence. Schaffel, *The Emerging Shield*, 198-199. 203. Valley had apparently independently reached the conclusion that computers would be suitable for this task, prior to an early 1950 encounter with his colleague Jerome Wiesner, who pointed him to Whirlwind, which was then under development at MIT. Bruce-Briggs, *The Shield of Faith*, 53.

⁴⁵ The Summer Study Group optimistically expected that a computerized system including distant early warning radars could permit the destruction of 60 to 70 percent of attackers, a figure which was far higher than any contemporary estimates of air defence effectiveness. Edwards, *The Closed World*, 94.

⁴⁶ Schaffel, *The Emerging Shield*, 202-203.

weighed 250 *tons*, used 49,000 vacuum tubes, and set a record for computer size and weight that is unlikely ever to be surpassed.⁴⁷

The construction of the SAGE control centre at North Bay was the most substantial of the CADIN projects supervised by DCL. If the strategic orientation of the project indicated a shift in Cold War thinking – the need for hardened, nuclear-resistant defence facilities – DCL was still able to mobilize the skills, resources, and companies who could respond. The conventional surface installation for this unit, its emergency generating plants, cooling system, and operations centre required a massive four-storey blockhouse and a two-storey annex for emergency generators and cooling equipment.⁴⁸ At North Bay, the task of planning and construction was amplified by having this equipment installed in a series of caverns carved from the Canadian Shield. At the same time that the RCAF's Construction Engineering division had begun to prepare estimates for a SAGE installation in the fall of 1958, the United States was carrying out feasibility studies for a SAGE installation that could survive nuclear attack.⁴⁹ Planners decided that a hardened facility was necessary for the Northern NORAD combat centre, and that this facility would also house the Sector Direction Centre, the Ottawa Air Defence Sector, and the staff of regional headquarters. Faced with a nuclear attack, the centre was to be designed to withstand an overpressure of 500psi and 4Gs of shock. The resultant SCC/DC (Super Combat Centre/Direction Centre) was therefore to be built underground,

⁴⁷ Winkler, *Searching the Skies*, 32. Edwards, quoting from *The System Builders*, gives figures as 300 tons, 70 cabinets, 58,000 tubes, 20,000 square feet, and requiring another 20,000 square feet for display consoles and telephone equipment. Edwards, *The Closed World*, 104. Early work using the Whirlwind computer and data relayed by telephone lines had begun in 1952, with a small-scale experimental SAGE sector beginning operations in 1954 in the US Northeast, directing interceptors against SAC bombers performing mock raids. *Ibid.*, 97.

⁴⁸ Jacobs, "SAGE Overview," 326-327.

⁴⁹ S.E. Martin, "Underground Chambers for air Defence," special supplement to *Construction Engineering News*, 3:4 (October-November-December 1962), 2-5, reprinted by RCAF, DHH 79/304.

some 560 feet below Reservoir Hill near North Bay. The RCAF's Construction Engineering section had overall responsibility for the project, while DCL managed the contracts, including those for consulting engineers and site supervisors, with the final cost for the facility reaching some \$50 million.⁵⁰

As originally planned, the SAGE installation at North Bay would have both the Direction Centre with the AN/FSQ-7, and the Combat Centre with another computer, the AN/FSQ-8, which was intended to control the Direction Centre at North Bay and also the Direction Centre at Bangor, Maine.⁵¹ The advent of the ICBM, however, and cutbacks in the American defence budget led to a scaling back of SAGE plans, and the FSQ-8 was never installed. Of the anticipated forty-six SAGE centres, only twenty-two were actually built, while plans for hardened SAGE combat centres were cancelled entirely. A transistorized SAGE, which was central to the hardened combat centres, was also cancelled.⁵² As completed, North Bay, which in some ways had been intended as the first of many hardened SAGE complexes, became something of an orphan; it was the only SAGE Combat Centre/Direction Centre located outside the United States; the first – and

⁵⁰ K.J. Holmes, *The History of the Canadian Military Engineers, Volume 3, to 1971*, (Toronto: Military Engineering Institute of Canada, 1997), 128-129; Martin, "Underground Chambers for air Defence," 2-4. The excavation work required specialized skills, hence the need for consultants to provide supervision. In comparison with the installation at North Bay, the above-ground concrete SAGE blockhouses could withstand overpressures of no greater than 5 psi. Schaffel, *The Emerging Shield*, 264.

⁵¹ Memorandum, probably from Department of Defence Production, "re Sharing of Production Tasks: North American Air Defence," Appendix B, "SAGE," DHH 73/1223, Series 1, box 1, file 11. The AN/FSQ-7 was designed for weapons control activities, while the FSQ-8 allowed regional commanders in their combat centres to supervise operations in their sectors. Schaffel, *The Emerging Shield*, 263-264.

⁵² Bruce-Briggs, *The Shield of Faith*, 138; Schaffel, *The Emerging Shield*, 260. At one stage, plans apparently called for the installation of the updated, transistorized version of SAGE in North Bay, but for a number of reasons, including operational deadlines, the original vacuum tube version was accepted instead. Canadian documents refer to it as the AN/FSQ-7A, but later publications on SAGE refer to it as the AN/FSQ-32. Intended to replace the vacuum tube AN/FSQ-7 and AN/FSQ-8 computers, it would be able to handle five to seven times more data. Memorandum, CAS to MND, 2 July 1959, "Master Plan for United States Air Defence," 3, DHH 73/1223, Series 1, Box 1, File 12; Memorandum, CAS to Minister, 1 June 1960, 2, DHH 73/1223, series 2, file 822; Winkler, *Searching the Skies*, 41; Jacobs, "SAGE Overview," 329; Schaffel, *The Emerging Shield*, 264-5.

last – one built underground; the centre responsible for controlling the largest area; and the only one to use the AN/FSQ-7 for both regional and sector operations.⁵³ Despite the scaling back of the SAGE initiative, the North Bay work of DCL would constitute one of the corporation's most lasting Cold War legacies in Canada – an icon of the vigilance and anxiety of an age on the nuclear edge.

The installation as built consisted of three underground caverns excavated from the Precambrian rock of Reservoir Hill. Two large caverns measured some 400 by 45 feet and 60 to 70 feet in height. Their creation involved the excavation of more than 300,000 cubic yards of rock, and involved an early Canadian application of the “smooth-wall blasting” technique that was being developed in Sweden. The third cavern was slightly smaller than the other two, and contained power plants and support facilities to make the complex self-sufficient.⁵⁴ Entrance to the main caverns was provided by two separate tunnels, one a half mile in length, with the other twice as long. Steel blast doors weighing some ten tons each could seal off the tunnels and allow the centre to become completely self-contained. Inside each of the two main caverns, a three storey freestanding structure housed the SAGE equipment, with the necessary environmental systems hung on the walls or located on the roof – this allowed for easier maintenance, and was made possible by the steady temperatures in the caverns. Concrete piers keyed to the bedrock allowed future upgrades to the buildings' shock resistance.⁵⁵ Excavation for the facility began in 1959, and the first headquarters staff moved in during August of 1962. By September of

⁵³ Ottawa NORAD Sector, “SAGE Goes Underground,” 7, DHH 90/28. It should be noted that only one SAGE centre had ever been considered for Canada.

⁵⁴ Two underground water reservoirs were also excavated; one for domestic use, the other, much larger, for emergency air conditioning for the computer installation.

⁵⁵ Holmes, *History of the Canadian Military Engineers*, 128-129; “SAGE Goes Underground,” 11; Martin, “Underground Chambers for air Defence,” 21-24.

1963 construction was essentially complete, and the installation was formally opened early in the following year.⁵⁶ When completed, North Bay was the first underground NORAD command and control facility – the better known NORAD Combat Operations Centre inside Cheyenne Mountain would not be ready for a few more years.⁵⁷ Unlike so much of DCL's other handiwork, however, the North Bay facility remains in use to this day.

BOMARC

The other prominent element of CADIN, and certainly its most controversial, was the BOMARC surface-to-air missile. Developed and fielded in two substantially different versions, ("A" and "B"), it encountered considerable and highly publicized development problems.⁵⁸ Plans for widespread deployment were progressively cut back in the face of repeated failed test firings and the emerging ICBM threat, but two Canadian launch sites were chosen, in part to provide some protection to the Windsor-Montreal corridor, but also to provide even further protection for the American industrial heartland. At times, the entire future of the programme was in doubt, which was not only a political liability for the Diefenbaker government, but also a challenge for the construction of the missile

⁵⁶ Holmes, *History of the Canadian Military Engineers*, 129; DCL, *Annual Report*, 1959-60, 10.

⁵⁷ There was significant concern about vulnerability of NORAD HQ at Ent AFB in Colorado Springs to nuclear attack, which led to the creation of the underground command installation in Cheyenne Mountain, south of Colorado Springs. The US Joint Chiefs of Staff approved the plan in March of 1959, with excavation beginning in May of 1961; it was completed by February 1966, after which NORAD began to shift its operations from Ent AFB to the new command centre. Holmes, *History of the Canadian Military Engineers*, 129; Winkler, *Searching the Skies*, 44-45; Bruce-Briggs, *The Shield of Faith*, 156. Bruce-Briggs quotes nuclear strategist Herman Kahn as telling NORAD that its recently completed headquarters was vulnerable to attack by newer Soviet ICBMs: "You put it in the mountain; you should have put it *under* the mountain." Similar comments would presumably have held true for the installation at North Bay.

⁵⁸ For a non-technical description of the differences between the two versions, see Clark, "Canadian Weapons Acquisition," 46-52.

bases.⁵⁹ In addition to these problems, DCL would also face and respond to situations that included potential breaches of security by employees when details of NORAD's plans to deploy the BOMARC in Canada were leaked. On a more parochial level, DCL would become embroiled in helping the federal government resolve disputes with local politicians over damage caused to roads by construction traffic.⁶⁰

In some ways, the BOMARC project allowed DCL to summon its original Cold War construction talents. The two sites chosen in Canada were at North Bay, Ontario, and La Macaza, Quebec. While the former could take advantage of RCAF facilities already established in the area to provide accommodation and support services for its personnel, the same advantages were not available at La Macaza, where an entire base had to be built from scratch. The result was a considerable discrepancy in costs between the two sites; in 1960, for instance, estimated final costs for the Canadian portions of the BOMARC sites were \$10 million for storage and launching facilities at North Bay and \$15 million for storage and launching facilities and living quarters at La Macaza.⁶¹ A DCL memo from March 1960 summarized the construction costs to date of the BOMARC sites at North Bay and La Macaza, and forecast costs to 31 March 1961. Costs for North Bay were given as \$2,191,000, while at La Macaza they were considerably higher, with conflicting figures of \$4,140,000 and \$4,911,151.15 being provided.⁶²

⁵⁹ *Ibid.*, *passim*.

⁶⁰ R.G. Johnson to Clive Chattoe, 16 December 1957, DCC in-house file, "Agreement – BOMARC, Gap Fillers, Heavy Radar and SAGE"; Raymond O'Hurley to Pierre Sévigny, 5 December 1961, LAC, MG32 B19, vol. 17, file 26-117, vol. 2. More extensive correspondence on the latter issue can be found in volume 3 of the BOMARC file.

⁶¹ "BOMARC – Storage and Launching Facilities for Pilotless Interceptors," 1959-60, DCC in-house file "Statements – Various Canadian and U.S. Government Programs".

⁶² J.P. Stirling, Memo to file, "Information 'phoned to Mr. W. Loynes," 7 March 1960, DCC in-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL".

Despite its Cold War resonance, the BOMARC project had an Achilles heel. A significant threat to the future of BOMARC and the construction of its launching sites had arisen. Earlier in the year, Minister of National Defence George Pearkes had already had to defend poor test results for BOMARC. None the less, construction of the SAGE and BOMARC installations at North Bay were continuing despite opposition criticism.⁶³ In the months that followed, a combination of factors including more failed tests and budget cuts led to the United States Department of Defence recommending cuts to the number of BOMARC sites to be built, and by the end of April the House Military Appropriations Subcommittee in Washington recommended – for the second year in a row – that the entire programme be cancelled.⁶⁴ At an early May 1960 meeting, Cabinet considered whether construction of the two launch sites should be slowed down or even stopped entirely pending a final American decision on the programme. The ministers acknowledged that Canada had committed to building the sites and decided that the awarding of contracts at La Macaza could be postponed. Acknowledging the potential for cost increases that a slowdown could cause in the long run, Cabinet still agreed that for the time being no further contracts be awarded for work at La Macaza, and that the Ministers of National Defence and Defence Production “should arrange for the slowing down of construction at the Bomarc site at North Bay to the extent possible, but that no announcement be made on the subject at this time.”⁶⁵

⁶³ Clark, “Canadian Weapons Acquisition,” 95-96.

⁶⁴ *Ibid.*, 95-101.

⁶⁵ Cabinet Conclusions, 03 May 1960, 13-15, LAC, RG2, series A-5-a, vol. 2746. Work at North Bay had started during 1959, so unlike La Macaza many of the construction contracts had already been let. DCL, *Annual Report*, 1959-60, 10. For details of construction progress shortly after this decision, see attachments to Memorandum, CAS to Minister, 1 June 1960, 2, DHH 73/1223, series 2, file 822.

Despite hostility and profound misgivings, the BOMARC was saved. As Pearkes had noted in Cabinet, the Eisenhower administration applied pressure to the Senate Military Appropriations Subcommittee, while Boeing and other BOMARC manufacturers were also able to bring considerable pressure to bear. A number of other factors, including the cancellation of the East-West Paris Summit in the wake of the U-2 incident, the successful testing of the BOMARC, and lobbying by the Canadian government also contributed to the preservation of a “rump” programme considerably reduced from earlier plans.⁶⁶ With BOMARC deployment preserved, albeit in a yet further reduced form, DCL was being informed in early July that the decision to slow down work on the two BOMARC sites had been rescinded and that the company should now “proceed with all dispatch to conclude any outstanding construction arrangements necessary to the execution of these projects.”⁶⁷ In October, the USAF accepted the BOMARC “B” for quantity production. By the start of November, construction work at North Bay was sixty-five to seventy per cent complete, while at la Macaza only some ten to fifteen per cent was finished.⁶⁸

Despite periods when their future had been cast into doubt, both installations were ultimately completed. The base at North Bay and its missiles became fully operational in August 1962, and its counterpart at La Macaza was ready at about the same time. As

⁶⁶ Cabinet Conclusions, 03 May 1960, 13-15, LAC, RG2, series A-5-a, vol. 2746; Clark, “Canadian Weapons Acquisition,” 101-103. As mentioned above, one element of CADIN had involved the growing dependence of Canada on equipment designed and built in the United States. In his study of the BOMARC acquisition process, Robert Clark notes that “this entire episode was another humiliating illustration of Canada’s vulnerability to the whims of a foreign legislature each time the country purchased a high-risk weapon abroad.” *Ibid.*, 103. On the broader issue of the U-2 and the Paris Summit, see, amongst others, Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev, and the U-2 Affair*, (New York: Harper & Row, 1986).

⁶⁷ A/C C.F. Johns, ADM/ND to R.G. Johnson, 8 July 1960, LAC, MG32 B19, vol. 17, file 12-117, vol. 2.

anticipated by Cabinet in 1960, however, the delays and deliberate slowdowns in construction had added to the costs of the undertaking.⁶⁹ By the time these installations were complete, a considerable controversy had arisen about the missiles and their warheads. This public debate centered around whether Canada should adopt nuclear weapons, including warheads for the BOMARCs. The Diefenbaker government chose not to accept nuclear warheads, a move that contributed to the Conservatives' defeat in the 1963 federal election.⁷⁰ The drawn-out debate had also meant that during the Cuban Missile Crisis of October 1962, the two squadrons of BOMARCs had been of no military potential whatsoever. The incoming Liberals under Lester B. Pearson agreed to the nuclear warheads for the BOMARCs on 16 August 1963, but they were not installed until the beginning of 1964.⁷¹ The missiles, finally equipped with their controversial payloads, remained in service until 1972, when they were declared obsolete and removed from service.⁷² DCL had thus participated in a fitful late episode of Cold War preparations in North America. It was becoming clear that military strategy and technology were rapidly altering the corporation's once-privileged role in the shielding of the continent from the Soviet threat.

⁶⁸ Fifty-eight of the three hundred and one missiles scheduled for production were earmarked for Canada. "BOMARC – Construction Status and Cost Summary as of 3 Nov 60"; "Aide Memoire – USAF Bomarc 'B' (IM99B) Programme," LAC, MG 32 B 19, vol. 29, file 44-30, "Bomarc Missile, Vol. 2, 1960-1962".

⁶⁹ Clearwater, *Canadian Nuclear Weapons*, 67, 76; DCL, *Annual Report*, 1962-63, 4; Canada, Office of the Auditor General, *Report of the Auditor General to the House of Commons for the Fiscal Year Ended March 31, 1964*, (Ottawa: Queen's Printer, 1964), 170.

⁷⁰ This debate and its significance for Canadian military policy, politics, and relations with the United States has been extensively studied. For an example of each, see, amongst others, Clark, "Canadian Weapons Acquisition," 105-136, Erika Simpson, "New Ways of Thinking about Nuclear Weapons and Canada's Defence Policy," in *The Diefenbaker Legacy: Canadian Politics, Law, and Society since 1957*, Donald C. Story and R. Bruce Shepard, eds., (Regina: Canadian Plains Research Center, 1998), 27-41; J.L. Granatstein and Norman Hillmer, *For Better or for Worse: Canada and the United States to the 1990s*, (Toronto: Copp Clark Pitman, 1991), 196-214. For a concise analysis of newspaper coverage and discussion of the issue, see Crosby, *Dilemmas in Defence Decision Making*, 161-163.

⁷¹ Clearwater, *Canadian Nuclear Weapons*, 67-72, 76-80.

⁷² *Ibid.*, 42-43, 72.

Expanded Radar Coverage and Radar Upgrades

These same years provided other echoes of the early Cold War. Both SAGE and BOMARC would have been of limited use had they not been provided with expanded radar coverage. BOMARC, as noted above, required both SAGE and radar coverage for its operation. CADIN had as one of its goals the expansion of radar coverage in Canada. The expansion took three forms; the construction of new “heavy radar” installations, comparable in size to existing Pinetree Line installations but with improved capabilities, the upgrading of existing Pinetree stations, and the construction of small, unattended “gap filler” stations designed to provide low-altitude coverage.⁷³

Plans for “heavy radar” involved the establishment of seven new installations with more capable equipment, five in the west to provide additional northern coverage in an area stretching from the Rocky Mountains to Lake Winnipeg, and two to the northwest of the Windsor-Quebec corridor.⁷⁴ The five western stations were built at Penhold, Alberta, Alsask, Dana, and Yorkton, Saskatchewan, and Gypsumville, Manitoba, and their two eastern counterparts were built at Chibougamau, Quebec and Moosonee, Ontario.⁷⁵

⁷³ Draft Memorandum to Cabinet Defence Committee, “Extension of Pinetree Radar System: Northward Extension – Canadian Programme,” 28 July 1958, DHH 73/1223, series 1, Box 1, file 10. The draft memorandum explained that “the physical characteristics of a heavy radar are such that at approximately 100 statute miles (87 nautical miles) from the site the bottom of the radar beam is [sic] 5,000 feet above the ground. Consequently between adjacent radars there is a gap between ground level and the bottom of the beam of the main radars through which a low flying bomber could penetrate the defences undetected. In order to fill this gap and also provide data for the control of weapons, small unattended radars are a requirement.” The gap filler radars intended for CADIN (AN/FPS-18) had a range of about sixty-five miles. Winkler, *Searching the Skies*, 35-36.

⁷⁴ Draft Memorandum to Cabinet Defence Committee, “Extension of Pinetree Radar System: Northward Extension – Canadian Programme”; Memorandum, probably from Department of Defence Production, “Re Sharing of Production Tasks: North American Air Defence,” Appendix A, “Pinetree Radar Improvement,” DHH 73/1223, Series 1, box 1, file 11.

⁷⁵ “Pinetree Line (A.C.&W. Stations)”; “Construction of Additional A.C.&W. Stations for the Pinetree Line (RCAF)”; Construction of Additional A.C.&W. Stations for the Pinetree Line (US),” DCC in-house file “Statements – Various Canadian and U.S. Government Programs”; Holmes, *History of the Canadian Military Engineers*, 128; E.J. Gauthier, “RCAF Telecommunications (Signals/Wireless) History,” 15 October 1963, 64, DHH 74/600.

In September of 1958 DCL was planning for the 1960 programme, which would include the commencement of work on the five new stations on the prairies.⁷⁶ Defence Construction awarded contracts for the eastern heavy radars and for preliminary work at one of the western sites in 1960-61.⁷⁷ The following year, contracts for the five heavy radar bases in Western Canada were awarded, while in 1962-63, the two eastern sites underwent final hand-over to the RCAF, while the five western stations had been occupied by the end of the year.⁷⁸

Work on radar improvement was equally widespread. A number of sites were upgraded by the installation of new height-finding radars, while all existing sites appear to have received new search radars. In both cases, the equipment was same as that being installed at the new stations.⁷⁹ A 24 September 1958 meeting of senior DCL officials noted that for the 1959 fiscal year radar improvements consisted of upgrading living conditions, and ACND minutes for July 1959 noted that facilities at the US-financed and operated Pinetree sites in Canada were being increased in preparation for equipment improvements the following year.⁸⁰ For 1958-59, additional work was carried out on a

⁷⁶ "Meeting of Defence Construction (1951) Limited Officials Re Arrow, U.S.A.F. and Canadian Radar Programmes held in the President's Office on Wednesday, September 24, 1958," 24 September 1958, DCC in-house file "All USA Programs - General Data".

⁷⁷ DCL, *Annual Report*, 1960-61, 11.

⁷⁸ DCL, *Annual Report*, 1961-62, 5; DCL, *Annual Report*, 1962-63, 4. Moosonee, for instance, was built in 1960/61, with personnel arriving in November of 1961 and the station becoming operational in July of 1962. Canada, Department of National Defence, Press Release, "CFS Moosonee," January 1975; "Statement by the Minister of National Defence," 16 January 1975, DHH Permanent Reference File "CFS Moosonee".

⁷⁹ Memorandum, probably from Department of Defence Production, "re Sharing of Production Tasks: North American Air Defence," Appendix A, "Pinetree Radar Improvement".

⁸⁰ "Meeting of Defence Construction (1951) Limited Officials Re Arrow, U.S.A.F. and Canadian Radar Programmes held in the President's Office on Wednesday, September 24, 1958," 24 September 1958, DCC in-house file "All USA Programs - General Data"; Minutes of 54th meeting of the ACND, 6 July 1959, 1, LAC, RG2, series B2, vol. 6183, pt. 5. DCL had entered into a contract with the Corps of Engineers in the summer of 1958 for the construction of additional buildings at various Pinetree Line stations that were financed by the United States. This had apparently consisted of towers and buildings to support the improvement or replacement of radar equipment and communication facilities "Additional work on

number of RCAF Pinetree stations, largely to expand accommodations and support infrastructure, add classrooms, and combined chapels. Some twenty contracts with a total value of \$1.8 million were administered by DCL at the ten stations.⁸¹ The corporation's 1961-62 annual report also notes that at about eighteen USAF Pinetree stations work was still underway to improve radar facilities through the construction of new towers and the addition of electrical generating capacity.⁸² By the end of the 1962-63 fiscal year, the Radar Improvement programme at USAF Pinetree sites begun in 1959 was completed. Construction costs, paid entirely by the United States, totaled \$18.1 million.⁸³

The third of the radar construction projects undertaken as part of CADIN, the gap-filler programme, was ultimately cancelled prior to its completion. Joint RCAF-USAF teams had completed surveys for proposed gap-filler radars in 1957, and they determined that forty-five such installations would be required on Canadian territory.⁸⁴ Although the threat of the ICBM and budget pressures affected plans for gap fillers, by July of 1959 US air defence plans were still calling for enough installations to provide coverage down to an altitude of about 500 feet above ground level for at least 150 miles forward of BOMARC launching sites.⁸⁵ In Canada, the gap-fillers were of particular interest to the Department of Defence Production. Production sharing discussions with the United

Existing Pinetree R.C.A.F. A.C.&W. Sites," DCC in-house file "Statements – Various Canadian and U.S. Government Programs."; Gauthier, "RCAF Telecommunications History," 64.

⁸¹ "Additional work on Existing Pinetree R.C.A.F. A.C.&W. Sites," DCC in-house file "Statements – Various Canadian and U.S. Government Programs."; DCL, *Annual Report, 1959-60*, 10; "General Outline of U.S. Military Construction Activities in Canada, 1951 to 1961," 5, DCC in-house file "Summaries of U.S.-Canada Diplomatic Agreement Affecting DCL"; "Additional Work on Existing CANUSAD A.C.&W. Sites," DCC in-house file "Statements – Various Canadian and U.S. Government Programs".

⁸² DCL, *Annual Report, 1961-62*, 6.

⁸³ DCL, *Annual Report, 1962-63*, 5; Gauthier, "RCAF Telecommunications History," 64.

⁸⁴ Appendix "A" to Minutes of 47th meeting of the ACND, 20 May 1958, LAC, RG 2, series B2, vol. 6183, pt. 4; Draft Memorandum to Cabinet Defence Committee, "Extension of Pinetree Radar System: Northward Extension – Canadian Programme," 28 July 1958, DHH 73/1223, series 1, Box 1, file 10.

⁸⁵ Memorandum, CAS to MND, 2 July 1959, "Master Plan for United States Air Defence," 3, DHH 73/1223, Series 1, Box 1, File 12.

States in October of 1958 had outlined opportunities for Canadian participation in the manufacture of radar and other electronic equipment for CADIN, and at one point there was the possibility that the gap filler radar equipment, which offered the greatest possibilities for Canadian manufacture, might be provided in part by Canada.⁸⁶ In 1961-62, work began at a number of the gap filler sites, with an operational target date of July 1963. By the early part of that year, however, the necessary radar equipment was not forthcoming due to problems with development and production. Since it was thought unlikely that suitable replacements could have been developed, produced, and installed within the time frame during which the sites were considered an essential part of continental air defence, the programme was ultimately cancelled in 1964. Consequently, the brief summary of completed CADIN projects in DCL's 1963-64 annual report makes no mention of the installations.⁸⁷ The pickings for DCL were becoming thin.

CADIN Communications

As already discussed, SAGE was not simply a computer, it was a network of computers connected to each other and to radars and weapons systems. In order to gather information and provide direction to interceptors and missiles, the existing communications network had to be upgraded, new networks installed, and modifications

⁸⁶ "Minutes of Canada-United States Discussion on Production Sharing," 9 October 1958; Supplement to Summary Record, *DCER*, Volume 25, Part II, 219, 226. "Notes on a Meeting Between the Honorable D. A. Quarles, Deputy Secretary of Defense of the United States and Mr. D.A. Golden, Deputy Minister of Defence Production," 28 April 1959, 5.

⁸⁷ DCL, *Annual Report*, 1961-62, 5; DCL, *Annual Report*, 1963-64, 4; Canada, Office of the Auditor General, *Report of the Auditor General to the House of Commons for the Fiscal Year Ended March 31, 1965*, (Ottawa: Queen's Printer, 1966), 52-53. General information on this programme is scarce; a collection of transcribed documents relating to the cancellation of the gap filler radars can be found at <http://www.pinetreeline.org/gap/gaprcaf.html>. The cancellation of the programme was covered by an exchange of notes in 1964. See *Exchange of Notes (May 6, 1964) Between the Government of Canada and the Government of the United States of America Amending the Agreement of September 27, 1961 Relating*

made to the radar installations; these initiatives merit brief examination. The advent of SAGE rendered the existing ADCOM I communications system for air defence sites obsolete in Ontario and Quebec. The re-engineering of the microwave communications system to new standards (ADCOM II) was relatively expensive, costing some \$15 million, in comparison with about \$20 million for the original system. The end product was a more complicated network of twenty-nine installations connected in part to commercial carriers. These companies, some of whom had been opposed to the RCAF's construction of the original system, criticized ADCOM II for its interference with their creation of a more widespread microwave communications network. In the early 1960s the Glassco Commission examining government organization argued that the RCAF, the telecommunications companies, and the public would have been better served by a more flexible system using leased civilian facilities.⁸⁸ By 1967, Bell Canada had acquired the system at the request of the government, and integrated parts of it into its own microwave network.⁸⁹

Radar and weapons also had to be modified in order to function as part of the SAGE network; data processing equipment to allow signals to be transmitted between the various components and the central computers, and to and from ground stations,

to the Continental Air Defence System by Cancelling the Proposed Gap Filler Programme, Canada Treaty Series, 1964, No. 7.

⁸⁸ A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, 4, DHH 78/512; Lester, "Taped Recollections," 6-7, DHH 77/493; Canada. Royal Commission on Government Organization, *Volume 2: Supporting Services for Government*, (Ottawa: Queen's Printer, 1962), 240-243. Some form of system like ADCOM II was necessary in the east because radars in that area were linked to the SAGE centre at North Bay; in the west, radars in Canada were linked southwards to American centres. Memorandum, probably from Department of Defence Production, "re Sharing of Production Tasks: North American Air Defence," Appendix B, "SAGE," DHH 73/1223, series 1, box 1, file 11.

⁸⁹ Cabinet Conclusions, 4 January 1967, 7, LAC, RG 2, series A-5-a, vol. 6323; Order in Council PC 1967-19, 4 January 1967, LAC, RG58, vol. 262, file 21 "Dept. of Defence Production - Sale of ADCOM II, 1964-68", Lester, *Special Contract*, 4. ADCOM II was sold to Bell effective 1 April 1967. At some point ADCOM II may have involved a tropospheric scatter link, but details remain vague. Frank A. Gunther, "Tropospheric scatter communications: Past, present and future," *IEEE Spectrum*, (September 1966), 93.

interceptors, and BOMARCs also needed to be installed as part of CADIN. DCL's responsibilities in this area largely involved the provision of buildings to house this equipment. Twenty-five existing Pinetree radar stations, for instance, had to be connected to the SAGE system, while GATR (Ground Air Transmitter Receiver) equipment was necessary for communication with aircraft and surface-to-air missiles.⁹⁰ In 1960-61, DCL awarded contracts for the construction of buildings to house SAGE equipment at nine sites, and for buildings to house GATR equipment at eight sites.⁹¹ The following year, contracts were awarded for both SAGE and GATR buildings at fifteen more stations.⁹² By the end of 1962-63, all of the SAGE and GATR installations at the older Pinetree Line sites had been completed and occupied; the new radar sites were presumably designed to accommodate and use the SAGE and GATR equipment from the outset. By this date, construction was essentially complete on all of the CADIN projects, with total construction awards reaching \$77.1 million.⁹³ Work was completed during the 1963-64 fiscal year, with contracts totaling \$82.7 million having been let by DCL.⁹⁴ These piecemeal contracts once again seemed to indicate that the heyday of Cold War construction was dwindling.

⁹⁰ "Pinetree Line (A.C.&W. Stations)"; "Construction of Additional A.C.&W. Stations for the Pinetree Line (RCAF)"; "Construction of Additional A.C.&W. Stations for the Pinetree Line (US)," DCC in-house file "Statements - Various Canadian and U.S. Government Programs". AN/FST-2 radar data processing and transmitting equipment was installed at main radar sites as part of the connection to the SAGE network. Memorandum, probably from Department of Defence Production, "re Sharing of Production Tasks: North American Air Defence," Appendix B, "SAGE," DHH 73/1223, Series 1, box 1, file 11; Jacobs, "SAGE Overview," 325.

⁹¹ DCL, *Annual Report*, 1960-61, 11.

⁹² DCL, *Annual Report*, 1961-62, 5.

⁹³ DCL, *Annual Report*, 1962-63, 4.

⁹⁴ DCL, *Annual Report*, 1963-64, 4.

Nuclear Voodoos

Following the cancellation of the Arrow, the RCAF was still in need of an interceptor to replace the obsolete CF-100. Political considerations required a decent period to elapse before replacements were acquired, and also prevented the outright purchase of the F-106 interceptor that was forming the backbone of the USAF's air defence forces.⁹⁵ A number of F-101B "Voodoo" interceptors were also available from the United States, however, and following negotiations that at one point proposed the exchange of Canadian transport aircraft for the Voodoos, a February 1961 Cabinet decision led the Canadian government to acquire sixty-six examples of the F-101 (called the CF-101 in Canadian service) in a three-way trade with the United States.⁹⁶

The acquisition of the CF-101 generated a requirement for new supporting infrastructure. In 1961-62, this led to the awarding of more than \$3.3 million in contracts for the construction of new facilities at Chatham, New Brunswick, Bagotville and Val D'Or, Quebec, Cold Lake, Alberta, and Comox, British Columbia.⁹⁷ While much of the initial work consisted of runway and taxiway upgrades, the annual report noted in 1963-

⁹⁵ McLin, *Canada's Changing Defence Policy*, 100-103; Schaffel, *The Emerging Shield*, 229. In a March 1959 study, the Chief of the Air Staff advised the Chiefs of Staff Committee that the CF-100 Mk V (the newest production version), which had originally been designed to counter piston-engined Soviet bombers, would have only "marginal effectiveness" against newer turbo-prop and jet-powered Soviet bombers and therefore had "only a very limited capability against today's threat to North America." Chief of the Air Staff to Chiefs of Staff Committee, March 1959, "Operational Effectiveness of the CF100 Mk V in the NORAD Role," 5, DHH 73/1223, Series 1, Box 1, File 12.

⁹⁶ The diplomatic arrangements for the acquisition of these interceptors was prolonged by domestic political concerns in both Canada and the United States. Acceptance in principle to the acquisition of the CF-101 in the three-way swap was given by Cabinet on 25 February 1961. Cabinet Conclusions, 25 February 1961, LAC, RG 2, series A-5-a, vol. 6176/ For a concise description of the F-101's entry into service as an interceptor, see Schaffel, *The Emerging Shield*, 230-231. Announced in June of 1961, the deal provided for a Canadian take-over of the US operated Pinetree Line stations and contribution of \$50 million towards the cost of providing F-104 aircraft to Europe as part of mutual assistance. In return, Canadair received an order for \$200 million in F-104s that would be built at its Montreal plant, while the RCAF would receive its interceptors. McLin, *Canada's Changing Defence Policy*, 103-105; Middlemiss, "Pattern of Co-Operation," 294-296.

⁹⁷ DCL, *Annual Report*, 1961-62, 5.

64 that contracts with a total value of some \$3.7 million were let for Chatham, Val D'Or, Bagotville, and Comox for "the construction of alert hangars, fire halls and weapon storage buildings."⁹⁸ These were the necessary facilities for the storage and handling of the AIR-2A Genie rocket and its W25 nuclear warhead that formed a central part of the CF-101's armament until the aircraft was retired in the mid-1980s.⁹⁹ Once again, DCL was ready to ply its trade on these projects, but an air of impending finality hung over these projects.

With these measures in place, the final expansion of Canadian air defences in the 1960s came to an end.¹⁰⁰ From this point until the mid-1980s, North American air defence forces would only decrease in numbers and capabilities; the deployment of ever-growing numbers of increasingly capable Soviet ICBMs made the provision of additional defences against the shrinking number of Soviet bombers more and more unsupportable. As one historian examining air defence radar would write thirty-five years later, "in retrospect, it is easy to understand reasons for the decline of America's air defenses in the years following 1962. Technical advances threatened to make America's air defenses irrelevant."¹⁰¹ The ICBM, however, brought with it its own threats, and in a combination of profound concern and technological optimism, the United States would deploy an early warning system against ballistic missile attack (Ballistic Missile Early Warning, or

⁹⁸ DCL, *Annual Report*, 1962-63, 4; DCL *Annual Report*, 1963-64, 4. The 1966-67 annual report noted that the \$600,000 contract for the construction of a loading and arming apron at Comox had been carried over to the following year. DCL, *Annual Report*, 1966-67, 11. The 1967-68 Annual Report notes that the apron was finished that year. DCL, *Annual Report*, 1967-68, 11.

⁹⁹ The weapons arrived at Chatham, Comox, and Bagotville in May of 1965, and became operational on 25 September, while at Val D'Or in they arrived in the last week of November 1965 and became operational in February 1966. Clearwater, *Canadian Nuclear Weapons*, 177-188.

¹⁰⁰ The mid-1960s witnessed the introduction of BUIC (Back-Up Interceptor Control) to Canadian air defences as a back-up to the SAGE system should it be destroyed, but this programme was limited in scale and falls almost entirely outside of the scope of this study.

¹⁰¹ Winkler, *Searching the Skies*, 37.

BMEWS), and would seek to develop and field an anti-ballistic missile (ABM) system. At much the same time that CADIN was being planned and built, the planning and construction BMEWS was also underway.

BMEWS – The Ballistic Missile Early Warning System

As the discussions surrounding the planning and implementation of CADIN demonstrated, the ICBM was supplanting the bomber as the most significant perceived threat to North America.¹⁰² While countermeasures, although politically and militarily controversial and of debatable effectiveness, existed for the bomber, the ballistic missile presented a more serious threat, both because it was much faster and high flying than the bomber, providing less warning time of an attack, and because actual interception, if possible, would be immensely expensive and challenging. The United States had been undertaking research on both subjects, and in response to the introduction of the ICBM by the Soviet Union fielded an early warning radar system and sought to develop and field an anti-ballistic missile system. While the first was successfully implemented, the second found itself overwhelmed by technical and political challenges that prevented its deployment.¹⁰³

Confronted with the emerging threat of the ICBM, the Eisenhower administration wanted to avoid the possibility of a nuclear “Pearl Harbor” that would destroy the United States and its nuclear deterrent that relied heavily on the strategic bomber. Among the ways it sought to do so was through the provision of early warning against the ballistic

¹⁰² See, for example, Cabinet Document 247-58, “Recommendations of Cabinet Defence Committee – Air Defence Requirements,” 22 August 1958, LAC, RG2, series B-2, vol. 2741, file C-20-5, pt. 6

¹⁰³ See, amongst others, Bruce-Briggs, *The Shield of Faith*, 101-109, 141-161; Schwartz, “Past and Present,” 332-335.

missile, and a hardened NORAD command centre.¹⁰⁴ The Ballistic Missile Early Warning System (BMEWS) would alert NORAD to a ballistic missile attack, and, although the warning time provided would not be substantial, a few tens of minutes at most, it would be significantly greater than the two to three minutes which RAND strategists Albert Wohlstetter and Fred Hoffmann had believed possible in the mid-1950s. “The terminal 2-1/2 to 3 minutes warning, which improved radars placed in the general target zone might provide,” they argued, “would barely permit even prayer.”¹⁰⁵

Faced with the ICBM, the chosen approach to protecting the American nuclear deterrent was not to increase the survivability of bombers on the ground, as some had earlier suggested, but to ensure that the bombers were in the air by the time a Soviet attack hit home.¹⁰⁶ Beginning in 1957 defence programmes including missiles, interceptors, and hardened command and control systems were cut back, while an emphasis was placed on increasing attack warning time and improving rapid response. BMEWS formed part of this response; in January 1958 Secretary of Defense Neil McElroy approved its development.¹⁰⁷ As with so many of the systems designed to detect incoming Soviet bombers, plans for BMEWS involved Canada, and this once again gave DCL another opportunity to practice its talents. In this case, however, Canadian territory would be used solely for rearwards communications links from the actual radar

¹⁰⁴ Winkler, *Searching the Skies*, 3. NORAD’s hardened command centre was briefly discussed earlier in this chapter.

¹⁰⁵ *Ibid.*, 52; Albert Wohlstetter and Fred Hoffmann, “Defending a Strategic Force After 1960, With Notes on the Need by Both Sides for Accurate Bomb Delivery, Particularly for the Big Bombs,” RAND Publication D-2270, 1 February 1954. Available online at <http://www.rand.org/publications/classics/wohlstetter/D2270/D2270.html>.

¹⁰⁶ Wohlstetter and Hoffmann’s paper quoted above proposed to protect SAC bombers against ICBM attack through the construction of underground shelters for the aircraft; it was not pursued partly because of expense and partly because of SAC Commander-in-Chief Curtis LeMay’s personal opposition to the concept. Bruce-Briggs, *The Shield of Faith*, 112-114.

installations in Alaska and Greenland, although discussions about BMEWS also included early plans for anti-ballistic missile systems that could have involved installations on Canadian territory.¹⁰⁸

An examination of this project is worthwhile not only because of Defence Construction Limited's involvement in the negotiation of the necessary diplomatic agreements and in the construction of the facilities – a difficult task to research given the secrecy that continues to surround the subject – but also because the exchange of notes on BMEWS involved the further entrenchment of Canadian construction conditions in mutual defence treaties with the United States, in this case in the agreement governing the establishment of rearwards communications from the site in Greenland. The construction of rearwards communications from the site in Alaska was also an interesting undertaking, since it witnessed the use of another Crown corporation, Canadian National Telegraphs, to build and operate one of the rearwards communications links, but it did not involve DCL and so lies outside of the scope of this dissertation.¹⁰⁹

¹⁰⁷ Later that year development work also began on an early warning satellite (MIDAS) to detect missile launches. David Alan Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," *International Security*, 7:4 (Spring 1983), 48.

¹⁰⁸ See, for instance, Memorandum to Panel on Economic Aspects of Defence Questions, Enclosure 2 to Memorandum from USSEA to Acting SSEA, "Ballistic Missile Early Warning System (BMEWS)," 10 November 1958, *DCER*, Volume 25, Part II, 291-293.

¹⁰⁹ Green gives the cost of the rearward link in the west as \$25 million. Green, *In Direct Touch*, 52; "BMEWS," 17 July 1959, 1, DCC file "Summaries [*sic*] of U.S. – Canada Diplomatic Agreements Affecting DCL" Not only was the Canadian government utilizing this other Crown corporation as an instrument to advance its interests in a mutual defence project, but the apparent absence of a separate formal agreement for this project is also notable, especially in light of the diplomatic negotiations that surrounded the establishment of rearwards communications on the eastern coast. The entire \$25 million microwave link from Grande Prairie, Alberta, to the Yukon-Alaska border appears to have been governed by the amendment of an earlier agreement with the United States and not by a new exchange of notes. For the original notes, see Canada, Department of External Affairs, *Exchange of Notes (March 1 and 31, 1948) Between Canada and the United States of America, Constituting an Agreement Concerning the Operation and Maintenance of the Land Line Communication System Between Edmonton, Alberta and Fairbanks, Alaska*, Canada Treaty Series 1948, No. 6.

In the aftermath of Khrushchev's boasts about Soviet ICBMs and the launch of Sputnik, prompt Congressional approval was given to BMEWS funding. Three installations would be required to cover the possible trajectories of ballistic missiles launched against the United States from the Soviet Union. Site I would be located at Thule, Greenland, Site II at Clear, Alaska, and Site III at Fylingdales Moor in Yorkshire, England.¹¹⁰ The sense of urgency surrounding this programme led to site construction work beginning in the summer of 1958 and the radars at the BMEWS installation at Thule reaching their initial operational capacity in September of 1960.¹¹¹ Multiple rearwards communications links were specified in order to guarantee reliable communications between the BMEWS sites and NORAD headquarters.¹¹²

Correspondence on this matter between the American ambassador in Ottawa and the Department of External Affairs began in March 1958, and an agreement on the issue would ultimately be formalized by an exchange of notes on 13 July, 1959.¹¹³ At the

¹¹⁰ Site I, which provided coverage for most of the trajectories from Eurasia to North America, received priority and would reach initial operating capability in the fall of 1960. Site II covered missile launches from Eastern Siberia and would begin operations in late 1961, while Site III covered launches from the western Soviet Union against the United States as well as warning of intermediate range missiles launched against Western Europe. The AN/FPS-49 tracking radars, designed by RCA, were intended for missile and satellite tracking, and could track objects at ranges of greater than 3,000 miles. The AN/FPS-50, designed by GE and MIT, was designed for missile early warning, and projected two beams. Objects passing through the lower of the two beams provided initial information and warning to NORAD HQ. When they passed through the upper beam, the information provided allowed the objects' trajectories to be computed and impact points predicted. The AN/FPS-50 missile detection radar was a truly huge installation, requiring three fixed fence-like antennas 165 feet tall and 400 feet wide. Initially, Site II at Clear, Alaska was equipped with the AN/FPS-50 detection radars. Site III in Yorkshire was equipped with the AN/FPS-49 tracking radar. Winkler, *Searching the Skies*, 49-50, 85.

¹¹¹ Work at the Alaskan site began in August of 1958, and following the construction of the antennas in 1959 and 1960, the installation began operations in 1961, while Site III began operations a few years later. Winkler, *Searching the Skies*, 49-50, 97; Paul A. Gorman, *Century One...A Prologue*, (New York: The Newcomen Society in North America, 1969), 22-23. Gorman was at the time president of Western Electric. NORAD's online chronology provides a date of January 1964 for date as beginning of Site III operations. NORAD selected chronology, <http://www.spacecom.af.mil/norad/maschron.htm>.

¹¹² M.D. Fagen, ed., *A History of Engineering and Science in the Bell System*, vol.2. (New York: Bell Telephone Laboratories, 1975), 565.

¹¹³ "BMEWS," 1, 3; "Establishment of Ballistic Missile Early Warning System," 13 July 1959, *TIAS*, Volume 10, Part 2, 1959, (Washington: United States Government Printing Office, 1960), 1260-1268.

outset, the United States sought Canadian permission for site surveys for the rearwards communications necessary to support a ballistic missile early warning system, with two routes being foreseen from Thule to NORAD headquarters in Colorado Springs.¹¹⁴

Shortly afterwards, the Canadian government granted its approval.¹¹⁵ Just over six weeks later, at the end of April, Cabinet considered an American request for concurrence in placing orders for the submarine cable that would be necessary for one of the rearwards communications links from Thule, and for the chartering of a ship to lay the cable. Given the urgency attached to the issue by the US, Cabinet had concurred in the request, but approval for the actual laying of the cable was still to be dependent upon the outcome of diplomatic negotiations with the United States.¹¹⁶

Once again, Ottawa turned to DCL as its preferred agent in this negotiation. DCL was brought into the discussions surrounding the rearward communications shortly afterwards, when the two governments began their exchanges of ideas and draft notes about the construction provisions of the BMEWS treaty. The Alaskan radar, it was soon determined, would make use of a telecommunication link to be built by Canadian

¹¹⁴ Initial plans called for one rearwards route via Cape Dyer and along the Labrador coast, with the other via the DEW Line station at Hall Lake and thence southwards through Churchill, Manitoba. At a briefing for Canadian government officials, the possibility of a cable for rearward communications from the Alaska BMEWS installation via a cable along the Alaska highway was discussed, as was the possibility of modernizing the POLE VAULT tropospheric scatter system along the Labrador coast. Minutes of 46th meeting of the ACND, 3 March 1958, 6, LAC, RG2, series B2, vol. 6183, pt. 4. Part of Western Electric's initial BMEWS included the evaluation of existing facilities that might be usable. Fagen, *History of Engineering and Science in the Bell System*, vol. 2, 565. The ACND had a strong interest in this general field; it had authorized the creation of a sub-committee on Northern Communications in January of 1958 in order to co-ordinate planning for the development of communications facilities in northern Canada. Minutes of 45th meeting of the ACND, 28 January 1958, 3, LAC, RG2, series B2, vol. 6183, pt. 4. For an earlier expression of concerns on the issue of American communications systems in Canada, see Minutes of the 35th meeting of the Vice Chiefs of Staff Committee, 1 March 1955, 2-3, DHH 73/1223, series 3, box 64, file 1312.

¹¹⁵ Memorandum to Panel on Economic Aspects of Defence Questions, Enclosure 2 to Memorandum from USSEA to Acting SSEA, "Ballistic Missile Early Warning System (BMEWS)," 10 November 1958, DCER, vol. 25, pt II, 290.

¹¹⁶ *Ibid.*; Minutes of 47th meeting of the ACND, 20 May 1958, 5.

National along the Northwest highway running through the Yukon to Alaska which was not covered by the BMEWS treaty, so DCL did not become involved in this undertaking.¹¹⁷ While DCL was not involved with the actual laying of the submarine cable from Thule via Cape Dyer – this was a very specialized task – it did have a hand in the negotiating of contracts for the cable installations at that site and for the upgrading of the POLE VAULT tropospheric scatter radio system linking Cape Dyer to Goose Bay.¹¹⁸ Design of the rearwards communications system was the responsibility of the USAF's Air Material Command, which, as with the DEW Line, awarded the contract to Western Electric (WECO). As systems contractor, Western Electric was responsible for the design and installation of the entire rearwards communication system.¹¹⁹ The USAF and WECO agreed that at Cape Dyer, which was already the responsibility of the Corps of Engineers as part of work on the DEW DROP tropospheric scatter communications link to Thule, BMEWS design and construction should also be part of the Corps' responsibility.¹²⁰

A measure of the urgency attached to this issue was the receipt of a third American diplomatic request related to BMEWS in 1958. This time, the United States sought authorization to begin construction of facilities at Cape Dyer so that a single cable could be laid to there from Thule. Although a formal agreement on the entire subject had still not been reached, approval was granted "subject to certain stated conditions

¹¹⁷ As mentioned above, however, the use of another Crown corporation to meet the defence policy needs of the Canadian government is worth noting. "General Outline of U.S. Military Construction Activities in Canada," 5-6; "BMEWS," 1.

¹¹⁸ The upgrade involved extensive work on existing stations at Brevoort Island, Resolution Island, Saglek, Hopedale, and Goose Bay. "BMEWS," 1.

¹¹⁹ The complete system for which WECO had responsibility included the design and construction of the cable stations and related facilities and the upgrading of seven tropospheric scatter installations, including POLE VAULT. Fagen, *History of Engineering and Science in the Bell System*, vol. 2, 564-565; Gorman, *Century One*, 22-23; "General Outline of U.S. Military Construction Activities in Canada," 6; "BMEWS," 1.

¹²⁰ "General Outline of U.S. Military Construction Activities in Canada," 6; "BMEWS," 1.

Figure 9: Map of BMEWS Radar and Rearwards Communications Sites in Greenland and Canada

▲ BMEWS Radar:	1 – Thule
● Communications Sites:	1 – Thule 2 – Cape Dyer 3 – Brevoort Island
	4 – Resolution Island 5 – Saglek 6 – Hopedale
	7 – Goose Bay
— Submarine Cable	

*Source Map: Natural Resources Canada
Source Data: Map, DCC in-house holding;
Gunther, "Tropospheric Scatter Communications."*

concerning construction contractors, equipment procurement, cable landing, etc., and without prejudice to any decision on the overall agreement.”¹²¹ According to a DCL summary of American military construction in Canada, probably written at this point in the negotiations, the BMEWS Project Office at Air Materiel Command asked that DCL grant permission for the Corps of Engineers to proceed with the design of facilities at Cape Dyer. The request was not necessary, but it was granted on the condition that a Canadian engineering firm would be given the contract. This was progress of a sort, since it marked the first time that the Corps had used a Canadian consultant for any construction design work in Canada.¹²² Further disputes about the use of Canadian sub-contractors were avoided when in early May 1959 the United States Air Force convinced the Secretary of Defense to override statutory requirements and permit the USAF to bypass the Corps of Engineers for its projects in Canada with the exception of the DEW Line and the leased bases at Goose Bay and Harmon.¹²³ As a result, with the exception of Cape Dyer, all work on BMEWS rearward communications construction, including the provision of engineering consultant work, would be contracted to Canadian firms via DCL.¹²⁴

These conditions formed part of the general development on the issue of construction provisions for American and joint defence projects in Canada which has been one of the central themes of this dissertation. This outcome was determined by a

¹²¹ Memorandum to Panel on Economic Aspects of Defence Questions, Enclosure 2 to Memorandum from USSEA to Acting SSEA, “Ballistic Missile Early Warning System (BMEWS),” 10 November 1958, *DCER*, vol. 25, pt. II, 290.

¹²² “General Outline of U.S. Military Construction Activities in Canada,” 6.

¹²³ One of the results of this decision was that the USAF’s Air Defence Command was chosen as the design and construction agency for all such work and the Strategic Air Command Project Office in Ottawa became a joint SAC/ADC undertaking. *Ibid.*

¹²⁴ The same conditions were applied to the work on TACAN stations and the Pinetree upgrades discussed earlier in this chapter. *Ibid.*

number of factors. As will be discussed below, BMEWS rearwards communications were a matter of extreme urgency for the United States, since they were essential to providing warning of an ICBM attack. As a result, the Americans were prepared to give way to Ottawa's demand for preferential treatment of Canadian consultants and construction contractors in order to expedite the completion of this project.¹²⁵ Furthermore, by this date the employment of Canadian firms through DCL had proved its worth, in terms of both timeliness and cost. As discussed in Chapter Five, for instance, the Canadian government had worked through DCL to expedite the letting of contracts for the Strategic Air Command refuelling base in Frobisher Bay, and the refuelling base programme as a whole had been completed for less than the American estimates. The expansion of DCL's activities in this area was also not actively opposed by the US Army Corps of Engineers, which, as DCL noted, was in a position to have blocked such moves if the performance of DCL and Canadian contractors had given them grounds to do so.¹²⁶ Finally, most of the electronics work, which held out the offer of greater economic benefits, would go to American firms, even if defence production sharing arrangements gave Canadian companies greater opportunity to participate. This situation must have served to counterbalance the Canadian insistence on construction provisions.

In addition to a request for construction work at Cape Dyer, the United States had also submitted a proposed draft note for an overall agreement on BMEWS rearwards communications which included a letter from the USAF to the DDP governing

¹²⁵ The American military assigned such importance to the construction of the rearward link from Alaska, for instance, that it unilaterally approached Canadian National Telecommunications to build the rearwards communications link, despite strong lobbying in Washington from AT&T, which had a significant interest in gaining the contract for Bell Telephone, and from the General Telephone Company of the United States, which sought to obtain the contract for British Columbia Telephone, which it controlled. See, for instance, Memorandum, J.R. White, to D.I. Grant, 8 October 1958, LAC, RG30, vol. 13168, file 7315-X1-1, pt. 1, "Grand Prairie Alta - Alaska Boundary - Microwave System."

construction and the procurement of electronics under the proposed agreement.¹²⁷ The Advisory Committee on Northern Development examined this and other issues when it discussed BMEWS rearwards communications in some detail at a 20 October 1958 meeting. The Canadian Co-Ordinator for the DEW Line, G.Y. Loughhead, reported that the DEW Line Co-ordinating Committee had reviewed the US draft agreement, and prepared their comments in the form of a memorandum to the Panel on the Economic Aspects of Defence Questions. He also noted that "construction at Cape Dyer was in progress. The POLEVAULT system could not handle the BMEWS requirement and a cable from Cape Dyer to Newfoundland was being planned."¹²⁸ W.H. Huck, reporting on DDP's activities, noted that

U.S. planning for BMEWS had now reached the stage when further Canadian approval was required. Unless an over-all agreement was approved, additional interim authorizations would have to be sought. The Deputy Minister of National Defence was asking the Secretary to the Cabinet to have the agreement considered by the Cabinet immediately. D.D.P. had been negotiating for Canadian participation in development and production of equipment for BMEWS and anti-missile requirements."¹²⁹

¹²⁶ "General Outline of U.S. Military Construction Activities in Canada," 7.

¹²⁷ Memorandum to Panel on Economic Aspects of Defence Questions, Enclosure 2 to Memorandum from USSEA to Acting SSEA, "Ballistic Missile Early Warning System (BMEWS)," 10 November 1958, *DCER*, vol. 25, pt. II, 292. A copy of the American documents referred to in the text, along with a most interesting covering memorandum from External Affairs, can be found in the DDP records of the Panel on the Economic Aspect of Defence Questions, LAC, RG49, vol. 707, file 245-5, pt.4.

¹²⁸ Minutes of 48th meeting of the ACND, 20 October 1958, 2. Loughhead had been introduced to the ACND as DEW Line co-ordinator in March of 1955. Minutes of 24th meeting of the ACND, 7 March 1955, 1, LAC, RG2, series B2, vol. 6183, pt. 3.

¹²⁹ Minutes of 48th meeting of the ACND, 20 October 1958, 2. Plans for the Nike-Zeus anti-ballistic missile system were referred to on a number of occasions, and appear to have been seen as an obvious addition to the early warning and missile tracking capability provided by BMEWS. While for technical and political reasons Nike-Zeus was never fielded, proposals for its development and deployment had involved Canada and, at times, Canadian territory. In an interesting contrast with contemporary reactions to American plans for the deployment of an ABM system, Nike-Zeus does not appear to have initially received much criticism from Canadian government officials, although discussions on the issue between DDP and the USAF attracted the ire of External Affairs for the way in which they had initially been handled. See, for example, USSEA to Chairman, Chiefs of Staff, DM/Defence Production, DM/Transport, DM/NANR, DM/National Revenue (Customs), DM/Citizenship and Immigration, "BMEWS - Overall Agreement," 14 July 1958, LAC, RG49, vol. 707, file 245-5, pt.5. Considerable archival material is already available on this issue, and the matter of Canadian plans for involvement in the production and deployment of the Nike-Zeus ABM system would benefit from further examination. For a brief overview of the weapons system and its

An interdepartmental group was established to examine the issue, and its report to the Panel on the Economic Aspects of Defence Questions warrants quoting at length:

The draft statement of conditions provides that contracts for construction and the procurement of electronic equipment shall be determined by agreement between the appropriate agencies of the two governments. This procedure has been worked out by the Department of Defence Production and it is proposed to set the agreement out in a confidential exchange of letters between the USAF and DDP. The proposed procedure conforms to the agreement reached on the SAC Refuelling Conditions. *The confidential letter between the USAF and DDP will state that all construction work will be undertaken through Canadian contractors and that the procurement of electronic equipment will be awarded as far as practicable, to Canadian companies....*¹³⁰

Both the Minister of National Defence and the Under Secretary of State for External Affairs concurred in the recommendations of the Panel. Authority would be given to enter into negotiations with the United States for an exchange of notes covering the establishment of BMEWS rearwards communications through Canadian territory, although External Affairs was concerned that Canada was not being kept apprised of American developments and plans for the ABM systems that were expected to ultimately accompany BMEWS.¹³¹ Once again, the Canadian government was following its proven pattern of securing construction conditions favouring Canadian firms retained through DCL. As with the Strategic Air Command refuelling bases, the awarding of this work to domestic companies would be guaranteed by a separate exchange of notes. While the construction provisions were by now a guaranteed matter of fact, however, the

development, see Fagen, *History of Engineering and Science in the Bell System*, vol. 2, 410-434; Bruce-Briggs, *The Shield of Faith*, 101-109, 141-146.

¹³⁰ Emphasis added. Practicability, the memorandum noted, would be "resolved on the basis of an assessment of such factors as availability at the time period, cost, performance and capabilities of Canadian and US companies." Memorandum to Panel on Economic Aspects of Defence Questions, Enclosure 2 to Memorandum from USSEA to Acting SSEA, "Ballistic Missile Early Warning System (BMEWS)," 10 November 1958, *DCER*, vol. 25, pt. II, 292.

“practicability” clause remained the guideline for the provision of electronics. In this respect, the misgivings expressed as part of CADIN had not changed, but unfortunately little information is available on how successful Canadian electronics firms were in obtaining BMEWS work.¹³²

On 12 November 1958, Cabinet gave approval in principle to the construction of BMEWS communications facilities in Canada, following which the United States was informed of the decision, and diplomatic notes prepared.¹³³ As described in the draft conditions quoted above, construction work at Cape Dyer, including the cable terminal facilities, would be performed by Canadian contractors, who had to submit bids to the Corps. The tropospheric scatter facilities stretching from Cape Dyer to Goose Bay also used consultants engaged by DCL for the RCAF, which was acting in conjunction with the USAF as design and construction agency. DCL would also call tenders and supervise the work on the facilities, for which tenders were restricted to Canadian contractors.¹³⁴

The Canadian focus on improving and entrenching preference for Canadian firms in the BMEWS rearwards communications agreement and in earlier defence construction

¹³¹ Memorandum from USSEA to Acting SSEA, “Ballistic Missile Early Warning System (BMEWS),” 10 November 1958; Memorandum from Minister of National Defence to Cabinet, 7 November 1958, *DCER*, vol. 25, pt. II, 288-290.

¹³² The 1959 DDP report, for instance, simply notes that “contracts were administered for the extension of Ballistic Missile Early Warning System (BMEWS) communications in Eastern Canada.” DDP, *Annual Report*, 1959, 15. Like many other DDP files, those covering matters pertaining to BMEWS do not appear to have survived.

¹³³ Cabinet Conclusions, 12 November 1958, 18, LAC, RG2, series A-5-a, vol. 1899; Minutes of 49th meeting of the ACND, 24 November 1958, 1-2, LAC, RG2, series B2, vol. 6183, pt. 4. These particular Cabinet Conclusions continue to be exempted under ATIP provisions; their content has been deduced from the ACND minutes. A minor modification to the clause on construction conditions governing rates of pay and working conditions had to be made in order to maintain federal control in this area; The problem with the requirements for rates of pay and working conditions was noted by the Department of Labour, which pointed out that unless the contract was between the federal government and a contractor, this area would fall under provincial jurisdiction. The Canadian draft letter was consequently modified to explicitly state that rates of pay and working conditions would be governed by the Canadian Fair Wages and Hours of Labour Act – this had been the case with the DEW Line agreement, but subsequent agreements had drifted towards a more general clause on the issue. *ibid.* See also Minutes of 11th Meeting of DEW Line Co-Ordinating Committee, 26 August 1958, 1, DHH 73/409.

arrangements with the United States was not escaping notice and comment in Washington. By the end of December 1958, President Dwight D. Eisenhower had signed off on National Security Council Report NSC 5822/1, which dealt with “certain aspects of U.S. relations with Canada.”¹³⁵ One section of the report covered the awarding of construction contracts for American defence installations in Canada and discussed the history of negotiations on this issue as well as providing an update on Canadian and American positions on construction contracts for BMEWS. After reviewing the history of past negotiations for construction provisions – a story varying in some details from accounts contained in DCL and Canadian government records¹³⁶ – and noting the significance of the agreement to use DCL and Canadian contractors for the Strategic Air Command refueling base programme, the discussion of construction provisions noted that

in negotiations for Ballistic Missile Early Warning (BMEW) facilities, including radars at Cape Dyer, the Canadian Government is seeking even more favorable treatment, in that it is trying to obtain agreement that a Canadian agency [DCL] would supervise construction. The United States has reserved its position on the above issues, and continues to treat each agreement on a case-by-case basis.”¹³⁷

The Americans suspected that in a treaty on the subject Canada would press for

an explicit formal commitment on the exclusive use of Canadian contractors in the construction of U.S. or joint defense installations in Canada. In negotiations for BMEW facilities, the Canadian authorities have indicated that they intend to make such a commitment a condition precedent to their agreement in principle on the facilities.

In short, the conflict in the matter of defense construction is between the Canadian Government's insistence on its right to regulate the terms on which the United States does business in Canada and the U.S. view that: (a) in the interests of fairness and economy, construction bids should be let on the traditional basis

¹³⁴ “BMEWS,” 2.

¹³⁵ NSC 5822/1, “Certain Aspects of U.S. Relations with Canada,” 30 December 1958, in Ronald D. Landa *et.al.*, eds., *FRUS, Volume VII, Part I, Western European Integration and Security; Canada*, (Washington: United States Government Printing Office, 1993), 729-743.

¹³⁶ The document, for instance, makes no mention of the separate provisions guaranteeing the use of Canadian contractors for DEW Line construction work.

¹³⁷ *Ibid.*, 734. The reference to “radars at Cape Dyer” would appear to be in error.

of equal consideration for all bidders, and (b) the construction of mutual defense installations should not be exploited to forward the special interests of either country. Controversy over this question has contributed to delays in the completion of certain defense projects, but where delays have threatened to become unacceptably long from the standpoint of national security the construction issue has been resolved by U.S. agreement to the use of Canadian contractors in the particular case.¹³⁸ Moreover, it is difficult to attribute delays to the construction issue alone, since the negotiating situation has generally been complicated by other points of difference.¹³⁹

The conclusions for policy guidance were that

The United States should continue to press for a policy of "equal consideration", being prepared within this policy to discuss such modifications of bidding procedures as the Canadian government feels are necessary to protect the interests of Canadian contractors.

The United States should continue to reject any policy of guaranteed preference to Canadian contractors where the United States assumes financial responsibility for the facility. If the Canadian Government conditions its acceptance of such a facility on obtaining preference for Canadian firms, the United States should seek a policy of conditional preference, i.e. a policy which restricts bidding initially to Canadian firms but provides that if the lowest bid exceeds U.S. cost estimates, the United States would subsequently solicit bids from both Canadian and U.S. firms. *Any agreements giving Canadian firms such conditional preference should be classified.*¹⁴⁰

While the National Security Council considered these issues, work had pressed ahead at Cape Dyer. By February of 1959 construction was underway on the switching centre for the communications link and the Foundation Company, which had already performed the architect-engineer services on the site, had also been awarded the contract for the cable building. A second cable from Thule was to be laid later in the year to

¹³⁸ The original document contains a footnote at this point noting that "An important factor in such cases, and one which reduced our negotiating latitude, has been the shortness of the construction season in northern Canada. Also in these instances, the presence of qualified Canadian contractors on or near the sites justified the assumption that, had the bidding been open to international competition, Canadians would have submitted the lowest responsible bids. NSC 5822/1, *FRUS* 1958-60, VII, pt. 1, 735, n.8.

¹³⁹ Emphasis added. *Ibid.*, 734-735.

¹⁴⁰ Emphasis added. *Ibid.*, 735.

accompany the one that had been laid during 1958.¹⁴¹ At an early July meeting of the ACND, G.Y. Loughhead, the Canadian Co-ordinator for the DEW Line, explained that “work on U.S. air defence contracts was now being handled on a service-to-service basis with the D.N.D. acting as the agent for the U.S.A.F. This procedure, authorized by the Governor-in-Council under the Defence Appropriation Act of 1950, had previously been used in the case of SAC contracts only,”¹⁴² while W.H. Huck from Defence Production

explained that U.S. air defence requirements in Canada were now being handled in exactly the same way as Canadian requirements, with Canadian contractors dealing with D.N.D. who were acting as agents for the United States. This procedure was very different from that followed for D.E.W. contracts which had been let directly by the United States.¹⁴³

DCL would later point out in an in-house summary of US military construction projects in Canada that the changes brought about by the corporation’s assumption of responsibilities for US programmes in Canada were largely procedural, and did little to alter DCL’s role in the various programmes. “This arrangement had not been accepted merely on the insistence that it was appropriate that work in Canada be handled by a Canadian agency,” it argued. “A more potent argument was that DCL had demonstrated a capability to have such work carried out satisfactorily and economically.”¹⁴⁴ A significant guarantee had now been obtained that American air defence construction contracts would be awarded to Canadian firms. From the start of such projects with the Pinetree Line some eight years earlier, the construction provisions had moved from “equal

¹⁴¹ Two cables were necessary since they were intended to work in one direction only. Minutes of 51st meeting of the ACND, 23 February 1959, 1, LAC, RG2, series B2, vol. 6183, pt. 5; Minutes of the 9th meeting of the DEW Line Co-ordinating Committee, 7 July 1958, 1, DHH 73/409.

¹⁴² Minutes of 54th meeting of the ACND, 6 July 1959, 1. DND had only recently been authorized to act on behalf of the United States for the provision of facilities and equipment, supplies, and services for a number of projects including BMEWS. For details, see Order in Council PC 1959-4/793; a copy can be found in LAC, RG58, vol. 260, file “RCAF-USAF Construction, 1959-61”.

¹⁴³ Minutes of 54th meeting of the ACND, 6 July 1959, 1.

consideration” for Canadian and American contractors to a definite arrangement that such work would be awarded to Canadian firms.

By the start of July an exchange of notes on BMEWS was believed to be imminent, and once an agreement had been reached, the contracts to upgrade POLE VAULT could be let. The exchange of notes took place on the 13th, and later that same month, nine contractors submitted tenders for work at the five stations stretching from Brevoort Island to Goose Bay, which carried with it estimated total costs of \$12 to \$15 million. Work was to start during that year’s construction season, with the Department of Transport shipping the necessary materials for this project. The 1960 construction season witnessed extensive activity at the five sites, with completion expected for the summer of 1961.¹⁴⁵ In the meantime, the radars of the BMEWS installation at Thule reached their initial operational capacity in September of 1960, and the installation as a whole was operational by the start of 1961.¹⁴⁶

While DCL was involved with the tropospheric scatter link upgrades and the construction of cable facilities at Cape Dyer, responsibility for the specialized task of laying of cables fell in large part to another Crown corporation, the Canadian Overseas

¹⁴⁴ “General Outline of U.S. Military Construction Activities in Canada,” 7. A longer version of this quotation appears in Chapter 6.

¹⁴⁵ “Establishment of Ballistic Missile Early Warning System,” 13 July 1959, *TIAS*, Volume 10, Part 2, 1959, (Washington: United States Government Printing Office, 1960), 1260-1268; Minutes of 54th meeting of the ACND, 6 July 1959, 1; DCL, *Annual Report*, 1959-60, 10; DCL, *Annual Report*, 1960-61, 12. As with the other elements of the rearwards communications system, Western Electric was the design agency. Gunther, “Tropospheric scatter communications,” 93. According to DCL’s annual report and a professional publication on tropospheric scatter systems, the system was completed in 1961. According to information that the Department of Defence Production supplied to the *Canada Year Book*, however, rearward communications were completed during 1960; the disagreement may reflect the difference between initial operating capability and the completion and final acceptance of the facilities. DCL, *Annual Report*, 1961-62, 6; Gunther, “Tropospheric scatter communications,” 93; Canada. Dominion Bureau of Statistics, *Canada Year Book 1961*, (Ottawa: Queen’s Printer, 1961), 1181.

¹⁴⁶ Winkler, *Searching the Skies*, 49; Clive Archer, “The United States Defence Areas in Greenland,” *Cooperation and Conflict*, XXIII (1988), 132.

Telecommunication Corporation (COTC).¹⁴⁷ Between 1958 and 1961, a number of cables linking Thule, Cape Dyer, and points in Newfoundland were laid by the United States Air Force, usually working in conjunction with the COTC. Available operational details about the cables are unclear and conflicting, but they were never particularly successful, being damaged by ice at the points where they came ashore and disrupted on occasion by deep-sea trawlers. Another cable laid direct from Cape Dyer to Newfoundland in 1964 did little to improve the situation; the cable link was eventually abandoned and replaced by a satellite link.¹⁴⁸

By 1961, the rearwards communications links, or at least those with which DCL was directly involved, had been successfully implemented. Much of the activity, it will be apparent, was centered on Cape Dyer, and this focus did not escape notice. An interesting comment in a DCL file noted that with the exchange of notes on BMEWS, communications facilities at Cape Dyer came under the terms of four separate agreements. When the four projects were completed, however, it would form an integrated hub in the communications system.¹⁴⁹ Its importance as a DEW Line station and communications hub in the 1950s and 1960s arguably places Cape Dyer in the

¹⁴⁷ COTC was created in 1949 as part of an overall Commonwealth agreement that covered the nationalization of external telecommunications services. In 1950, COTC had taken over overseas telecommunications services and facilities in Canada that had been owned by Cable and Wireless Limited and Canadian Marconi. Canada, Dominion Bureau of Statistics, *Canada Year Book 1959*, (Ottawa: Queen's Printer, 1959), 107; Kenneth Richardson Haigh, *Cables and Submarine Cables*, (Washington: United States Underseas Cable Corporation, 1968), 182; Canadian Overseas Telecommunication Corporation, *10th Annual Report for the Year Ended March 31, 1960*, 9-10. COTC was not involved in laying the initial Thule-Cape Dyer cable, and does not seem to have been involved with the second such link. Minutes of 54th meeting of the ACND, 6 July 1959, 1.

¹⁴⁸ Some details of the cables can be gained from Minutes of 47th meeting of the ACND, 20 May 1958, 5; Minutes of 51st meeting of the ACND, 23 February 1959, 1; Minutes of 52nd meeting of the ACND, 20 April 1959, 1; Minutes of 54th meeting of the ACND, 6 July 1959, 1; DEW Line Co-Ordinating Committee, Progress Report #21, 14 May 1959, 1; Minutes of 9th meeting, 7 July 1958, 1, DHH 73/409; Haigh, *Cables*, 300-301; Donald R. Tarrant, *Atlantic Sentinel: Newfoundland's Role in Transatlantic Cable Communications*, (St. John's, NF: Flanker Press, 1999), 133-135.

running as one of the most important pieces of land in Canada – at least so far as the American military was concerned.

The construction of BMEWS rearwards communications was the last substantial joint continental defence project undertaken in the 1950s. In large part this was because the ICBMs it was built to detect also marked a substantial turning point in continental defence and the Cold War as a whole. By superseding the bomber as the major perceived threat to the North American continent, the ICBM brought into question the further development of air defences and their supporting infrastructure. Throughout the 1950s, these projects – most notably the Pinetree, Mid-Canada, and Distant Early Warning Lines – had formed a considerable part of DCL's workload. The securing of favourable conditions for Canadian construction contractors, suppliers, and electronics firms had also been a significant concern for government agencies, including Defence Construction. By the time of the BMEWS agreement considerable success had been obtained in obtaining favourable terms for Canadian construction firms and their suppliers through the use of confidential exchanges of letters guaranteeing the use of Canadian firms for construction work. Comparable efforts in the electronics and equipment field, however, proved less fruitful. Despite these successes and disappointments, many accomplishments in these areas had become of debatable value by the time that work on the BMEWS communications system had begun. By this time, all of the major continental defence projects involving Canada and Canadian territory were either underway or completed, and the advent of the ICBM meant that continental air defence against the Soviet bomber threat would be progressively downgraded. Although it was not obvious at the time –

¹⁴⁹ "Can. – US Agreements – Defence Installations," no date, DCC in-house holding – booklet "Various Canadian and US Government Programs," 1958.

plans were still in the works, after all, for ballistic missile defence – there would be no more such undertakings until the mid-1980s.

Government Goes Underground: Projects EASE and BRIDGE

The developments in Soviet nuclear weapons and delivery systems that prompted the planning, development, and construction of many of the air defence systems discussed earlier in this chapter and in this dissertation also had consequences for planners concerned about the continuity of government (COG) – the ability to keep the country functioning as a national entity – during and after a Soviet nuclear assault. In the wake of such an attack, planners argued that the government would not only have to continue the prosecution of the war, but would also have to organize the rebuilding of a heavily-damaged country. By the late 1950s Canada was developing COG blueprints, and in August of 1959 Prime Minister Diefenbaker set forth plans for a decentralized system of emergency government. Shelters, it was anticipated, would accommodate central, and regional government elements. National and provincial Warning Centres were established as part of a National Survival Attack Warning System, which would rely on radio broadcasts and warning sirens to alert the population.¹⁵⁰

The most tangible evidence of these plans was the construction of shelters as emergency headquarters for the federal government and many of its provincial counterparts. Construction of the underground facility for the federal government began

¹⁵⁰ COG planning included provisions to cover legal and constitutional matters, the copying and storage of important documents, “skeleton” bureaucracies that could take over departmental responsibilities during and after a war, and the dispersion, transportation, and shelter of these people and documents. One of the many consequences of Diefenbaker’s plans was the abolition of the civil defence organization and the creation of the Emergency Measures Office (EMO) within the PMO to co-ordinate civil defence. Sean M. Maloney, “Dr. Strangelove Visits Canada: Projects Rustic, Ease, and Bridge, 1958-1963,” *Canadian*

in late 1959 at Carp, Ontario, some twenty miles west of Ottawa. Given the cover name EASE (Experimental Army Signals Establishment), it would become popularly known as the "Diefenbunker."¹⁵¹ EASE had its provincial counterparts in the Regional Emergency Government Headquarters (REGHQs), which formed part of the plans for Project BRIDGE; as a consequence, the provincial facilities were often referred to as "BRIDGE sites". Unlike the Diefenbunker, which was intended to provide protection against blast and fallout, REGHQs were designed to provide protection against fallout only, and were usually co-located with the provincial warning centres.¹⁵² Since DND had become responsible in May of 1959 for a number of functions during a "national emergency" (i.e. a nuclear attack), its COG role included the co-ordination and control of civil defence duties, and the Army Works Service was assigned responsibility for the creation of the emergency government headquarters.¹⁵³ As a result, in addition to their COG function, the Diefenbunker and BRIDGE sites were intended to coordinate survival and rescue operations after a nuclear attack. EASE and many of the BRIDGE sites therefore also served as nodes in the DND communications system.¹⁵⁴

Military History, 6:1 (Spring 1997): 42-50; Holmes, *History of the Canadian Military Engineers*, 281.

Maloney also makes reference to "zonal" governments without providing further explanation.

¹⁵¹ *Ibid.*, 282.

¹⁵² Maloney, "Dr. Strangelove Visits Canada," 50; Dave Peters, "The Diefenbunker: Then and Now," article available at the Diefenbunker Museum website, <http://www.diefenbunker.ca/>; Holmes, *History of the Canadian Military Engineers*, 282. Some REGHQs had Regional Relocation Units (RRUs) that provided overflow and backup facilities. Provinces with large populations had Zone Emergency Government Headquarters (ZEGHQs) that reported to the REGHQs. Municipal Emergency Government Headquarters (MEGHQs) would have reported to the ZEGHQs. Dave Peters, "The Role of the 'Diefenbunker' (The Central Emergency Government Headquarters) in Canada's Civil Defence/Continuity of Government Program," article available at the Diefenbunker Museum website, <http://www.diefenbunker.ca/>.

¹⁵³ "National survival" training, involving re-entry and rescue work in target areas, became a major commitment for the Canadian Army at this time – both for Regular Army units in Canada and the Militia; the field units of the Royal Canadian Engineers and the various construction trades were also to perform reconstruction work. Holmes, *History of the Canadian Military Engineers*, 280-281.

¹⁵⁴ Peters, "The Diefenbunker: Then and Now". A tape relay system at EASE became operational in 1962, and two years later the first automated message system in the Canadian military, STRAD (Signal Transmit Receive and Distribution), along with TARE (Telegraph Automatic Relay Equipment), became operational

Figure 10: Map of EASE and BRIDGE Installations

- EASE 1 – Carp
- BRIDGE 2 – Nanaimo 3 – Penhold 4 – Shilo 5 – Borden 6 – Valcartier 7 – Debert

Source Map: Natural Resources Canada. Source Data: Maloney, "Dr. Strangelove Visits Canada," 45.

at Carp. "The History of the Communications & Electronics Branch, Chapter 6,"
http://www.dnd.ca/commelec/brhistory/chap6_e.htm.

The bunker at Carp was the most complex and costly of the installations built to support COG and related tasks, and was officially designated the Central Emergency Government Headquarters (CEGHQ).¹⁵⁵ Extensive research and design work by the National Research Council (NRC) and Defence Research Board (DRB) was required to meet the shelter's protection requirements; it was designed to resist overpressures of 100psi, which would be generated by a 5 megaton nuclear weapon detonating 1.1 miles away.¹⁵⁶ The end result was a carefully designed, strongly built 100,000 square foot, four storey reinforced concrete structure surrounded by a layer of carefully selected gravel some five feet thick which allowed it to absorb shocks by moving. The backfill was sloped in order to deflect the blast from nuclear detonations, and the entrance to the bunker was at right angles to a long entrance tunnel open at both ends in order to provide protection against blast. More than ninety miles of cable connecting the central bunker to transmitter sites had to be buried in rock, a challenging task by itself.¹⁵⁷

Acting once again in its favoured role as an instrument of Ottawa's bidding, DCL supervised the construction effort, while the main construction contractor was the Foundation Company of Montreal. Concurrent design and build activities were used to

¹⁵⁵ Peters, "The Role of the "Diefenbunker"".

¹⁵⁶ Holmes, *History of the Canadian Military Engineers*, 282; "Bunker Facts,"

<http://www.diefenbunker.ca/bunker/default.asp?vid=106859172>. A 5 megaton nuclear device has a yield equivalent to the detonation of five million tons of TNT. According to Maloney, this was the "standard" Soviet nuclear weapon used by Canadian planners when developing and evaluating schemes. Maloney, "Dr Strangelove Visits Canada," 45. In a February 1960 discussion, the Chief of the General Staff noted that "the Army and DRB had worked with EMO in deciding on the hardening of NEHQ [National Emergency Headquarters] sites and EMO had decided that a criteria of 5 megatons would be acceptable" Minutes of 656th meeting of Chiefs of Staff Committee, 4 February 1960, DHH 73/1223, series 3, box 63, file 1310A. To put the bunker's level of protection into context, 0.5 to 1 psi of overpressure is sufficient to destroy a typical frame house, while 3 psi will destroy typical commercial buildings and 5 psi will do the same for reinforced concrete structures.

¹⁵⁷ Holmes, *History of the Canadian Military Engineers*, 282; "Bunker Facts"; Peters, "The Diefenbunker: Then and Now". In case the facility was destroyed or incapacitated, six less protected shelters at various locations in the Ottawa area called Central Relocation Units (CRUs), housed staff and officials (Supreme

minimize construction time, and the recently introduced method of critical path project management was also employed, as was a large three-dimensional Plexiglas model which helped with the allocation of space during the design process.¹⁵⁸ Colonel Edward Churchill supervised construction for the Army Works Service, as well as travelling to REGHQ sites to assist with the implementation of critical path method (CPM) planning. DCL would once again work with him in his later role as Director of Installations for Expo 67 in Montreal.¹⁵⁹ Both DND and DCL, according to later reports, “were among the first in Canada to use the increasingly popular critical path method of planning and scheduling of work,” an approach to project management that offered the possibility of considerable savings in time and money in comparison with older planning and scheduling methods.¹⁶⁰ EASE construction was finished in late 1961, by which time the security and cover story surrounding its construction – that it was an experimental signals establishment for the Army – had been very significantly and very publicly compromised by journalists, most notably by the *Toronto Telegram*, which overflowed the site, and published the resulting photographs and information gleaned from local inhabitants.¹⁶¹

Tender calls for the less dramatic REGHQs were scheduled for the spring and summer of 1961 for the installations at Nanaimo, BC, Penhold, AB, Camp Borden, ON,

Court Justices and federal ministers) empowered to act as Governor-in-Council in case of extreme emergency. Peters, “The Role of the “Diefenbunker”.

¹⁵⁸ Holmes, *History of the Canadian Military Engineers*, 282; Peters, “The Diefenbunker: Then and Now”. The Foundation Company filed its first progress claim on 24 July 1959. LAC, RG83, vol. 72, file “EASE Project – Construction Progress Claim #1, 24 July 1959”.

¹⁵⁹ “Expo 67,” undated document in “History of DCL,” DCC in-house holding; Leonard H. Harper to Glen G. Taverner, 20 July 1992, DCC in-house holding.

¹⁶⁰ Ben Dworkin, “Ottawa Today: Defence Construction Limited,” *Daily Commercial News and Building Record*, 21 April 1965. According to one report, CPM had been introduced to Canada sometime in 1958. Walter Rooke, “Critical path method saving millions of building dollars,” *Financial Post*, 12 September 1964, 9. CPM is a project management technique that analyzes the activities that have the least amount of flexibility in their scheduling and then produces a schedule based on a “critical path.” Activities along this path cannot be delayed without affecting the schedule for the project.

and Valcartier, PQ.¹⁶² By the end of 1962-63, the first REGHQ was completed and the other five were nearing completion. Although some \$19 million in contracts had been let for the facilities by the end of this year, some additional contracts for the five remaining sites were deferred until the following fiscal year.¹⁶³ Work on the facilities was completed by the end of 1963-64, and the total value of contracts let by DCL for the REGHQs amounted to just over \$19 million.¹⁶⁴ While plans had originally called for a REGHQ for each province, budgetary restrictions limited the number of permanent sites to six.¹⁶⁵

In addition to its responsibility for tendering contracts and supervising construction of the Diefenbunker and the BRIDGE sites, Defence Construction Limited found itself providing operation and maintenance services for the completed installations. The corporation's annual report for 1963-64 noted that "as an interim measure pending the development of permanent staffing arrangements for these regional emergency centres, DCL is providing certain operations and maintenance staff on behalf of DND Army. The direct cost of this service is recovered from DND."¹⁶⁶ A 1967-68 review of DCL's future status noted that "this method of staffing came about because of a shortage of trained military and departmental civilian personnel when the sites were

¹⁶¹ Holmes, *History of the Canadian Military Engineers*, 282; Maloney, "Dr. Strangelove Visits Canada," 49.

¹⁶² DCL, *Annual Report*, 1960-61, 10. Contracts with a total value of \$17 million were let during the 1961-62 fiscal year for sites in British Columbia, Alberta, Manitoba, Ontario, Quebec, and Nova Scotia, with additional contracts anticipated for the following year. DCL, *Annual Report*, 1961-62, 4.

¹⁶³ DCL, *Annual Report*, 1962-63, 4.

¹⁶⁴ DCL, *Annual Report*, 1963-64, 4.

¹⁶⁵ All six sites were built on existing military bases: Nanaimo, British Columbia; Penhold, Alberta; Shilo, Manitoba; Borden, Ontario; Valcartier, Quebec; and Debert, Nova Scotia. Maloney, "Dr. Strangelove Visits Canada".

¹⁶⁶ DCL, *Annual Report*, 1963-64, 4.

completed,”¹⁶⁷ while one DCL engineer involved with the construction and initial operation of the installation at RCAF Station Penhold, Alberta, would more explicitly state that DCL involvement was necessary because “DND had not programmed [made provisions for] the people to operate the facility.”¹⁶⁸ In any event, DCL assumed this responsibility, which it would discharge for the following decade of its existence.

In 1966-67, DCL’s annual report noted that the corporation received some \$1.5 to \$1.6 million for its work at the REGHQs, and half as much again for work at the Diefenbunker. A total of some 200 people were employed on these contracts, which formed a significant if largely unacknowledged source of activity and revenue for the corporation into the early 1970s.¹⁶⁹ In a 1992 letter, for instance, former DCL engineer Len Harper noted that

one of the odd things about the O & M [Operation & Maintenance] operation was that during the DCL low period of the mid and late 60’s the O & M operation consisting of some 210 personnel was not mentioned in the Annual Report until very late on in the game. It was a cash recoverable operation, not a Budget item and hence not worthy of mention. The O & M component was equal to the whole of the rest of DCL.¹⁷⁰

These activities would continue through the 1960s and early into the following decade, when a combination of management studies, including an evaluation of the corporation performed for the Treasury Board, as well as a short-lived strike by some employees, led to DND finally assuming responsibility for operation and maintenance of the both the provincial and the federal government installations, with the changeover being completed

¹⁶⁷ Public Service Commission, Bureau of Management Consulting Services, “Future Status of Defence Construction (1951) Limited,” 56, January 1968, DCC in-house holding.

¹⁶⁸ Leonard H. Harper to Glen Taverner, 20 July 1992, DCC In-house holding.

¹⁶⁹ For 1965-66, cost recovery for the REGHQs amounted to \$1.53 million, while for the following year it amounted to \$1.66 million. In 1965-66, recoverable costs for the Diefenbunker amounted to \$728,000, while for 1966-67 it came to \$752,330, rising to \$772,754 the year after. DCL, *Annual Report*, 1966-67, 12-13, 17; DCL, *Annual Report*, 1967-68, 13-14.

¹⁷⁰ Leonard H. Harper to Glen Taverner, 20 July 1992, DCC In-house holding.

by the end of March 1973.¹⁷¹ This little-acknowledged undertaking by DCL, however, had formed a significant part of its operations through the mid and late 1960s. At that time, the corporation's activities, which had been so heavily dependent on major new defence projects and the ongoing work of keeping existing installations up-to-date, entered a sharp decline from which they would not begin to recover until the latter half of the 1970s. The end of the initial stages of the Cold War, accompanied by the move away from continental air defence against the bomber, meant that DCL's traditional roles in the construction of these defence projects proved less and less important both to Ottawa and to the corporation.

Continental Air Defence Integration North and the BMEWS rearwards communications system had proved to be the last hurrah for the large continental defence projects that had previously composed much of the mainstay of DCL's work. Over the span of almost a decade in the pursuit of continental defence, a series of diplomatic agreements covering a range of projects had been negotiated by Canada and the United States. During these years, Canadian agencies, including DCL, had succeeded in securing increasingly favourable conditions that ultimately resulted in guarantees that construction work would be performed through a Canadian agency – Defence Construction Limited – and that the contracts would be awarded to Canadian firms. In these agreements, explicit provisions awarding the work to Canadians were not forthcoming; as has been seen, the United States, with its substantial network of overseas bases, raised significant obstacles

¹⁷¹ For the sections of the study of DCL covering the O&M contract, see Public Service Commission, Bureau of Management Consulting Services, "Future Status of Defence Construction (1951) Limited," 56-58, 63-64, January 1968, DCC in-house holding. A separate study of staffing was apparently already underway at the time of this review. See also Minutes of annual meeting of shareholders, 16 June 1971, DCL Minute Book, 1971-80, DCC in-house holding; DCL, *Annual Report*, 1971-72, 11, 14; Leonard H. Harper to Glen Taverner, 20 July 1992, DCC In-house holding; DCL, *Annual Report*, 1972-73, 16, 14.

to any open statement along these lines. A *modus vivendi*, however, had been worked out that secured the substance of the Canadian government's goals while avoiding the creation of a precedent that was such a concern for the United States. In the pursuit of this goal, the Canadian government and bureaucrats in Ottawa had been willing to embrace fairly aggressive measures, deliberately delaying negotiations in at least one instance, but ultimately the Canadian government had never actually refused an American request. To bastardize F.R. Scott, while it may have postponed and postponed, it had never actually abstained.

The American position was driven by the understanding that these were urgent continental defence projects that depended on access to Canadian territory and the cooperation of Canadian government agencies in order to succeed. As such, the United States was willing to compromise on construction provisions if such moves were necessary to expedite the completion of such projects.¹⁷² The desire of the United States Air Force to free itself from the requirement to use the Army Corps of Engineers for its construction work may have contributed to the success of Canadian efforts in this field. Furthermore, in the latter part of the 1950s the Canadian contracting system, working through DCL, brought in a number of American projects under their forecast budgets, which must also have increased the likelihood of preferential treatment for Canadian contractors and contracting procedures being accepted by the United States. When coupled with Ottawa's steadfast insistence on the use of Canadian contractors for American and joint Canadian-American defence projects in Canada, the United States chose a compromise that satisfied Canadian demands without having to openly commit

itself to the use of Canadian construction firms. In the end, what mattered most to officials in Washington was that the projects be built as quickly as possible. Given the priority assigned to continental defence in the 1950s, the nationality of the company assembling the “bricks and mortar” was less important than the timely completion of the work.

While Canadian agencies, including DCL, had managed to obtain these preferential construction conditions by the end of the decade, success in this field did not extend to the provision of electronics for these projects. The United States was unwilling to compromise in this area, which proved to be a significant irritant for the Department of Defence Production and other organizations in Ottawa. The greater value of equipment and electronics in comparison with construction work – the 2/3 to 1/3 split of CADIN is a good example – must have been a driving force, along with the considerable American corporate interests in this field. AT&T, working through Bell Laboratories and Western Electric, for instance, had a significant stake in many of the projects discussed in this dissertation, and was notoriously able to wield considerable influence in Washington.¹⁷² Canadian actions also contributed to this state of affairs. In her study of Canada’s role in NORAD, Ann Denholm Crosby argues that Canadian political decision-makers demonstrated an increasing tendency to defer decision-making on NORAD issues and

¹⁷² The American ownership or control of many Canadian construction firms, which was acknowledged by both DCL and DDP, may also have played a role in the willingness of American officials to compromise in this area, but without further research this must remain conjectural.

¹⁷³ AT&T’s lobbying ability in Washington was legendary. The corporation, for instance, successfully persuaded the Federal Communications Commission to block the introduction of microwave long-distance telephone, television, and data links in the immediate postwar years, largely to protect its profits as well as its extensive investments in conventional copper wire telephone lines and switching equipment. For a discussion of this issue, see Philip L. Cantelon, “The Origins of Microwave Telephony – Waves of Change,” *Technology and Culture*, 36:3 (July 1995): 560-582. In areas related to defence work, its lobbying at the Pentagon against Canadian National Telecommunications’ work on the rearwards BMEWS communications link from Alaska serves as an interesting example; see correspondence on this matter in

programmes until definite plans had been formulated, by which point “the extent of Canadian political input into continental air/aerospace defence programs was limited to whether Canada would participate. The programs, however, were either in place or on their way.”¹⁷⁴ CADIN, discussed earlier in this chapter, is held up as a prime example. While Crosby’s focus is largely on the political aspects of such decision-making, this tendency to “postpone, postpone” had comparable consequences for the electronics provisions of CADIN and other agreements. The deferral of a decision on Canadian involvement all too often meant that by the time Ottawa had finally agreed to Canadian participation, the technical requirements and specifications for a project had already been established, and that Canadian electronics firms were placed in an unfavourable situation when competing with their American counterparts, since the time at which they could have bid on and geared up for participation in these projects had already passed.¹⁷⁵

Even the most favourable construction conditions, however, were of no avail to Canadian firms or government agencies if defence projects stopped being built. The downturn in the volume of work for DCL that accompanied the end of major continental defence projects had been foreseen by the corporation’s management. While some smaller projects, and the continued maintenance of the extensive defence infrastructure that had been built up during the 1950s, promised work for DCL in the future, its amount and nature remained unclear and probably quite limited. The Strategic Air Command refuelling base programme discussed in the previous chapter; the projects outlined above, and a number of other undertakings had brought about a temporary increase in the

LAC, RG30, vol. 13168, file 7315-X1-1, pt. 1, “Grand Prairie Alta – Alaska Boundary – Microwave System.”

¹⁷⁴ Crosby, *Dilemmas in Defence Decision-Making*, 195-196.

volume of work handled by DCL in the late 1950s, but this situation would not last.¹⁷⁶

DCL's rapid growth and nationwide activities had been to a large degree the result of the extensive and expensive crash programmes for continental air defence and its accompanying infrastructure that had been undertaken earlier in the decade. The decisions that brought an end to further air defence programmes, and that led to the progressive reduction of existing systems from the late 1950s onwards, marked the end of an era for the corporation. Not until the North American Air Defence Modernization Program of the mid-1980s would DCL again be involved with a comparable undertaking.¹⁷⁷

The diminished opportunities of Cold War construction therefore obliged the corporation to improvise in order to find new means of existence. In this respect, the provision of operation and maintenance personnel for the emergency government headquarters was by no means an isolated undertaking. Such work demonstrated that in addition to its established function as contracting and supervisory authority for defence construction, the corporation possessed a set of skills that made it a useful instrument of government policy, a versatile tool for use in meeting Ottawa's range of objectives. Many of these skills were a product of DCL's established role, but proved useful in other areas because of their applicability to the wide range of construction projects characteristic of

¹⁷⁵ For a concise discussion of these issues with respect to CADIN, see Middlemiss, "Pattern of Co-Operation," 232-237.

¹⁷⁶ Minutes of Meeting of Board of Directors, 4 November 1958, DCC in-house holding. Other programmes in the late 1950s and early 1960s included the construction of facilities to support the recently acquired Canadair Argus maritime patrol aircraft, the National Defence Medical Centre in Ottawa, and work for the Defence Research Board that included a high-speed wind tunnel at Uplands, near Ottawa, and work at the Prince Albert Radar Laboratory in Saskatchewan. DCL, *Annual Report*, 1957-58, 10; DCL, *Annual Report*, 1958-59, 8-9; DCL, *Annual Report*, 1959-60, 9-10; DCL, *Annual Report*, 1960-61, 10-12; DCL, *Annual Report*, 1961-62, 5-6.

many government activities. Given the corporation's existing role in defence construction, these new fields would, almost by default, involve work best characterized as "civilian." Such projects presented a new opportunity for an organization faced with a significant downturn in its volume of work. Although this was emerging as a significant challenge by the late 1950s, Defence Construction had in fact been performing civilian tasks from the early days of its existence. Since the early 1950s the corporation had been providing technical services to other government agencies, a series of actions which benefited both DCL through the provision of work for a core group of skilled employees, and the federal government, through the furtherance of its policy goals.

Some of these contributions were undertaken in response to challenges faced by the corporation. Beginning in the late 1950s and running through to the mid-1960s, Ottawa was faced with the consequences of a rapidly expanding bureaucracy, and in search of remedies for its growing unwieldiness and inefficiency, commissioned a number of significant reviews of government organization and operation. The recommendations and changes that flowed from these reports had, or threatened to have, a profound effect on Defence Construction Limited and the bureaucratic environment in which it operated. The recommendations that flowed from these committees included challenges to DCL's existing personnel policies, plans that brought the future existence of DCL into question, and suggestions and re-organizations that brought the corporation's relationship with the DDP and DND into question. By 1965, Defence Construction would not only have served as an instrument of government policy by lending a hand to foreign aid projects, the Northern Ontario Pipeline, and agreeing to assist with the construction of

¹⁷⁷ The North American Air Defence Modernization Agreement was signed at the "Shamrock Summit" in Quebec City on 17 March, 1985. It provided for the modernization of North American air defences to better

Expo 67, but would also have retained its ability to operate independently from the Civil Service Act, avoided dissolution as recommended by the Glassco Commission, and signed a Memorandum of Understanding with the Department of National Defence. These accomplishments and challenges will be the subject of this dissertation's next and final chapter.

counter air- and submarine-launched cruise missiles and other air-breathing threats.

Chapter 7

Change and Responses to Change: Civilian Work and the Institutional Environment, 1952-1965

The late 1950s and early 1960s had witnessed a substantial reduction in Canadian and American continental defence efforts and in Canadian defence expenditures in general. Driven by the emergence of new military threats, most notably the intercontinental ballistic missile, the ambitious air defence programmes that had represented the largest and most significant infrastructure projects for Defence Construction Limited quickly seemed outdated. Programmes still in the works were scaled back or cancelled, and even when such projects went ahead, by the mid-1960s their impetus was exhausted.¹ Major programmes for the other services were also drawing to a close; the massive army base at Gagetown, New Brunswick, for instance, was completed, and the construction of other installations that had been prompted by the outbreak of the Korean War in 1950 was either finished or drawing to a close. While requirements still existed for new installations, and the maintenance and upgrading of existing facilities, the massive and urgent demands of the early to mid 1950s were no more. This downturn was inevitably accompanied by significant consequences for a Crown corporation that had been created to help meet the military's defence infrastructure requirements. The military and ideological imperatives that had given wartime birth to DCL and that had sustained it in the early Cold War were disappearing.

The same period would also bring re-evaluations of government and defence organization in Canada, all of which promised to substantially change DCL's workload,

¹ David J. Bercuson, "Canada, NATO, and Rearmament, 1950-1954: Why Canada Made a Difference (But Not for Very Long)," in *Making a Difference? Canada's Foreign Policy in a Changing World Order*, John English and Norman Hillmer, eds., (Toronto: Lester, 1992), 119-120; B. Bruce-Briggs, *The Shield of Faith: A Chronicle of Strategic Defenses from Zeppelins to Star Wars*, (New York: Simon and Schuster, 1988), 137.

established modes of operation, and the bureaucratic environment in which it operated. The corporation's adroit adaptation to these challenges were ultimately successful not only in facilitating the Canadian government's efforts to meet its objectives in other fields but also in guaranteeing DCL's continued existence. In response to government requirements and in furtherance of its own objectives, DCL was involved in civilian construction projects that included the provision of foreign aid through the Colombo Plan, the building of the Northern Ontario Pipeline, and the construction required for Expo 67. Thus, the corporation was able to adeptly shift its strategic focus from purely military to a combination of military and civilian purposes.

At the same time that this refocusing was taking place, the bureaucratic environment in which the corporation operated was provoked to change by the 1959 Heeney Report on Civil Service reform and the recommendations of the Glassco Commission's enquiry into government organization that followed shortly thereafter.² The reconfiguring of the Department of National Defence and subsequent integration of the Canadian military that followed the 1964 Defence White Paper, with its increased emphasis on peacekeeping and related activities resulted in substantial changes to this environment and held the potential to terminate the corporation's existence.³ By 1965, Defence Construction Limited was not only handling a far lower volume of work than it had at its peak in the mid-1950s, but was also responsible to a new minister and was

² Canada, Civil Service Commission (hereafter CSC), *Personnel Administration in the Public Service: A Review of Civil Service Legislation*, (Ottawa: Queen's Printer, 1959); Canada, Royal Commission on Government Organization (hereafter RCGO), *Report*, 5 vols., (Ottawa: Queen's Printer, 1962-1963).

³ Canada, Department of National Defence (hereafter DND), *White Paper on Defence*, (Ottawa: Queen's Printer, 1964); Greg Donaghy, *Tolerant Allies: Canada and the United States, 1963-1968*, (Montreal & Kingston: McGill Queen's University Press, 2002), 93-99.

operating under the auspices of new arrangements with the Department of National Defence through a Memorandum of Understanding.

Many of the projects undertaken by DCL and the changes in its bureaucratic environment were the result of the substantial decrease in defence construction requirements in Canada and their consequences for DCL. The downturn in the volume of work handled by the corporation constituted a tangible change with significant impacts. At a May 1962 meeting of the board of directors, R.G. Johnson noted that while the Western Radar and Bridge programmes were progressing satisfactorily, "unless new programmes were started, volume would be down substantially towards the end of the year."⁴ In January of 1964, the board was informed that forecasts for total values of work in 1963-64 and 1964-65 stood at about \$30 million, dramatically down from the 1962-63 total of \$71.6 million, although there was a trend towards an increase in the number of new contracts.⁵ This decline was publicly acknowledged; in a speech to the Association of Consulting Engineers of Canada in April of 1965, the corporation's new president, A.G. Bland, noted that over the past few years, rebuilding and extension programmes in defence construction had largely "peaked out," and that maintenance of the approximately \$3 billion worth of defence facilities under Canadian purview was now a more important task for the corporation.⁶

⁴ Minutes of Meeting of Board of Directors, 30 May 1962, DCC in-house file, "Defence Construction (1951) Limited minute book, 1955-1970". The "Western Radar" programme was discussed as part of CADIN in the previous chapter, which also examined DCL's involvement with the BRIDGE sites.

⁵ These estimates were confirmed at the June 1964 board meeting. Minutes of Meeting of Board of Directors, 30 January 1964; Minutes of Meeting of Board of Directors, 11 June 1964, DCC in-house file. The Auditor General's reports for these years also track the sharp decline in personnel employed on regular work and the corporation's operating expenses. Canada, Office of the Auditor General (hereafter OAG), *Report of the Auditor General to the House of Commons for the Fiscal Year Ended March 31 1963*, (Ottawa: Queen's Printer, 1963), 99-100; OAG, *Report*, 1964, 98-99; OAG, *Report*, 1965, 143-144.

⁶ A.G. Bland, Speech to ACEC, 27 April 1965, 3-4, DCC in-house file, "Bland Speeches (historical file)".

DCL sought a number of means to accommodate this downturn in business. It took advantage of the independence in employment matters provided by its status as a Crown corporation and significantly reduced staffing.⁷ These reductions left the corporation with a concentrated “core” group of employees possessing considerable expertise. DCL wanted to deploy these people to best advantage, and as a result began to promote its services in addition to performing defence work, loaning personnel to other government departments and to the private sector. By offering its services in this manner, DCL was nimbly continuing an established pattern of involvement in civilian construction work for the federal government. Even at the height of major Cold War construction projects in the mid- to late 1950s, its personnel had assisted in the implementation of the Colombo Plan and the building of the Northern Ontario Pipeline. In doing so, the corporation was acting as an instrument of government policy in much the same way that it was for Ottawa’s more explicitly Cold War objectives. Operationally, however, it was pursuing a policy of diversifying its activities much as any private sector corporation would. In some areas there was considerable overlap with these objectives; in the case of the Colombo Plan, for instance, there was also a clear Cold War motive for Canada’s foreign aid policies. By the mid-1960s, following its involvement with the Colombo Plan and the pipeline, DCL’s most important civilian clients would be the new agencies created for the delivery of foreign aid, particularly in the Caribbean, and the Canadian Corporation for the 1967 World Exhibition, a Crown corporation which had been created to build and operate Canada’s major centennial project, Expo 67.

⁷ *Ibid.*, 4.

DCL Afield: Civilian Projects, 1952-1969

Again, one recognizes the hand of Mr. Howe. Looking back one realizes what a tribute he paid in selecting DCL's engineers for such a variety of projects.

Former DCL President R.G. Johnson, 1975.⁸

From an early stage of its existence, Defence Construction facilitated a number of the federal government's civilian construction projects. The corporation's involvement was useful to the government because of the experience and sets of skills it could bring to the tasks at hand, particularly given that many of these projects involved the construction of public works and large-scale infrastructure. From the early 1950s through to the mid-1960s, DCL was involved in a number of such undertakings, of which the three largest and most notable were the Colombo Plan, the Northern Ontario Pipeline, and eventually Expo 67. Aside from the obvious arguments about the skills, knowledge, and experience that DCL was able to bring to the tasks at hand, the corporation was also tied to the projects through close relationships with some of their central figures. In the first two instances, there was a strong tie between C.D. Howe and the projects, while in the third, there were close connections between DCL and senior Expo officials. In the case of Howe, DCL's mixed military-civilian role provides telling evidence of Howe's famed pragmatism, his willingness to employ the best – or at least the most expeditious – medium available regardless of ideological hue. Involvement in these activities was beneficial to DCL, particularly following the downturn in defence construction work in the late 1950s and early 1960s. Work on civilian projects for other government departments and agencies allowed the retention of a skilled core of employees at a time

⁸ R.G. Johnson, "Nostalgia," speech delivered to DCL's 25th anniversary reunion party, 14 November 1975.

when work was decreasing and also decreased the corporation's overall operating expenses through the reimbursement it received for its services.

In response to the defence construction downturn, DCL's workforce had fallen precipitously. Between its 1956 peak and 1965, for instance, the workforce was reduced from 832 employees to 197. Of those let go, 397 had been dismissed in the first sixteen months of the period.⁹ In general, those who were retained appear to have been the longest-serving employees with the greatest experience in the company's operations. In 1965, for instance, much of this core staff had been with the corporation for ten years or more. Work on civilian projects offered the possibility of retaining this experienced core of personnel. Other important benefits were derived from DCL's involvement in such projects; the Auditor General's report for 1964-65 noted that the corporation's increased income and expenses were the result of this additional work and that reimbursement for engineering and administrative services had increased from \$622,000 in the previous year to \$1,540,000. As a result of this increased income and the reduction of the number of regular employees in DCL, the net expense of the corporation's operations that had to be met through Parliamentary appropriation fell from \$2.5 million to \$2.2 million.¹⁰ In this respect, the operation and maintenance contract for the emergency government headquarters outside Ottawa and in various provinces discussed in the previous chapter is

⁹ A.G. Bland, "40th Anniversary Letter from DCL's Immediate Past President," *Envoy*, vol. 5, no. 5, August 1991, 2; A.G. Bland, speech to ACEC, 27 April 1965, 4-5. DCL had begun work in the West Indies in 1960-61, with the awarding of a preliminary survey contract for the proposed construction of a dock and warehouse at St. Vincent in the British West Indies. DCL, *Annual Report*, 1960-61. Assistance with work in the Caribbean would continue until at least 1971. DCL, *Annual Report*, 1968-69, 14; DCL, *Annual Report*, 1969-70, 13-14; DCL, *Annual Report*, 1970-71, 13-14. See also Library and Archives Canada (hereafter LAC), RG83, vol. 85, file 920-BWI-3-EAO-36-17-11, "Construction of Primary Schools and Warehouses, Leeward & Windward Islands - West Indies"

¹⁰ Reimbursement for services would increase to \$1,674,000 in 1965-66 and to \$1,776,000 in 1966-67. OAG, *Report*, 1965, 144; OAG, *Report*, 1966, 154; OAG, *Report*, 1957, 164. The 1965 report was the first to provide this breakdown of figures, and retroactively provided information for 1964 as well.

also worth recalling; it was another example of service delivery through DCL that benefited another government agency – in this case the Department of National Defence – and the company itself. At a time when reduced defence expenditures and government reorganization called into question the corporation's future, the retention of employees through such work, coupled with reduced net operating expenses and the provision of services to government, helped secure the corporation's continued existence and revealed it to be far from a lazy Crown corporation immune to the twists of the external market.

Perhaps not surprisingly, all of the undertakings discussed above were also symbols of engineering dominance and control of the environment. Major Colombo Plan projects included dams, irrigation projects, and power plants, an exhibition of Canada's powers in the world. The Northern Ontario pipeline was seen as a triumph of engineering and an assertion of Canadian nationalism; construction over the Canadian Shield offered a case study in what historians called "Laurentianism," the strong Canadian desire to construct a sea-to-sea links uniting the hinterland with the metropolitan St. Lawrence River. Expo 67 was an almost entirely artificial creation, from its site built in the middle of the St. Lawrence River to its celebratory and ostentatious architecture.¹¹ All three were arguably characteristic of the era and characteristic of Canada – many of the Colombo projects would subsequently be described as areas of national specialization for Canada, for instance, while the Northern Ontario pipeline would be compared to "the CPR of natural gas pipelines," a reference to its route across the Canadian Shield north of Lake Superior and to its nationalist symbolism for its supporters. Expo 67, of course, would become a symbol of both of the centennial of Canadian confederation and of an

¹¹ The architecture of Expo received considerable contemporary attention. See, for instance, *Architectural Review*, 142:846 (August 1967); *Progressive Architecture*, June 1967, 123-167.

economic, technological, and nationalist confidence and optimism that now seems quite dated. Perhaps as a result, it would also become in retrospect a monument for what some considered the country's "last good year".¹²

Defence Construction and the Colombo Plan

While Defence Construction Limited's major focus in the 1950s was work on military projects in Canada and Europe, it also had a hand in other types of construction elsewhere in the world. Beginning in 1952, DCL was involved in the administration of contracts for Canadian foreign aid programmes that were part of the Colombo Plan for Co-operative Economic Development in South and Southeast Asia. The plan had been established following the January 1950 meeting of Commonwealth foreign ministers in Colombo, Ceylon (now Sri Lanka), and while it was originally scheduled to run for six years from mid-1951 to mid-1957, as events unfolded it continued after that date.¹³

Although the Colombo Plan and its construction projects were not military, they were undertaken in part to serve diplomatic and foreign policy requirements. An early 1957

¹² Keith Spicer, "The Administration of Canadian Colombo Plan Aid," *International Journal*, 16:2 (Spring 1961), 171; Michael Bliss, *Northern Enterprise: Five Centuries of Canadian Business* (Toronto: McClelland and Stewart, 1987), 473-474; Pierre Berton, *1967: The Last Good Year*, (Toronto: Doubleday Canada, 1997), 276-279. On Expo 67 and the nationalist significance of international exhibitions, see Sonja Macdonald, "Expo 67, Canada's National Heterotopia: A Study of the Transformative Role of International Exhibitions in Modern Society," (MA Thesis, Carleton University, 2003).

¹³ John Hilliker and Donald Barry, *Canada's Department of External Affairs, Volume II: Coming of Age, 1946-1968*, (Montreal & Kingston: McGill-Queen's University Press, 1995), 82-85; "An Introduction to Defence Construction (1951) Limited," 3, n.d., DCC in-house file; David R. Morrison, *Aid and Ebb Tide: A History of CIDA and Canadian Development Assistance*, (Waterloo, ON: Wilfrid Laurier University Press, 1998), 28-30; Memorandum from SSEA to Cabinet, 8 September 1953, Canada, External Affairs and International Trade Canada, *Documents on Canadian External Relations, Volume 19: 1953*, (hereafter DCER) Donald Barry, ed., (Ottawa: Minister of Supply and Services Canada, 1991), 917; Memorandum from SSEA to Cabinet, Cabinet Document 184-55, "Canadian Participation in the Colombo Plan," 13 September 1955, in Canada, Department of Foreign Affairs and International Trade (hereafter DFAIT), *DCER, Vol. 21: 1955*, Greg Donaghy, ed., (Ottawa: DFAIT), 539-541.

memorandum to Cabinet, for instance, emphasized the Plan's Cold War significance when it stated that

the primary objective of the Canadian government in contributing to the Colombo Plan is political. Basically it is to offer some hope, and to provide a sense of international co-operation, to the ruling and politically effective groups in the Asian countries concerned by assisting governments in sensible projects for economic development that seem likely to show results in the next few years. In doing this we hope to reduce the attractiveness of communism to these groups as an alternative and desperate solution to their problems. There are a number of other motives for our participation and some convenient by-products which result from active membership in the Plan but these, it should be emphasized, are essentially subsidiary in character.¹⁴

In October of that year, Sidney Smith, the Secretary of State for External Affairs, emphasized the plan's political objectives when he argued that "in the light of the present political situation in South and Southeast Asia, the Colombo Plan has taken on considerable significance as a means of preserving the ties of friendship and mutual interest, not only among Commonwealth countries, but also among the Asian and Western members of the Plan generally."¹⁵ Given these views and objectives, the Colombo Plan was in many ways as much a part of the nation's Cold War strategy as the radar lines, airfields, and army bases whose construction DCL was supervising in Canada.¹⁶ Colombo Plan construction work would be comparable to Cold War

¹⁴ Memorandum by Assistant Secretary to Cabinet, "Colombo Plan Operations," 25 February 1957, *DCER, Volume 22: 1956-57, part 1*, Greg Donaghy, ed., (Ottawa: DFAIT, 2001), 1217. This function of the Plan was not widely advertised; the Canadian delegation to the 1957 Colombo Plan Consultative Committee meeting in Saigon, for instance, was given general instructions noting that "it is undesirable to make any reference to the fact that one of the reasons for Canada participating in the Colombo Plan is our wish to help counter the threat of Communist subversion. Two of the most important countries of the Plan are avowedly neutral in this struggle – India and Indonesia – and it has, therefore, become an almost unwritten rule at the meeting that no reference be made to this issue." "Memorandum of Instructions to the Canadian Delegation to the Colombo Plan Consultative Committee Meeting, Saigon, 1957," Cabinet Document 252/57, 9 October 1957, LAC, RG2, vol. 1891, file C-20-5, (1957), Cabinet Documents 251-300.

¹⁵ Memorandum, SSEA to Cabinet, "Canada's Contribution to the Colombo Plan for the Financial Year 1958-1959," Cabinet Document 250/57, 8 October 1957, 1, LAC, RG2, vol. 1891, file C-20-5, (1957), Cabinet Documents 201-250.

¹⁶ The case of the Aswan High Dam in Egypt was perhaps the best-known case of an aid project, with the added baggage of nationalist symbolism, enmeshed in the Cold War and serving overtly ideological

construction work in Canada in yet another respect; as will be seen below, Plan work was also structured in a way that brought benefits to Canadian construction and engineering firms and suppliers of equipment and material. Once again, DCL was well positioned to act as an instrument of government policy.

Although there has been remarkably little academic examination of the Colombo Plan, this dissertation is not the place for an extensive study of the Plan's history or the broader politics of foreign aid in the 1950s and 1960s.¹⁷ Worth keeping in mind is that the events discussed in this section were occurring at a time when "development" was often connected to large-scale projects and industrial development, and was usually seen as an unalloyed benefit. If dams and other development projects were part of the ideological conflict of the Cold War, they were also ideological in a broader sense of development and control, particularly since many, if not all, governments have used technology as a means of legitimizing their existence.¹⁸ The number of dams and

purposes. In the UK, for instance, one MP epitomized much of this attitude when he found it "incredible that at this moment, instead of Great Britain and the United States helping to build the Aswan Dam, which will help to take away the poverty of the country, this project should have passed into the hands of the Soviet Union. This seems to me a terrible tragedy, but I think that with political wisdom and skill it still can be redeemed." *Hansard*, 28 October 1958, 137. For a general discussion of dams and aid, see Patrick McCully, *Silenced Rivers: The Ecology and Politics of Large Dams*, rev. ed., (New York: Zed Books, 2001), 236-280, and especially 238-239 dealing with the Aswan High Dam.

¹⁷ One of the few relatively recent works on Canadian involvement in the Colombo Plan appears to be Jacqueline T. Shaw, "'Grudging Gifts': Canada, the Colombo Plan and the Formation of an Aid Policy," (M.A. thesis, Carleton University, 1992), which examines the decisions that led to Canadian involvement in the plan, and notes that "the tendency of historians to concentrate on the North Atlantic world creates serious omissions in the history of Canadian foreign policy at the official level," and that "most of the works on Canada and Asia centre on Canada's trade and military involvement with specific countries in Asia, China and Japan in particular." *Ibid.*, 10. David R. Morrison's work on the Canadian International Development Agency (CIDA) provides a useful but brief description of the first years of Canadian development assistance. Morrison, *Aid and Ebb Tide*, 27-56. McCully's discussion of dams and aid would also provide a useful starting point for any examination; a number of his contentions about contemporary patterns in this field appear to be borne out by events in the 1950s.

¹⁸ On the connection between Canadian development aid and deliberate plans for economic "modernization," see Morrison, *Aid and Ebb Tide*, 35-37. The title of one mid-1960s book on the Aswan High Dam, for instance, explicitly links dams and control. See Tom Little, *High Dam at Aswan: The Subjugation of the Nile*, (New York: John Day, 1965). Historians of technology have paid considerable attention to the uses of technology as a means of legitimation by the Soviet Union. In part, this has been

irrigation projects built as part of DCL's involvement in Colombo Plan work underlines that this was a time when dams were symbols of development and progress – Indian Prime Minister Jawaharal Nehru famously compared them, with nationalist overtones, to temples – and that they were still generally seen as beneficial, unlike today, when dams and the firms that build them are often controversial. Closer to home, W.A.C. Bennett's British Columbia would embrace the same joining of hydroelectric technology and development.¹⁹

Following a protracted decision-making process about the plan itself, the federal government decided in September of 1951 to form a special body to spend the \$25.4 million initially allocated for the Colombo Plan. As a result, the International Economic and Technical Co-operation Division (IETCD) of the Department of Trade and Commerce was created, both to take advantage of the Department's ability to deal with Canadian industry and to obtain C.D. Howe's support within Cabinet.²⁰ DCL provided

because of its explicitness on these matters and in part because of the catastrophic consequences of the technological hubris it engendered, although Moscow was by no means alone in these areas. For a concise discussion of the Soviet uses of large-scale technologies for ideological and other purposes, see Paul R. Josephson, "'Projects of the Century' in Soviet History: Large-Scale Technologies from Lenin to Gorbachev," *Technology and Culture*, 36:3 (July 1995): 519-559. Josephson argues that "while nations differ in their economic and political organization...the display value, that is, social, cultural, and ideological significance, of large-scale technologies is cross-national. Technologies are symbols of national achievement. They reflect the omniscient power of scientists and engineers. They give legitimacy to political systems. They are central to national security strategies. *They serve foreign policy through technology transfer.* They entrance a public, which becomes intoxicated with symbolism and overlooks potential dangers to society." *Ibid.*, 520-521. Emphasis added.

¹⁹ McCully, *Silenced Rivers*, 1-2. Nehru, however, subsequently reconsidered his uncritical support for large dams. *Ibid.*, 20-21. Comparable comments were made by Keith Spicer in a 1961 article, in which he argued that "perhaps a certain fascination with the visible success of a few 'photogenic' capital projects, notably Warsak, Kundah and the Canada-India Reactor, has tended to divert the attention of our governments from long-term planning." Spicer, "Administration of Canadian Colombo Plan Aid," 175. For a general and critical overview of the ideology of dams and the strong relationship between dams and aid projects, see McCully, *Silenced Rivers*, 236-280. Robert Bothwell, Ian M. Drummond, and John English, *Canada Since 1945: Power, Politics and Provincialism*, rev. ed. (Toronto: University of Toronto Press, 1989), 227-228; Jeremy Mouat, *The Business of Power: Hydro-Electricity in Southeastern British Columbia, 1897-1997*, (Victoria: Sono Nis Press, 1997), 137-160.

²⁰ Spicer, "Administration of Canadian Colombo Plan Aid," 174; Morrison, *Aid and Ebb Tide*, 28-32. For a discussion of the decision-making process, see Shaw, "Grudging Gifts".

assistance to the division as well as to the Canadian Commercial Corporation, another Crown corporation, which was responsible for purchasing and shipping the Plan's requirements.²¹ According to historian David R. Morrison, however, the IETCD "is remembered less for its substantive accomplishments than for its marginality in the hierarchy of foreign policy. It was plagued by organizational confusion, continual staff turnover, and low morale."²² Morrison also argues that the use of DCL and the CCC worsened the problems faced by the IETCD by contributing to the fragmentation of responsibilities for the implementation of capital projects.²³ Expediency, so often the hallmark of C.D. Howe, was not always the best policy.

There are a number of possible explanations for Defence Construction's involvement in the Colombo Plan. The most obvious, perhaps, was that these were large-scale construction projects, and that DCL had recently demonstrated, and was continuing to demonstrate, its abilities in negotiating and administering contracts with consulting engineers for project design and supervision, as well as its ability to negotiate, administer, and supervise construction contracts. Canada was not unique in using an organization like DCL. As the corporation's former president, R.G. Johnson, asked in a 1975 speech, "can you imagine anyone but C.D. Howe setting a defence construction organization to supervise work being carried out as civilian aid to under-developed countries. As a matter of fact I can, the U.S. Corps of Engineers was also working in some of these countries when we were."²⁴ The Corps of Engineers, of course, was the agency with which DCL

²¹ R.G. Johnson, "Defence Construction Programme and Practices," *Proceedings of the 39th Annual Meeting of the Canadian Construction Association*, (Ottawa: Canadian Construction Association, 1957), 99; Canada, Canadian Commercial Corporation (hereafter CCC), *Annual Report, 1959-60*, (Ottawa: Queen's Printer), 6.

²² Morrison, *Aid and Ebb Tide*, 31.

²³ *Ibid.*, 31-32.

²⁴ Johnson, "Nostalgia."

dealt regularly at that time in the construction of American defence projects in Canada, and in that particular field the two organizations were roughly analogous. Furthermore, given the focus on large projects, especially dams, as part of the Colombo Plan and the Corps' heavy involvement in comparable undertakings in the United States, its involvement in the construction of American aid projects is not surprising.²⁵

C.D. Howe's role in the plan can also help to explain DCL's involvement. As mentioned above, he had been drawn in through the recruitment of the Department of Trade and Commerce to supervise Canadian involvement. Howe, himself an engineer, would make similar use of Defence Construction in other projects with which he was involved, such as the Northern Ontario Pipeline and on occasion seems to have made use of the corporation as a form of private consulting firm.²⁶ DCL's familiarity and close relationship with the Canadian construction industry, as well as its experience in selecting contractors and consultants for major defence projects must also have played a significant role in its selection as an instrument of policy working for the Colombo Plan. This appears to have been borne out in 1953, at which time DCL provided further assistance to the International Technical Co-operation Division by assuming responsibility for the negotiation and administration of engineering and construction contracts; the corporation's role would subsequently be described as that of an engineering advisor.²⁷

²⁵ These domestic projects would later become the subject of considerable criticism. See McCully, *Silenced Rivers*, 243-245; Marc Reisner, *Cadillac Desert: The American West and its Disappearing Water*, (Vancouver: Douglas & McIntyre, 1996), *passim*.

²⁶ Bliss, *Northern Enterprise*, 463. At one point in the later 1950s, for instance, Howe was asking DCL to examine feasibility studies and cost estimates for dam and irrigation projects on the South Saskatchewan River. See, for example, Johnson to Howe, 12 April 1957, 27 May 1957, 28 May 1957, "Re: South Saskatchewan River Project", DCC holding, unlabelled folder.

²⁷ R.G. Johnson, "D.C.L. at Home and Abroad," 28 January 1958, *Proceedings of the 40th Annual General Meeting of the Canadian Construction Association, 1958*, (Ottawa: Canadian Construction Association, 1958), 115; Memorandum, SSEA to Cabinet, "1957-58 Colombo Plan Program: Additional Projects," Cabinet Document 123/58, 28 April 1958, 5, LAC, RG2, series B2, vol. 2741, file C-20-5, (1958) Cabinet

The nature of this task and DCL's influence on its outcome was laid out in 1957, when Mitchell Sharp, at the time Deputy Minister of Trade and Commerce, informed Gordon Churchill, the new minister, that

The system of calling for tenders always used in purchasing Colombo Plan supplies and equipment is not used in procuring engineering services. Engineering consultants are selected for Colombo Plan projects on the basis of a number of factors affecting their suitability, including quality of work and personnel as well as engineering charges. When firms of consulting engineers are chosen for Colombo Plan work this has been done in the past on the advice of Defence Construction (1951) Limited....²⁸

Regardless of the reasons for its involvement, the corporation was playing a significant role in this aspect of the Plan. As the remainder of this section will demonstrate, the Canadian government would prove itself willing to use the corporation as an instrument of policy – a tool, as it were, to help further policy ends. Given the important role of infrastructure and public works in many undertakings in addition to the Plan, DCL would prove to be a useful tool for the government on more than one occasion.

While DCL's involvement in the Colombo Plan offered obvious benefits to the federal government, one of the benefits of plan work for the company was that it allowed DCL to keep skilled staff on the payroll without incurring financial losses. This was an especially important consideration when DCL faced a drop in the volume of its contracts.²⁹ As a result, the Plan became an important recourse for a company seeking to retain skilled employees at times when "business" was slow, a pattern that would be

Documents 101-150. Morrison notes that External Affairs also appeared to be quite happy to have Trade and Commerce deal with these matters; he quotes an EA official interviewed by Keith Spicer who admitted that his department "was not equipped to deal with recruiting engineers and such creatures." Morrison, *Aid and Ebb Tide*, 32.

²⁸ Mitchell W. Sharp, Deputy Minister, Department of Trade and Commerce, to Gordon Churchill, Minister of Trade and Commerce, 19 December 1957, LAC, MG32 B9, vol. 25, file "Colombo Plan".

²⁹ Although the 1956-57 fiscal year would show the largest volume of work put in place since 1952-53, senior management anticipated that volume would drop by one third in 1957-58 due to the completion of the Mid-Canada Line and the work on the army base at Gagetown, New Brunswick. Minutes of Board of Directors Meeting, 06 December 1956, DCL Minute Book, 1955-1970, DCC in-house file.

repeated with other undertakings. The Colombo Plan had a strong need for technical experts of the sort DCL could offer either directly or through contracts. Between 1950 and the end of 1961 over 14,000 experts from member countries and international agencies had provided technical assistance to countries through the Colombo Plan.³⁰ By 31 March 1961, 255 Canadian experts had been sent to Colombo Plan countries as part of the Technical Co-operation scheme, and more than 200 engineering and technical personnel had performed contract work as part of capital assistance programmes.³¹

An October 1965 article in *External Affairs*, the Department of External Affairs' monthly publication, noted that the emphasis of Canada's involvement had been in the fields of power, transport, natural resources, and education.³² In the 1960s, the focus of much Canadian federal policy shifted from Cold War deterrence to questions of promoting growth and aiding development in the "Third World."³³ While DCL would obviously be unable to help with the last of the four, it was especially involved in the first, most notably through the hydro-electric power projects and their related transmission lines, as well as through irrigation systems related to dams. *External Affairs* would explain and justify the emphasis on hydroelectric dams in Canada's Colombo Plan commitments in the early 1960s, when it pointed to Canadian experience in this field, as well as the importance of electricity in a "modern industrial economy," one of the goals of Colombo Plan development. Some 30 percent of Canadian aid to India and Pakistan in

³⁰ "Colombo Plan Consultative Committee," *External Affairs*, 14:1 (January 1962): 8.

³¹ "Canada and the Colombo Plan," *External Affairs*, 13:11 (November 1961), 391. By 1965, Canada's expenditures on Colombo Plan assistance totaled \$528,678,000 out of a total of some \$15 billion involved in the Plan. "Colombo Plan Review," *External Affairs*, 17:10 (October 1965), 439.

³² *Ibid.*, 439-440.

³³ For a discussion of the expansion of the quantity and wider geographical distribution of Canadian aid beginning in the early 1960s, see Morrison, *Aid and Ebb Tide*, 44-51.

the first decade of the plan would consist of such projects.³⁴ In 1961, University of Toronto graduate student Keith Spicer – who would subsequently go on to greater responsibilities and wider recognition – described an emphasis on infrastructure in areas that were Canadian “national specialties.” In addition to hydroelectric work, this included resource surveys, communications, and transportation.³⁵ Furthermore, these were also areas where Canadian firms could sell their products and services; “by their very nature,” External Affairs noted in April of 1959,

these major projects call for an integrated contribution of Canadian equipment and services. In that way they provide substantial employment for Canadians and have an appreciable impact on the operations of Canadian manufacturers of capital goods, particularly in the engineering and electrical equipment fields. They also familiarize countries of the area with Canadian manufactured goods and should help Canadian firms in the longer term to develop export markets in those countries.³⁶

DCL president R.G. Johnson had made a similar observation to the Canadian Construction Association in 1958, when he noted that “all of these projects have been designed and equipment and material specified by Canadian engineering companies and construction firms. Insofar as possible, material and equipment of Canadian manufacture is specified and supplied to those projects with the result that in some instances, 90% of the equipment and services is of Canadian origin.”³⁷ In his discussion of the Colombo Plan, Morrison notes that this procurement tying became one of the features that defined

³⁴ “Colombo Plan Projects in India and Pakistan,” *External Affairs*, 13:3 (March 1961), 74. A 1995 study would note that Canada was among the leading builders of major dams. McCully, *Silenced Rivers*, 6.

³⁵ Spicer, “Administration of Canadian Colombo Plan Aid,” 171; *The Canadian Who's Who*, 2005, (Toronto: University of Toronto Press, 2005), 1234.

³⁶ Memorandum, Acting SSEA to Canada, “The Colombo Plan: Pattern of Canadian Aid in 1959-60,” Cabinet Document 126/59, 16 April 1959, 3, LAC, RG2, series B2, vol. 2742, file C-20-5, (1959), Cabinet Documents 101-150.

³⁷ Johnson, “D.C.L. at Home and Abroad,” 116.

Canadian aid from the 1950s onwards.³⁸ Targeting aid expenditures in this way was not unique to the 1950s or to Canada's Colombo Plan projects; in his work on the ecology and politics of large dams, Patrick McCully argues that "the provision of work for domestic consultancy and construction companies is the main reason why many bilateral aid agencies are keen to help fund dams in developing countries."³⁹ This claim certainly seems to hold true for Canada's involvement in the Colombo Plan, as does McCully's observation that

large dams are a particularly attractive destination for aid funds. During the Cold War, they attracted funds partly because the superpowers wanted visible signs of the dependence of their client states and advertisements for the technological wonders which followed in the wake of capitalism or communism. Macroeconomics were also important: dams offered the prospect of suddenly propelling remote "undeveloped" areas into the international economy.⁴⁰

Through the Colombo Plan, therefore, the Canadian government was committing resources to a foreign aid effort with significant diplomatic objectives that relied heavily on the construction of large public works.⁴¹ The latter, of course, was a traditional rationale for and function of government and its instruments of policy. As part of this programme, DCL administered the capital engineering construction programme of eleven major projects on behalf of the International Economic and Technical Co-operation Division of the Department of Trade and Commerce. These included a cement plant at Daudkhel and the Warsak dam in Pakistan, the Mayurakshi hydro electric plant and Umtru power project in India, the Ganges-Kobadak power project in East Pakistan (now Bangladesh), and a fish refrigeration plant and the Gal Oya transmission line in Ceylon

³⁸ Morrison, *Aid and Ebb Tide*, 27, 34-35. See *ibid.*, 52, for a particularly pithy quotation on domestic political justifications for procurement tying.

³⁹ McCully, *Silenced Rivers*, 260-262.

⁴⁰ *Ibid.*, 255.

⁴¹ Morrison notes that "Canada's bilateral aid was at first dominated by major capital projects." Morrison, *Aid and Ebb Tide*, 35.

(now Sri Lanka).⁴² The Warsak Dam became perhaps the best-known and best-documented of the Colombo Plan projects in which DCL was involved. At one point, the corporation was maintaining an office in Karachi, Pakistan, as part of its work at Warsak and elsewhere.⁴³

The Warsak project, centered on a concrete dam some 76.2 m high and 198.1 m long, was located on the Kabul River some 30km from Peshawar in Pakistan's North-West Frontier Province.⁴⁴ The scale of the dam and its distance from Canada were not its only claims to fame, however; one of the reasons why Warsak became DCL's best known and best-documented Plan project is that it seems to have encountered the greatest number of problems. Following a series of June 1956 meetings that included presentations from a DCL engineer and the company's president, for instance, A.F.W. Plumptre, the Assistant Deputy Minister of Finance recounted how he had outlined the way "the Canadian contribution had risen, step by step over 2 1/2 years, from \$13 million to \$36 million."⁴⁵ The ultimate cost to Canada, however, would be even higher at an estimated total of \$39.1 million, and would consume much of Canada's Colombo Plan commitment to Pakistan.⁴⁶ Ultimately, the Warsak project cost some \$60 million in

⁴² JHP Scullion, "A Compended History of Defence Construction (1951) Limited, also known as Defence Construction Canada (DCC)," June 1988.

⁴³ "History, Responsibilities & Operations of Defence Construction (1951) Limited," June 1957, 7; "WAPDA – Power Generation," <http://www.pakwapda.com/htmls/pgeneration-dam-warsak.html>, 10 March 2005.

⁴⁴ *Ibid*.

⁴⁵ Memorandum from ADM/Finance, "Colombo Plan – Warsak – Recent Developments," *DCER*, vol. 22, 1263. The discussion of problems with work at Warsak could merit a chapter in and of itself; a combination of remote location, harsh climate, and difficult communication between the parties involved contributed to the considerable delays and cost overruns. Highlights of the Canadian government's discussions can be reconstructed from *Documents on Canadian External Relations* and Cabinet Conclusions for the mid-to-late 1950s. See, for instance, *DCER*, vol. 22, 1261-1269.

⁴⁶ While such overruns may have been disturbing to Ottawa bureaucrats and politicians, experience has demonstrated that they are common problems with large dam projects. "Canada and the Colombo Plan," 389; "Annex to Memorandum to Cabinet of 27 November 1957," Cabinet Document 313/57, 29 November

Canadian and Pakistani funds, and not surprisingly made extensive use of Canadian services and products. In addition to supplying equipment for the operation of the dam and power plant, Canada also supplied construction equipment, supplies and materials, and approximately 150 personnel who provided engineering and supervisory services.⁴⁷ In material terms, the Warsak Dam, once at full capacity, promised to effectively double electrical generating capacity in West Pakistan, although the sediment carried by the Kabul River has since filled the reservoir, limiting the dam's power output in dry months and eliminating its irrigation function, as well as inflicting damage that has required extensive rehabilitation of the dam and its equipment.⁴⁸

In its 1956-57 annual report, DCL noted that in the past five years, eleven major projects had been undertaken. Two, the Daudkhel cement plant in Pakistan and the Mayurakshi hydroelectric plant in India, had already been completed and turned over to the governments of the two countries, while it was anticipated that four more would be ready for hand-over early in the following fiscal year – the Ganges-Kobadak power

1957, 1, LAC, RG2, vol. 1891, file C-20-5 (1957), Cabinet Documents 301-350; McCully, *Silenced Rivers*, 269-271.

⁴⁷ "Colombo Plan Projects in India and Pakistan," 75; "Canada and the Colombo Plan," 389; "WAPDA – Power Generation". Revealingly, the residential installation for Canadian personnel at Warsak was called "the colony". See, for instance, Memorandum from ADM/Finance, "Colombo Plan – Warsak – Recent Developments," 18 June 1956, *DCER*, vol. 22, 1262.

⁴⁸ Other projects promised similar increases; the completed Kundah dam project in India, for instance, doubled the generating capacity of Madras State. Spicer, "Administration of Canadian Colombo Plan Aid," 171. Warsak's original planned output was 160 MW of electricity and the storage of water for the irrigation of 110,000 acres of previously unfarmed land. The reservoir has by now completely silted up, however, and no longer provides any water for irrigation, operating as a "run of the river" project, with its power output now dependent on the river's flow. While the dam's generating capacity has been increased to 240 MW, its output *peaks* at 100 MW during lean flow periods, which suggests that average output during this time may well be half of what had originally been planned and therefore possibly one-third of its current maximum capacity. Furthermore, problems due in part to silt in the river led to an extensive multi-year rehabilitation programme using Canadian assistance. Sedimentation that fills reservoirs and damages equipment is a fundamental and widespread problem with dams, as is the difference between generating *capacity* and actual *output*. In his work on dams, McCully argues that "despite more than six decades of research, sedimentation is still probably the most serious technical problem faced by the dam industry." McCully, *Silenced Rivers*, 107-112, 136-140; Norman Smith, *A History of Dams*, (London: Peter Davies, 1971), 241; "WAPDA – Power Generation".

project in East Pakistan, the Umtru power project in India, and the Fish Refrigeration Plant and Gal Oya transmission line in Ceylon. Despite the project's problems, at Warsak, "substantial progress" had been made.⁴⁹ The subsequent annual report noted that "exceptional progress" had been made during the year, with completion a possibility for 1960, when the four major projects mentioned above were in fact completed; in January of 1961 all Canadian assets at Warsak were formally handed over to Pakistan as part of Cabinet minister Gordon Churchill's tour of the area which featured a number of such inaugural ceremonies.⁵⁰ That same year, Keith Spicer put Canada's plan contributions to date in the context of other expenditures or potential expenditures – the \$331 million represented roughly the cost of "one St. Lawrence Seaway or several squadrons of Avro Arrow aircraft."⁵¹

By the start of the new decade, however, the major projects with which DCL had been involved since the early 1950s were either finished or nearing completion. By this time significant changes had taken place in the management of Defence Construction's involvement in the Colombo Plan. Discussions between officers of the Colombo Plan Administration and DCL officials in early 1957 led to the creation in March 1958 of a Memorandum of Arrangement between DCL and the Economic and Technical Co-operation Division of the Department of Trade and Commerce. Johnson would later

⁴⁹ DCL, *Annual Report*, 1956-57, 8-9. Morrison describes the fishery modernization and refrigeration plant as "a complete failure because it had been seen as a purely technical matter" based on then-prevalent theories of economic growth. Morrison, *Aid and Ebb Tide*, 35.

⁵⁰ Although Churchill was at the time Minister of Veterans' Affairs, he had been responsible for Colombo Plan projects between 1957 and 1960 as Minister of Trade and Commerce. DCL, *Annual Report*, 1957-58, 10; "\$1 Billion Defence Contracts Provided Jobs Here, Abroad," *Financial Post*, 21 February 1959, 54; DCL, *Annual Report*, 1957-58, 11; "Colombo Plan Projects in India and Pakistan," 75. Work on the Gal Oya transmission line in Ceylon was completed during the year, but as of the end of the fiscal year work was being carried out on additional requirements, with completion expected sometime in 1958-59. According to the 1959-60 Annual Report, the first two 40,000 KVA generators at the Warsak project were expected to come on line in May of 1960, with the remaining two scheduled to begin operation in September of the same year. DCL, *Annual Report*, 1959-60, 11.

⁵¹ Spicer, "Administration of Canadian Colombo Plan Aid," 170.

explain that it set out “in a general way the terms of reference and responsibilities of DCL in connection with the construction phase of the requirements of [the] Department.”⁵² At the time, he described the arrangement as “the same type . . . under which we act on construction matters for the Northern Ontario Pipe Line Crown Corporation and under which Central Mortgage and Housing Corporation acted for DCL when that Corporation played a large role on our behalf in the administration and supervision of construction contracts.”⁵³

In November of 1960, however, the Canadian government changed the way it administered Colombo Plan aid. The Economic and Technical Assistance Branch of the Department of Trade and Commerce was wound up, and an External Aid Office was created within the Department of External Affairs.⁵⁴ Defence Construction would continue its involvement with development projects after this change, albeit on a smaller scale. The corporation provided technical assistance and advice on engineering and construction projects, although the 1961-62 annual report noted that after the handover DCL’s role had been “mainly that of a technical consultant, with responsibility for administration of contracts transferred to the External Aid Office.”⁵⁵ In 1962-63, DCL supplied a project group of engineering, technical, and administrative personnel to provide full-time assistance to the Canadian Commercial Corporation (CCC) with

⁵² R.G. Johnson to A.O. Moran, 5 January 1961, DCC in-house file “Agreement Between Dept. of Trade & Commerce and Defence Construction Ltd. Re: Colombo Plan”.

⁵³ R.G. Johnson to Mitchell Sharp, 19 February 1958, DCC in-house file “Agreement Between Dept. of Trade & Commerce and Defence Construction Ltd. Re: Colombo Plan”. The Economic Technical Assistance Division had just replaced the International Economic and Technical Co-operation Division of the Department of Trade and Commerce. See also Minutes of Meeting of Board of Directors, 9 July 1957, DCC in-house file; T.B. Minute 518375 of 5 July 1957.

⁵⁴ R.G. Johnson described the transfer of responsibilities as “recent” in a 5 January 1961 letter to the Director General of the new External Aid Office. R.G. Johnson to A.O. Moran, 5 January 1961; Hilliker and Barry, *Canada’s Department of External Affairs, Volume II*, 178-180; Morrison, *Aid and Ebb Tide*, 38-44.

⁵⁵ DCL, *Annual Report*, 1961-62, 1, 6.

engineering and construction procurement for aid projects including the Colombo Plan. Until 1964, the group served as the construction administration unit for the External Aid Office; at that time, they were transferred to the Department of Defence Production, where they became part of its newly created International Programs Branch.⁵⁶ In the late 1960s and early 1970s, DCL would continue to provide similar services to the External Aid Office's successor, the Canadian International Development Agency.⁵⁷

Although Defence Construction Limited had been created to help meet defence infrastructure needs, involvement in the major Colombo Plan projects of the 1950s was significant for the corporation precisely because it was not, strictly speaking, a defence construction project, even if it did further the Canadian government's Cold War diplomatic goals. The company's involvement also marked the first time when DCL gained experience with making its employees available for other government undertakings – an option that would prove to be of increasing value in the 1960s as defence cutbacks inevitably led to staffing cutbacks and the corporation sought to maintain a core group of skilled employees and to justify its continued existence. DCL would continue its involvement with foreign aid through the mid-1970s, but in the meantime it would take part in other significant projects created to meet policy goals

⁵⁶ The transfer was made in order to simplify the department's takeover of CCC functions that resulted from the recommendations of the Glassco Commission. DCL, *Annual Report*, 1963-64, 5; DCL, *Annual Report*, 1964-65, II, 5. In accordance with recommendations from the Glassco Commission, the International Programs Branch was created in 1964, integrating the activities of the CCC and the United States and Overseas Divisions of DDP. The CCC, however, retained its corporate identity, even though its management and staff had been integrated with the Purchasing Department of DDP in November of 1963. Canada, Department of Defence Production, *Fourteenth Report*, 1964, (Ottawa: Queen's Printer, 1965), 20; DDP, *Thirteenth Report*, 1963, (Ottawa: Queen's Printer, 1964), 10; CCC, *Annual Report*, 1962-63, 5-6; *Annual Report*, 1963-64, 4-5; C.A. Ashley and R.G.H. Smail, *Canadian Crown Corporations: Some Aspects of Their Administration and Control*, (Toronto: Macmillan, 1965), 116-119.

⁵⁷ A.G. Bland, "40th Anniversary Letter from DCL's Immediate Past President," *Envoy*, vol. 5, no. 5, August 1991, 2. The Colombo Plan would continue to undertake a number of significant dam projects after DCL's involvement with such projects had ended; see, for instance, L.P. Goonetilleke, "Some Major Dam Projects under the Colombo Plan," *World Dams Today '70*, (Tokyo: Japan Dam Association, 1970), 96-100.

closer to home for the Canadian government. Among these undertakings was the Northern Ontario Pipeline.

North of Superior: The Northern Ontario Pipeline

Those of you who are familiar with the terrain from Kenora to Kapuskasing will have some appreciation of the problem of burying a 30" diameter steel pipe through the shield rock and muskeg for some 675 miles.

DCL President A.G. Bland, 1965.⁵⁸

If work on behalf of the Colombo Plan allowed DCL to help fulfill government policy objectives on the world stage, the corporation's involvement in the construction of the Northern Ontario Pipeline might better be described as helping C.D. Howe fulfill his nation-building policy goals on the home front. In the 1950s, Canadians were increasingly switching from coal to oil and natural gas as their principal domestic heating fuels. Trans-Canada Pipelines Limited (TCPL), a natural gas transmission company first incorporated in 1951, had by 1954 assembled Canadian and American business interests to build a pipeline linking Alberta gas supplies to Eastern Canadian markets. C.D. Howe and TCPL's founder, Clinton Williams Murchison, had agreed upon an all-Canadian route for the pipeline in 1951; for Howe, the argument in favour of the more economically feasible route south of the Great Lakes and through the United States, rather than through the rock and muskeg north of Lake Superior was outweighed by what Michael Bliss has described as "a mixture of sentimental nationalism and political pragmatism: the voters wanted an all-Canadian gas pipeline and there would be no Liberals elected in Northern Ontario if the region did not get gas." American involvement, however, prompted accusations that despite the all-Canadian chosen route

⁵⁸ A.G. Bland, speech to ACEC, 27 April 1965, 3.

Canadian interests were being sold out. Despite efforts to raise the necessary capital, TCPL still faced by April 1956 a considerable shortfall – it needed \$375 million to start construction, but had only raised some \$265 million.⁵⁹

Howe's executive assistant, Mitchell Sharp, suggested that a Crown corporation be created to build the stretch of pipeline through the difficult terrain north of Lake Superior and lease it to TCPL until the company could purchase it outright.⁶⁰ The resulting entity, the Northern Ontario Pipe Line Crown Corporation, would ultimately succeed in this task but would find itself in the midst of a significant and controversial Parliamentary debate. In late May of 1956, Howe had two weeks to obtain Parliamentary approval for the \$118 million necessary to build the pipeline. If the money was not available by early June, the resulting disruptions to pipe orders would delay completion by a year. There was considerable criticism of the bill, but singled out for even more significant attack was the decision to invoke closure to end the debate before the 7 June deadline.⁶¹ The bill was passed and the money made available on time, but the Pipeline debate further tarnished the reputation of Howe and the Liberals and contributed to their defeat in the following year's election.⁶² The infamous Pipeline Debate constitutes a dark day in Liberal historiography, but the sad tale none the less contains insights into DCL's utility as a federal agency. In view of Howe's role as creator of DCL and his intimate involvement with the Trans-Canada pipeline, it is ironic that DCL was involved in work

⁵⁹ Bliss, *Northern Enterprise*, 463, 473-474, 525-528; Robert Bothwell and William Kilbourn, *C.D. Howe: A Biography*, (Toronto: McClelland and Stewart, 1979), 283-303. The increasing production and distribution of Canadian natural gas in the latter half of the 1950s can be traced in the Dominion Bureau of Statistics' *Canada Year Book*.

⁶⁰ Mitchell Sharp, *Which Reminds Me... A Memoir*, (Toronto: University of Toronto Press, 1994), 61-63; Bothwell and Kilbourn, *C.D. Howe*, 303; William Kilbourn, *Pipeline: Transcanada and the Great Debate – A History of Business and Politics*, (Toronto: Clarke, Irwin & Company, 1970), 81-90.

⁶¹ Bothwell and Kilbourn, *C.D. Howe*, 303-316; Sharp, *Which Reminds Me...*, 63-65.

⁶² Bothwell and Kilbourn, *C.D. Howe*, 317-331; Bothwell, Drummond, and English, *Canada Since 1945*, 159-160; Bliss, *Northern Enterprise*, 473-474.

on the project that bears a great deal of responsibility for toppling Howe and the Liberal government of Louis St. Laurent in the 1957 federal election.

As with the Colombo Plan, DCL was put to use as an instrument to implement the government's – or perhaps more accurately C.D. Howe's – policy objectives. A Crown corporation with established expertise was ideally suited to Howe's "hurry-up" strategy on the pipeline. Much as it had with the Colombo Plan, Defence Construction provided Ottawa with a ready source of administrative and technical assistance, and advised on construction issues, in this instance to the Northern Ontario Pipe Line Crown Corporation (NOPL). The NOPL was established on 7 June 1956 "for the purpose of acquiring real and personal property for the construction, maintenance and operation of and constructing, maintaining, and operating the Northern Ontario section of the all-Canadian natural gas pipe line, and leasing the same to Trans-Canada Pipe Lines Limited, with an option to purchase."⁶³ It was authorized to borrow up to \$130 million from the federal government, and also to make short-term loans to TCPL for construction of the Western Section of the pipeline that stretched from Alberta to the Ontario border.⁶⁴ As a Crown corporation, NOPL was another of Howe's favourite entities, in this case one created and put to use for a very specific purpose.⁶⁵

⁶³ NOPL, *First Annual Report, 7 June to 31 December 1956*, 1; R.G. Johnson, "Defence Construction Programme and Practices," 99.

⁶⁴ During the first seven months of its existence, from 7 June to 31 December 1956, the corporation's only administrative expenses were related to the loaning of \$43.75 million to TCPL for construction of the Western Section of the pipeline and for the wintertime purchase and delivery of pipe for the following year's construction. It also borrowed money from the federal government for operating expenses and to begin construction of the Northern Ontario section of the pipeline early in 1957. NOPL, *First Annual Report*, 1-2.

⁶⁵ The creation of a special purpose Crown corporation was not a new idea. As noted in the discussion in Chapter 2 of the POLE VAULT tropospheric scatter communications link along the Labrador coast, the possibility of forming a Crown corporation solely for the construction of the project had been discussed between August and November of 1952, but was ultimately rejected in favour of having Bell Telephone undertake the task. A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, Canada, Department of National Defence, Directorate of History and Heritage (hereafter DHH) 78/512, 8-9.

To formalize the arrangements between NOPL and DCL, the corporations signed two agreements in 1956, one on 7 June, the other on 27 December. The first was for the provision of administrative and supervisory personnel, reviewing the estimates provided by Trans Canada Pipe Line Limited and reporting on the progress of construction work. The second was for construction and engineering services and administrative assistance for the construction of the Northern Ontario section, which involved DCL providing engineering liaison with TCPL, calling tenders, providing general field supervision, and providing progress and cost reports. In both cases, DCL was paid the salaries of staff involved in the work plus 50% to cover overhead costs.⁶⁶

By the end of 1956, TCPL had built much of the 34" main gas line from the Alberta-Saskatchewan border to Winnipeg, with financing provided by loans from the NOPL. On 26 February 1957, after providing evidence that it had made arrangements to finance the entire system with the exception of the stretch through Northern Ontario, TCPL repaid the outstanding principal on the loans along with 5% interest and NOPL's administrative expenses, an action which also discharged DCL's obligations under its first agreement with NOPL.⁶⁷ At that point, the federal government demonstrated its willingness to proceed with the construction of the Northern Ontario section of the pipeline. Under the terms of the agreement, NOPL would have the 30" line constructed

⁶⁶ "Agreement dated the 7th day of June, 1956 between Northern Ontario Pipe Line Crown Corporation and Defence Construction (1951) Limited"; "Agreement dated the 27th day of December, 1956 between Northern Ontario Pipe Line Crown Corporation and Defence Construction (1951) Limited," DCC in-house file "Agreement Between Northern Ontario Pipeline Crown Corporation and Defence Construction Limited"; DCL, *Annual Report*, 1956-57, 9; "History, Responsibilities & Operations of Defence Construction (1951) Limited," June 1957, 5; Minutes of Meeting of Board of Directors, 25 October 1956, DCC in-house file. A copy of the June 1956 agreement can also be found in LAC, RG58, vol. 227, file 3, "Northern Ontario Pipe Line - Perpetual File". This file also contains excerpts of minutes of the meetings of NOPL's Board of Directors and other documents providing further detail on NOPL and DCL's involvement with the corporation.

⁶⁷ NOPL, *Second Annual Report, Year ending 31 December 1957*, 1-2; DCL, *Annual Report*, 1956-57, 9.

and would lease it to TCPL, which would pay operating expenses, repairs and maintenance, taxes, and other upkeep expenses. The company also had the option of purchasing the pipeline once the government had received a return of 3.5% on its investment, with some credit given to the corporation for rental payments.⁶⁸

As a result of these decisions, pipe orders placed in the spring of 1957 by TCPL were taken over by NOPL, and contracts were let for construction of the first phase of the pipeline from the Manitoba-Ontario border to Port Arthur, Ontario. These contracts covered pipeline construction and three river crossings, and work on clearing the right-of-way for the second phase of the line, from Port Arthur to Kapuskasing, which began in early December 1957, although it was briefly delayed in January 1958 due to a labour dispute. Installation contracts for 367 miles of pipeline had also been let by the end of 1957.⁶⁹ The terrain crossed by the pipeline included considerable amounts of rock and muskeg. Such hard-rock conditions and the uncertain costs they might entail made Ottawa's inclination to employ Crown corporations understandable; private contractors would have been wary of such an obstacle. Some 220,000 tons of pipe would ultimately be required for the project, with deliveries in 1957 sufficient for construction and the building up of a stockpile for the 1958 construction season.⁷⁰ In early January of 1958, construction of the first phase of the pipeline was finished on schedule, and the line was tested and connected to the TCPL at the Manitoba-Ontario border. Natural gas from Alberta could now be supplied on a small scale to Kenora, Dryden, Fort William, and

⁶⁸ The agreement specified that under no circumstances, however, was the purchase price to be less than 70% of the capital cost of the section as initially built. NOPL, *Third Annual Report, Year ending 31 December 1958*, 3-4.

⁶⁹ NOPL, *Second Annual Report*, 3-4.

⁷⁰ 170,000 tons were ordered from mills in Canada and the United Kingdom, while the remainder came from the United States. *Ibid.*, 3.

Port Arthur, with plans to increase deliveries as the local distribution systems were expanded. By the spring of 1958, DCL's annual report noted, \$75 million had been expended on work on the pipeline.⁷¹

Contracts had been let in November 1957 for work on the second section of the pipeline, with clearing operations being completed during the winter, and completion of the pipeline itself scheduled for the fall of 1958.⁷² Construction of this second phase was completed on 10 October 1958, with tests completed and operations begun by the 22nd. Also completed during 1958 was a compressor station at Port Arthur which provided the pressure to maintain the flow of natural gas.⁷³ The completion of the second phase of the pipeline took place at the same time as the opening of the final section of the pipeline running eastwards to Montreal, Quebec, and natural gas from Alberta could now be delivered as far as Montreal by an all-Canadian pipeline.⁷⁴

During the construction effort, DCL had made a number of senior personnel available to NOPL and thus was closely involved with the pipeline's construction. Along with Mitchell Sharp, R.G. Johnson, DCL's president, served as one of NOPL's first board members. A.G. Bland, who would be Johnson's successor as DCL president, was project engineer during the line's construction, while Nick Tokaryk, DCL's Treasurer, was NOPL treasurer from 1 July 1961, and William Mulock served as NOPL Secretary from

⁷¹ *Ibid.*; DCL, *Annual Report*, 1957-58, 11.

⁷² *Ibid.*

⁷³ NOPL, *Third Annual Report*, 1-2.

⁷⁴ *Ibid.*, 3. Since the mid-1950s, a number of utilities in Ontario had been expanding their natural gas pipeline systems in anticipation of the arrival of the TCPL, while the demand expressed for this gas, once it arrived, was beyond initial expectations. Canada, Dominion Bureau of Statistics (hereafter DBS), *Canada Year Book 1957-58*, (Ottawa: Queen's Printer, 1958), 883; DBS, *Canada Year Book 1959*, 845-846; Bothwell and Kilbourn, *C.D. Howe*, 318.

the company's creation.⁷⁵ The Northern Ontario Pipe Line Crown Corporation's annual report for 1958 publicly acknowledged this assistance when it noted that

the work in completing the main line has proceeded with few administrative difficulties. The Board wishes...to express its appreciation for the continued cooperation afforded by the staff of Trans-Canada Pipe Lines Limited; also of the excellent work of the staff of Defence Construction (1951) Limited in exercising overall supervision of the construction of the line.⁷⁶

Similar acknowledgments were made in the corporation's 1959 and 1960 annual reports.

It is worth noting that despite the political stigma attached to the pipeline, the TCPL project was a brilliant engineering success, one that quickly repaid Ottawa its financial support and soon was delivering affordable Alberta gas to eastern Canada. DCL was instrumental in this success. The rapidly growing demand for the natural gas the new pipeline could provide was one of the strongest vindications of the project's basic principles. An increase in TCPL's delivery commitments beginning in November 1959 required additional pipeline capacity. As a result, NOPL planned to build three new compressor stations during the 1959 construction season at an additional cost of \$10.5 million.⁷⁷ Demand continued to increase, however, and plans were made for the construction of a new compressor station at Kenora and the expansion of the existing station at Port Arthur during the 1960 construction season. The completion of these two

⁷⁵ Sharp was Deputy Minister of Trade and Commerce, and the close relationship with the Department of Defence Production – another of Howe's areas of responsibility – was demonstrated by NOPL's first president, David Golden, who was Deputy Minister of Defence Production. Press release, 6 March 1957, LAC, RG49, vol. 563, file 200-14-1-8, "Northern Ontario Pipeline Crown Corporation"; W. Mulock, "Trans-Canada Pipeline (Northern Ontario, 1956-63)," *Envoy*, vol. 5, #5, August 1991, 14.

⁷⁶ NOPL, *Third Annual Report*, 5-6. Considerable challenges had to be overcome during the construction of the pipeline, and in a February 1959 speech to the CCA, R.G. Johnson described some of them. In the muskeg, pipe had to be held in place by concrete weights of three to five tons each. The 55,000 weights, placed every 11 or 24 feet for a stretch of 150 miles, required a total of 225,000 tons of concrete. Some 250 miles of the section was built through rock, requiring the use of shielding to protect the corrosion wrap on the pipe from damage by the rock. "\$1 Billion Defence Contracts Provided Jobs Here, Abroad."

⁷⁷ NOPL, *Third Annual Report*, 5. The three stations, at Ignace, Geraldton, and Parthia, eventually cost some \$11.7 million and were in operation by the end of November 1959, with some work remaining to be completed in the spring of 1960. NOPL, *Fourth Annual Report, Year ending 31 December 1959*, 1, 4.

installations in that year marked the end of the NOPL's construction programme.⁷⁸ While the line had been designed for an initial capacity of 300 million cubic feet per day, the installation of the additional compressors almost doubled this, allowing the line to deliver 530 million cubic feet per day. Ultimately, the total cost of the Northern Ontario pipeline, including the five compressor stations, came to \$129,856,316.⁷⁹ Although construction was finished by 1960, which brought an end to Defence Construction's main task of providing technical assistance to the corporation, DCL continued to provide NOPL with assistance in the administration of its lease agreement with TCPL until the 1963-64 fiscal year, during which time TCPL exercised its option to purchase, with DCL staff assisting with the negotiations involved in this transaction.⁸⁰

The pipeline had proved to be an engineering success but a political disaster. While the increasing demand for natural gas deliveries demonstrated that the completed pipeline was commercially viable, the methods used to make it possible – primarily the high-handed actions of Howe and the Liberal government in forcing through the relevant legislation – were politically catastrophic.⁸¹ The experience of the pipeline debate and the building of the Northern Ontario Pipeline demonstrated once again that there is a fundamental difference between the two apparently similar skills of knowing how to

⁷⁸ *Ibid.*; *Fifth Annual Report, Year ending 31 December 1960*, 1. Domestic sales of natural gas were increasing rapidly in the late 1950s; the Dominion Bureau of Statistics estimated that 1959 sales, for instance, had increased by 35% over 1958 levels. DBS, *Canada Year Book 1960*, (Ottawa: Queen's Printer, 1960), 554.

⁷⁹ NOPL, *Fifth Annual Report*, 2; NOPL, *Eighth Annual Report, Year ending 31 December 1963*, 1.

⁸⁰ DCL, *Annual Report*, 1961-62, 6. TCPL exercised its option to purchase the NOPL on 29 May 1963. After taking into account the rental payments from 1958 to 1963 and the requirements of the agreement, the purchase price was \$108,372,873. DCL, *Annual Report*, 1962-63, 5; *Annual Report*, 1963-64, 5; NOPL, *Eighth Annual Report, Year ending 31 December 1963*, 1-2.

⁸¹ Bothwell and Kilbourn, *C.D. Howe*, 307-331.

build something and knowing how to get it built.⁸² The political fallout from the debate that brought about the election of a Conservative government would have significant consequences for Canadian politics and inadvertently for DCL; these will be discussed below. In the meantime, shortly after the end of its involvement with the pipeline, DCL would find itself involved with a still larger project designed to further government objectives – the construction of a world exhibition intended to celebrate the centennial of Canada's confederation.

Expo 67

I would like to thank you for the hardworking efficiency with which Defence Construction (1951) Limited has supported our efforts.... When this Corporation was faced 3 years ago with building a tremendous organization, the action of the Canadian Government in making available to us an organized, experienced and efficient group, greatly lightened our task.

Expo Deputy Commissioner General R.F. Shaw to
Minister of National Defence Paul Hellyer, 4 April 1967.⁸³

One of the highlights of Canada's 1967 Centennial celebrations was the 1967 World's Fair, commonly known as Expo 67. As Peter Aykroyd explains in *The Anniversary Compulsion*, "Expo '67 was a mega project on a scale equal to the construction of the transcontinental railway or the St. Lawrence Seaway. The whole enterprise was beautifully conceived, planned, designed and brilliantly executed."⁸⁴ In his

⁸² This difference is noted and aptly described in a different context by Robert Caro. In his monumental biography of Robert Moses, Caro explains that in the early 1920s "to a few men, young engineers whose passion had been fired by a dramatic facet of their profession – the construction of highways – the Belmont Mansion [Moses' headquarters at the time] was Delphi. They came to it to learn, not just the engineering of great roads, for they could learn engineering elsewhere, but rather a secret available at that time nowhere else: *the secret of how to get great roads built.*" Robert Caro, *The Power Broker: Robert Moses and the Fall of New York*, (New York: Alfred A. Knopf, 1974), 10-11. Emphasis added.

⁸³ Letter tipped into "The DCL "Expo" Story," DCC In-house file.

⁸⁴ Peter H. Aykroyd, *The Anniversary Compulsion: Canada's Centennial Celebrations – A Model Mega-Anniversary*, (Toronto: Dundurn Press, 1992), 166-167.

elegy for Canada's centennial year, Pierre Berton would describe it as a "miracle", asking "how did we [Canadians] manage to pull off the greatest world exposition in history with about half the start-up time that most world's fairs require?"⁸⁵ Defence Construction Limited would, perhaps predictably, describe it more prosaically as "one of Canada's greatest displays of construction activity."⁸⁶ As a megaproject with significant construction requirements, it was not surprising that Expo 67 required expertise in many fields, and that substantial assistance in these areas was also needed. DCL was able to contribute to this multi-faceted effort through its experience in providing contracting, engineering and construction services, and in return was able to benefit through the retention of trained personnel in much the same way it had with the Colombo Plan and Northern Ontario Pipeline; the corporation would also point to this form of assistance to help justify its continued existence.

In a way, Expo 67 came about by accident. As far back as 1960, the Soviet Union had originally won the right to host the 1967 World's Fair, but withdrew two years later after concerns about large crowds, the internal security measures necessary to deal with the influx of foreign visitors, and other factors.⁸⁷ Official sanction for Canadian hosting of the fair, which had been discussed by Cabinet as far back as 1958 was granted by the Bureau of International Expositions on 13 November 1962, less than five years before the fair was to open. The Canadian Corporation for the 1967 World Exhibition (CCWE) was

⁸⁵ Berton, 1967, 256.

⁸⁶ "The DCL "Expo" Story," 2, DCC In-house file. For a concise overview of Expo, see Peter M. Warner, "Expo 67: Universal and International Exhibition of 1967," in *Historical Dictionary of World's Fairs and Expositions, 1851-1988*, John E. Findling, ed., (New York: Greenwood Press, 1990), 329-335.

⁸⁷ Berton, 1967, 256; Macdonald, *Expo 67*, 107-108. The Soviet government's concerns may have been motivated in part by the overwhelming reaction of its citizens to presentations from the western world. In 1959, for instance, the multi-screen "Glimpses of the USA" presentation that formed part of a "cultural exchange" in Moscow drew three million Soviet citizens during its six-week run. Pat Kirkham, *Charles and Ray Eames: Designers of the Twentieth Century*, (Cambridge, MA: MIT Press, 1995), 320-325.

created shortly thereafter to handle the task of planning, building, and operating the fair.⁸⁸ Prime Minister John Diefenbaker's fall from power in the 1963 federal election led to further delays as his government was replaced by Lester B. Pearson's; to further complicate matters the fair's theme of "Man and His World" was chosen only in May of that year.⁸⁹ Further delays were occasioned by the debate about the siting of the fair in the middle of the St. Lawrence River in Montreal, where Mayor Jean Drapeau had played a central role in obtaining the fair for his city.⁹⁰ The situation became even more uncertain when political disagreements between federal, provincial, and local governments led to the resignation of Expo's first top managers in August of 1963.⁹¹

By October, however, a new executive had been chosen and the location finalized in the middle of the St. Lawrence River, a site that caused consternation in some circles. Pierre Dupuy, the former Ambassador to France, became the CCWE's new Commissioner General, while Robert Shaw was appointed its Deputy Commissioner General.⁹² Shaw was President of the Foundation Company of Canada, and had earlier been loaned to the Department of Defence Production as DCL's Vice President and Chief

⁸⁸ Cabinet Conclusions, 29 October 1958, 8-9, LAC, RG2, series A-5-a, vol. 1899; Berton, 1967, 256-257; Aykroyd, *The Anniversary Compulsion*, 166.

⁸⁹ Berton, 1967, 257-258; Macdonald, *Expo 67*, 108-113.

⁹⁰ Berton, 1967, 259-261. During one of his visits to Ottawa, Drapeau had visited Lester B. Pearson while the latter was Leader of the Opposition. Pearson, who apparently remained quite skeptical of the project until Expo actually opened, recalled in his memoirs that he thought Drapeau's plans for Expo "quite literally out of this world," and that the site in the middle of the river "was one of the silliest things I had ever heard." Lester B. Pearson, *Mike: The Memoirs of the Rt. Hon. Lester B. Pearson, Volume Three*, (Toronto: University of Toronto Press, 1975), John A. Munro and Alex I. Inglis, eds., 306. For Pearson's skepticism, see Berton, 1967, 259-263, 275.

⁹¹ Paul Bienvenue, the first Commissioner General, and C.F. Carsley, the first Deputy Commissioner General, are described by Berton as "patronage appointments...party stalwarts from Montreal," and he argues that "the continuing political squabbles between three levels of government had soured them, or so they said. Certainly the Liberals made little effort to retain them." Berton, 1967, 257, 259.

⁹² Aykroyd, *The Anniversary Compulsion*, 168-169. For a description of the duties of the various executives, see Canadian Corporation for the 1967 World Exhibition (hereafter CCWE), *General Report on the 1967 World Exhibition, Volume I*, (Ottawa: Queen's Printer, 1969), 21-22. Extensive discussion of many of these matters, including the location for the exhibition, can also be found in Cabinet Conclusions for 1958 onwards.

Engineer. Later, when he had returned to Foundation, he played an important role in that firm's involvement in DEW Line construction.⁹³ Another CCWE executive familiar with DCL was Colonel Edward Churchill, the Director of Installations, who had been involved with the construction of airfields during the Second World War and the "Diefenbunker" at Carp.⁹⁴ In 1965, DCL president A.G. Bland would describe DCL's arrangements with the CCWE as "logical because we had something to offer which EXPO had to have and because of our past associations with Deputy Commissioner Shaw and Col. Edward Churchill."⁹⁵ This is a significant observation; Shaw's request that DCL become involved with Expo was used to influence Cabinet's decision on the issue, and these relationships undoubtedly facilitated DCL's work on behalf of Expo.

By the 1960s, DCL had arguably become synonymous with hurry-up competence; its availability for federal projects tended to assuage anxiety when the engineering odds seemed daunting. As an organization with demonstrated competence in the contracting and supervisory fields, Defence Construction (1951) Limited played an important role in the planning and construction of Expo 67. In addition to its benefits for the CCWE, this involvement was advantageous for DCL. As discussed at the beginning of this chapter, in response to the downturn in business, DCL both reduced staff and began to promote its

⁹³ *The Canadian Who's Who, Vol. X: 1964-1966*, (Toronto: Trans-Canada Press, 1966), 996. Foundation played up Shaw's career in a 1957 advertisement for the company. "Bob Shaw...From Ditches to DEW-Line," *Time* (Canadian Edition), 12 August 1957, 1. Berton claims that Shaw "came reluctantly to the job, his arm twisted by Ottawa." Given Shaw's extensive private sector background, Cabinet had foreseen the possibility of Shaw's appointment being controversial; in their 12 September 1963 meeting, some ministers "said that care must be taken to avoid any appearance of a conflict of interest between Mr. Shaw's position as Deputy Commissioner General and his past business associations." Pearson noted that this would be taken into account, "but [that] the overriding need seemed to be for a strong organization man with a business background." Shaw accepted the position and his appointment was confirmed a week later. Berton, 1967, 264; Cabinet Conclusions, 12 September 1963, 21; 19 September 1963, 12, LAC, RG2, series A-5-a, vol. 6254.

⁹⁴ Berton, 1967, 265-266. A joke at the time claimed that CCWE stood for "Colonel Churchill's World Exhibition"; he had retired from the military by the time he joined Expo. *Edward Churchill* should not be confused with *Gordon Churchill*, the former Conservative MP and Cabinet member.

⁹⁵ A.G. Bland, speech to ACEC, 27 April 1965, 5.

services in fields outside defence work. Expo was definitely in need of these services. While the city of Montreal would furnish the completed site to Expo, the CCWE was responsible for everything else. A central element of its task was the construction of the necessary infrastructure – in addition to the pavilions for various national, regional, and industrial displays, underground utilities were also needed, as were transportation systems to link the site to the city of Montreal, while the Habitat 67 housing project was erected on nearby Mackay Pier in the Cité du Havre.⁹⁶

On 9 December 1963 Cabinet approved the recommendation of the Minister of Industry, C.M. Drury, that the CCWE should use the services of DCL for engineering and construction services.⁹⁷ In a letter to the Minister of Public Works, Shaw had specifically requested that materials for Expo be purchased through the Montreal office of the Department of Defence Production, while construction services be retained through DCL's Montreal office. "The alternative to the proposal," Cabinet conclusions noted, "would be for the Corporation [CCWE] to set up its own construction branch and purchasing agency. If the latter course were to be followed, steps would have to be taken immediately to find the necessary personnel."⁹⁸ The Minister of Finance and other members "said that it seemed a very sensible proposal that the Corporation should use

⁹⁶ Expo required the construction of a site in the middle of the St. Lawrence River, where twenty-eight million tons of fill would be required to accommodate the fair site. Île Ste-Helene would double in size and a new island, Île Notre Dame, would be created nearby. CCWE, *General Report on the 1967 World Exhibition, Volume III*, (Ottawa: Queen's Printer, 1969), 1265-1266, 1270-1271; Berton, 1967, 262-263, 291.

⁹⁷ "Memorandum of Arrangement," 17 June 1964, DCC in-house file 967-200, "Agreement – Canadian Corporation for the 1967 World Exhibition and D.C.L."; Cabinet Conclusions, 09 December 1963, 5, LAC RG2, series A-5-a, Volume 6254. The Department of Industry had recently come into existence through the proclamation of the Department of Industry Act in July of 1963. DBS, *Canada Year Book, 1963-64*, (Ottawa: Queen's Printer, 1964), 677.

⁹⁸ Cabinet Conclusions, 09 December 1963, 5, LAC, RG2, series A-5-a, vol. 6254.

existing contracting services of the government rather than create duplicate staffs," and approved the request that Drury had made on Shaw's behalf.⁹⁹

According to its annual report and internal documents, however, Defence Construction's support to the CCWE had begun in either September or October of 1963, almost certainly before Shaw had made his official request and well before Cabinet had formalized such an arrangement.¹⁰⁰ The CCWE requested assistance with creating organizational procedures for construction, and DCL's recently appointed President A.G. Bland sent Secretary Norm Smith to draw up a procedures manual. DCL was then asked to run the contracting system, and Terry Kelly was sent down to Montreal to get things started, arriving 13 December 1963, and remaining almost four years until November 1967. Graham Lancaster, one of DCL's Construction Superintendents, was also loaned to CCWE.¹⁰¹ In effect, DCL's reputation had preceded its contractual role in Expo, a reflection of its reputation as one of Ottawa's preferred agents.

Following the Cabinet decision in December, DCL was put to work drafting a Treasury Board submission and an agreement with CCWE that would govern their relationship.¹⁰² By February of 1964 the Ministers involved had agreed to DCL's provision of services to the CCWE, and DCL sent the first draft agreement to the CCWE for consideration.¹⁰³ Substantial progress was made by April, and the Memorandum of

⁹⁹ *Ibid.*, 6.

¹⁰⁰ DCL, *Annual Report*, 1966-67, 13; "The DCL "Expo" Story," 1, DCC in-house file.

¹⁰¹ "Expo 67," undated document, DCC in-house file "History of DCL"; "The DCL "Expo" Story," 1; CCWE, *General Report*, Volume I, 22.

¹⁰² At that time, the precise nature of the services to be provided were still undecided – while the draft agreement limited DCL's involvement to construction services and excluded purchasing, it included site supervision and other services. A fee of employee salary plus fifty per cent to cover expenses set out in the draft was derived from the arrangements that had earlier been made for Colombo Plan services. DCL Inter-office Memo, J.D. Jennison to A.G. Bland, 3 December 1963, "Re: Canadian World Exhibition Corporation," DCC in-house file "Old Correspondence."

¹⁰³ A.G. Bland to R.F. Shaw, 14 February 1964, DCC in-house file "Old Correspondence."

Arrangement was signed on 17 June 1964. Its first provision was that "the Company [DCL] will supply to the Corporation [CCWE] such technical, advisory, supervisory and administrative services as may be required in connection with construction projects and service requirements for the Corporation."¹⁰⁴

DCL provided engineering and administrative assistance to the CCWE, consisting of technical advice, the development of tender documents and estimates for proposed projects, the reviewing of tenders, the making of recommendations for contract awards, and the drafting of submissions for administrative and government approval.¹⁰⁵ The CCWE noted in its final report on its contracts and procurement branch that

management...soon realized that it had an extremely difficult problem to solve; it had to construct in three years a fully operational site and then to disband the staff, to do the job efficiently and in a manner satisfactory to the three governments involved. This seemed next to impossible for various reasons. First, trained procurement staff was not readily available on the market. Second, even if such staff had been available, it would have had to be trained to follow a procedure acceptable to the three government levels involved, a rather difficult undertaking.

A solution was sought and found: existing government facilities and procedures were made use of. The Contracts and Procurement Branch was therefore organized in November 1963 with the support of the staff of Defence Construction Ltd. and the staff of the Department of Defence Production, two procurement agencies of the federal government. *Furthermore, it was decided to adopt the tender and contract procedures of Defence Construction Limited for the construction of the site.*

With the help of half a dozen engineers from DCL, the Branch managed to call over 1000 tenders, award as many contracts and negotiate several thousand extras, involving an expenditure of approximately \$200,000,000.¹⁰⁶

¹⁰⁴ Handwritten minute, Smith to Bland, 8 April 1964, on A.G. Bland to R.F. Shaw, 14 February 1964; Memorandum, Bland to Smith, 13 April 1964, DCC in-house file "Old Correspondence"; "Memorandum of Arrangement," 17 June 1964, DCC in-house file 967-200, "Agreement - Canadian Corporation for the 1967 World Exhibition and D.C.L."

¹⁰⁵ Scullion, "A Compended History of Defence Construction (1951) Limited," 10.

¹⁰⁶ CCWE, *General Report on the 1967 World Exhibition, Volume II*, (Ottawa: Queen's Printer, 1969), 705.

By turning to DCL, Shaw and Churchill had chosen an agency whose procedures and senior staff were familiar to themselves and to government, and whose personnel were familiar with government operations. Like the pipeline, the Expo project was one with a tight schedule – Expo 68 was not an option and, in these circumstances, Ottawa turned to the assured assistance of DCL to ensure no slippage occurred. At first, the assistance to Expo involved organizing and setting up the administrative procedures to cover tender calls, contract processing and awards, supervision work, and the certification of contractors' progress claims. As part of this effort, DCL had to develop contract documents, other forms, and administrative structures to deal with these requirements, and judging by the descriptions in the CCWE's final report, many of DCL's forms were transferred directly from its standard procedures. The next task for DCL was to aid negotiations with professional consultants for building and services designs, which resulted in the awarding of some 500 contracts.¹⁰⁷

DCL's "most prolific and long-lasting assistance" consisted of handling tender calls and the subsequent stages of contracts. Much of the administrative work was carried out in Ottawa and sent to CCWE for their approval and signature. The compiling of the tender advertisements, the drafting of the tender forms, assistance with the opening of tenders, the compiling and analyzing of the bidding results and the recommending of bidders were all areas where DCL was involved.¹⁰⁸ The CCWE's final report noted that the corporation had "benefitted greatly" from the "wide experience" of representatives from DDP and DCL who had attended the 390 meetings of the Committee on the

¹⁰⁷ "The DCL "Expo" Story," 1-2; CCWE, *General Report, Volume II*, 705, 707-711.

¹⁰⁸ "The DCL "Expo" Story," 2; CCWE, *General Report, Volume I*, 32-33.

Opening of Public Tenders.¹⁰⁹ DCL also drafted submissions to the federal and Quebec provincial Treasury Boards, requesting approval to enter into contracts. Following approval, tender acceptances were handled by the corporation, as were change orders for existing contracts. The latter involved perhaps more paperwork than any other form of assistance provided to Expo.¹¹⁰

While staff assistance from head office in handling contract-related paperwork formed an essential part of DCL's assistance to the CCWE, more direct forms of support were also provided. The three senior staff members mentioned above were provided on a full time basis, and all of them proved useful.¹¹¹ In addition to the supervisory services that were normal on such undertakings, the engineer (Terry Kelly) provided troubleshooting assistance with the various construction contracts, while the brief in-house DCL history of assistance to Expo anonymously praises the supervisor – probably Graham Lancaster – involved with Moshe Safdie's well-known Habitat 67. "Due to his analytical foresight," it for instance claims, "an unforeseen problem which faced the erectors was overcome".¹¹² In addition to the various DCL employees involved on a regular or short-term basis with the CCWE, other personnel, including the entire management team, were involved from time to time, by telephone conference or through periodic visits to Montreal. Their familiarity with standard government contracts meant that the DCL

¹⁰⁹ According to the CCWE, the representatives' "sound advice enabled the Corporation to perfect an efficient system for the award of contracts through public tender similar to the one existing in the various government bodies." *Ibid.* The Canadian Construction Association – an organization which had a long-standing working relationship with DCL – also had a representative at the meetings in order to act as an observer and representative of the Canadian construction industry. CCWE, *General Report, Volume II*, 718.

¹¹⁰ "The DCL "Expo" Story," 2-3; CCWE, *General Report, Volume II*, 705-734.

¹¹¹ "The DCL "Expo" Story," 3.

¹¹² *Ibid.* Safdie's account of the construction process mentions a number of problems that were encountered, but does not shed any definite light on the problem to which this comment refers; it might possibly be the creative use of two cranes to lift the cast boxes into place. Moshe Safdie, *Beyond Habitat by 20 Years*, (Montreal: Tundra Books, 1987), 125-133, especially 126-127. The supervisor was presumably Graham Lancaster, but the original DCL document does not provide names.

executive, especially Legal Adviser J.D. Jennison, were frequently asked for opinions and advice.¹¹³

An important technique brought to the Expo project, quite possibly by DCL, was the use of the critical path method (CPM) of scheduling and control of projects.

According to the CCWE's final report, CPM was introduced in September of 1963, when

the management of the CCWE was advised by the Consultants who had completed a preliminary study, that the Expo Project could not be built in the time remaining. The CCWE Management ordered changes to be made and a new group considered the possibility of using the most advanced management techniques available. On the basis of this further investigation, the signal was given to start. The new DAY ONE for the Expo Project was November 11, 1963. Negotiations between the International Exhibitions Bureau and CCWE were quickly finalized, and included in the terms of agreement to be used between Participants and CCWE, was the necessary legal phrasing which was to bind all parties to the agreement, to the use of the Critical Path Method for all project planning."¹¹⁴

The report also claimed that

there was little if anything which could be used as a precedent of the Management Information System (using the Critical Path Method) which was to be the means by which the Department of Installations was to function. A Management Consulting Firm was put under contract. It brought trained personnel with it and their experience in the use of the Critical Path Method applied to Construction planning and management.¹¹⁵

The Department of Installations was, of course, headed by Edward Churchill. While Pierre Berton has claimed that he introduced CPM to Expo directly from the United States, as discussed in the previous chapter both Churchill and DCL had experience with the method, at least some of which was gained while working together.¹¹⁶ CPM had been

¹¹³ "The DCL "Expo" Story," 3.

¹¹⁴ CCWE, *General Report, Volume III*, 1282.

¹¹⁵ *Ibid.* Berton also notes the utility of CPM in dealing with government. Its identification and tracking of critical items allowed Expo officials to persuade government officials to deal with the items expeditiously, lest they be identified as the people who had held up Expo's completion. Berton, 1967, 267.

¹¹⁶ Pierre Berton claims that "Churchill borrowed the "critical path" method from the U.S. space program, expanding and adapting it for Expo." *Ibid.*, 266-267. As explained in the previous chapter, CPM is a project management technique offering the possibility of considerable savings in time and money in comparison

used for the EASE and BRIDGE sites in the early 1960s with which Churchill and DCL had been involved. In a 1992 letter to head office, Len Harper, a retired DCL engineer, recalled that between early 1961 and July 1962, "we had the first experience with Critical Path Planning when a guy named Smith came out from Ottawa with Col. Ed Churchill (later of Expo fame) and with the contractor made the CP [critical path] drawings for the concrete portions of the building and the plan worked." This was not an isolated event; the company's 1962-63 annual report noted that "particular attention was given this year to the training of DCL staff members in the use of the "critical path" method of scheduling and control. The use of this relatively new technique as an instrument in the forecasting and control of completion dates was promoted,"¹¹⁷ while a 1965 *Daily Commercial News* article about DCL noted that the corporation and DND were among the first in Canada to use the critical path method for planning and scheduling of projects.¹¹⁸ While the CCWE's final report makes no mention of Defence Construction's involvement in this particular field, the experience and familiarity with CPM brought to the project by Churchill and DCL would undoubtedly have proved useful.¹¹⁹

with older planning and scheduling methods. CPM examines the project activities that have the least amount of flexibility in their scheduling and then produces a schedule based on a "critical path" through these activities.

¹¹⁷ Leonard H. Harper to Glen G. Taverner, 20 July 1992, DCC in-house file; DCL, *Annual Report*, 1962-63, 7. See also DCL, *Annual Report*, 1961-62, 8; 1964-65, 1.

¹¹⁸ Ben Dworkin, "Ottawa Today: Defence Construction Limited," *Daily Commercial News and Building Record*, 21 April 1965. By that date, the interest of Canadian firms in the subject was widespread; one journalist in the construction field noted that although the industry had adopted a slow and cautious approach to the subject due to a "prove-it-to-me" attitude, "most firms in the multimillion-dollar-a-year class have made the changeover readily." Walter Rooke, "Critical path method saving millions of building dollars," *Financial Post*, 12 September 1964, 9. Contemporary discussions of CPM were widespread in trade and specialist publications; among others, see B.B. Hercus, "Planning and Scheduling with CPM (Critical Path Method)," *Industrial Canada*, October 1963, 36-40; Dennis Peters, "An Introduction to CPM," *RAIC Journal*, 41:4 (April 1964), 63; Ian McKenzie, "The Critical Path Method of Scheduling," *RAIC Journal*, 41:4 (April 1964), 64-67.

¹¹⁹ CCWE, *General Report, Volume III*, 1279-1291. Praise for CPM's role in the planning and construction of Expo was widespread and remains a theme in subsequent descriptions, but the method was by no means universally appreciated. See "Problems of Construction," *Progressive Architecture*, June 1967, 150-151.

Expo 67 opened on schedule on Friday, 28 April, 1967. By the time it closed in October, some 50,306,648 people had visited the fair. To that date, it was the largest and best attended six-month exhibition ever held, and it remains the best attended of any such North American events.¹²⁰ Following the opening of Expo, DCL administrative assistance included minor contracts for the completion of buildings and services, as well as for maintenance. Support continued through the 1967-68 fiscal year, even after Expo had closed to the public, although according to the company's annual report it was "limited to completing the administrative details of various contracts."¹²¹ By the end of its commitment in April 1968, DCL support for the CCWE had involved the co-ordination of 712 various types of contracts with a total value of \$139,804,174.22; 2,617 change orders for contracts with a total value of \$26,229,282.59; the analysis and preparation of 226 Treasury Board and Privy Council submissions; and the submission of 40 reports to the Treasury Board covering contracts awarded under pre-approved Orders-in-Council.¹²² Once again, DCL had proven itself as Ottawa's engineering handmaiden.

The CCWE-DCL Memorandum of Agreement provided that the employee's salary plus 30% for administration and indirect costs was recoverable by DCL, although the original figure in the draft agreement had been 50%. Travelling and living expenses were also recoverable, and between October 1963 and April 1968, DCL recovered \$250,000 in costs from the CCWE. Defence Construction would subsequently argue that this represented a savings over the costs to CCWE had Expo attempted to hire comparable personnel to work directly for them. Direct hiring, DCL estimated, and

¹²⁰ Berton, 1967, 272; Warner, "Expo 67," 334.

¹²¹ During the year, 281 contracts and 878 change orders were drafted for the CCWE. DCL, *Annual Report*, 1967-68, 14.

¹²² DCL, *Annual Report*, 1968-69, 14; "The DCL "Expo" Story," 4, DCC In-house file.

argued in its defence, would have cost in well in excess of \$300,000, while the use of consulting firms would have driven the costs up into the \$600,000 range. Equally experienced people would have been unavailable on the job market, DCL claimed, which meant that more personnel would have had to have been hired to perform the same tasks, and salaries would also have had to be higher to compensate for the relatively short term of the jobs.¹²³ The corporation's activities, in other words, were presented as a case of providing value for money to Canadian taxpayers.

Defence Construction's brief in-house history of these events, entitled "The DCL Expo Story," noted that "this story has been recorded with two principal thoughts in mind. First, this sort of experience is too soon forgotten even by the participants. Secondly, it is an extremely fine example of the manner in which the Crown Corporation can react successfully to an urgent and important requirement."¹²⁴ The second point contains echoes of Howe's pragmatism and rationale for the corporation's creation and continued operation. DCL's account would also note that "it would be safe to assume that the general public was not aware that a federal Crown Company was behind the scenes in developing and assisting in one of Canada's greatest displays of construction activity,"¹²⁵ and argue that

as far as is known – no other agency, federal or provincial, had the trained expertise in this particular area of operations, namely, the ability and organization to quickly set up tender calls on a wide field of construction projects, to analyze the tenders and draft and process the data to the award stage as well as to

¹²³ "The DCL "Expo" Story," 4-5. Shaw to Hellyer, 4 April 1967, appended to "The DCL "Expo" Story". The figure of 50% had been used in comparable arrangements for the Colombo Plan and the Northern Ontario Pipeline. Minutes of meeting of Board of Directors, 25 October 1956, 9 July 1957, DCC in-house file. T.B. Minute 518375 of 5 July 1957 confirms the arrangements for the provision of Colombo Plan services to the Department of Trade and Commerce.

¹²⁴ "The DCL "Expo" Story," 5.

¹²⁵ *Ibid.*, 2.

subsequently process the many contracts and contract change orders essential to completion.¹²⁶

These and comparable services that Defence Construction had offered to the federal government through the Colombo Plan, the Northern Ontario Pipeline, and Expo 67 demonstrated the corporation's utility as an instrument of policy in areas outside of its original and usual function in the provision of military infrastructure. They also demonstrated the corporation's internal ability to retool itself for a changed business environment; this was no inert public enterprise, but instead one with managerial verve and forethought. Consequently, this readjustment and the projects it brought also proved beneficial to DCL by allowing the retention of a core group of skilled employees when the changing patterns of the Cold War and Canadian and American defence policies caused a decline in the corporation's volume of business following the high point of the mid-1950s. DCL would also argue that its expertise in such areas, because of its utility to government, was also a point in favour of the corporation's continued existence when its future was threatened during a time of change in government organization. These challenges to the corporation were tangible. Beginning in the late 1950s, a series of changes, both proposed and actual, to DCL's bureaucratic environment promised to change its ordinary ways of operation and even threatened to bring an end to the corporation as an independent entity.

Changes Internal and External

The decline in Defence Construction Limited's volume of business beginning in the latter part of the 1950s reflected broader changes in the course of the Cold War and in American and Canadian responses to these changes. The advent of the intercontinental

¹²⁶ *Ibid.*, 1.

ballistic missile brought an end to the major air defence programmes that had composed a significant portion of defence infrastructure programmes in Canada, while defence budget cutbacks in both countries, but particularly in Canada, also had their effects. In addition to the challenges DCL faced as a result of these alterations in the broader defence environment in the last years of the 1950s and the first half of the 1960s, DCL confronted and accommodated change in a number of other areas. Internal change centered around the loss or departure of some key management figures in the early to mid-1960s, while external changes to the organization of Canada's public service also promised to substantially alter the corporation's freedom to hire and fire employees, a threat that was taken quite seriously. Finally, and perhaps most importantly, the consequences of the Royal Commission on Government Organization and the 1964 Defence White Paper would bring an end to relationships that had existed since DCL's inception. Changes in departmental organization and most importantly in the structure of the Canadian military would have profound effects on Defence Construction Limited as it entered the second half of the 1960s, changes that DCL's management could not adjust to as readily as it had the shrinking of Cold War opportunity.

Internal Change: The First Generation of Management Departs

Following an extraordinary degree of continuity in the corporation's first decade of existence, a number of Defence Construction's senior management and administrative personnel left the company during the early 1960s. Most notably, the corporation's president, R.G. Johnson, resigned his position at the end of June 1963, but remained involved with the construction industry, becoming Executive Vice-President of the

Canadian Institute of Steel Construction.¹²⁷ Alan Goldworth Bland was chosen as Johnson's successor and Defence Construction Limited's second president. Bland had been with the Canadian Mortgage and Housing Corporation from 1951, and joined DCL on 14 January 1954, where he was appointed Engineer-in-Charge of Navy and Defence Research Board Projects. Later that year, he was promoted to Engineer-in-Charge of RCAF Projects, arguably the largest and most significant division at the time, given the preponderance of air defence projects in DCL's workload. In June of 1956 he was loaned to the Northern Ontario Pipe Line Crown Corporation, whose activities were discussed above, returning to DCL in July of 1959 where he was appointed Head Office Administrative Engineer. Three years later, Bland was promoted to Assistant Chief Engineer (Construction Planning), and shortly thereafter was chosen to attend the prestigious National Defence College in Kingston, Ontario. On 28 June 1963, he was appointed President and General Manager of Defence Construction (1951) Limited.¹²⁸

Other senior management positions also experienced turnover during the early 1960s. Assistant Chief Engineer Claude Maxwell died shortly before the end of May 1962, while J.D. Jennison tendered his resignation as Secretary effective 24 February 1964. At the request of Bland, however, he agreed to stay on another year as Legal Adviser, but in fact remained involved with the corporation in various ways for another sixteen years until his death in 1980.¹²⁹ A few months after Jennison's resignation, J.P.

¹²⁷ Minutes of meeting of Board of Directors, 26 June 1963; A.G. Bland, "40th Anniversary Message from DCL's Immediate Past President," *Envoy*, vol. 5, no. 5, August 1991, 2; *Canadian Who's Who, 1964-66*, 549.

¹²⁸ This information is taken from a one page personal history of A.G. Bland in the Bland personal information file at DCC Head Office, and from *Canadian Who's Who, 1964-66*, 93.

¹²⁹ Jennison had been with the company since its inception in 1950. He would remain Legal Adviser until for a number of years, and a legal consultant to the company until his death in July of 1980. Minutes of meeting of Board of Directors, 30 May 1962, 30 January 1964; DCL, *Annual Report, 1968-69*, 18; *Annual Report, 1980-81*, 24.

Stirling retired as Chief Engineer and one of the company's directors, a position he had held since 1955.¹³⁰ With these changes, DCL lost some of the valuable corporate experience it had been acquiring since 1950; not until the mid-1970s would the company experience a similar wave of retirements and deaths among senior personnel.¹³¹

Finally, events in the mid-1960s brought significant change to DCL's board of directors. Board and shareholder meetings – both had the same members – in the early 1950s had been perfunctory and superficial at best, and were held annually in order to discharge the legal obligations for the corporation's continued existence. Beginning in the mid-1950s, however, and especially after the 1957 federal election that brought the Conservatives to power, these meetings became more frequent and discussed DCL's operations and future outlook in more detail. This was undoubtedly motivated in part by the change in governments, the departure of C.D. Howe, and the arrival of a series of new ministers, but the growing complexity of the programmes and the negotiation of their construction provisions may also have contributed to this change.¹³² While there was a slow turnover of board members in the 1950s and early 1960s, the composition of the board changed quickly and substantially as a result of the 1965 Memorandum of Understanding with the Department of National Defence, which is discussed below. Since the corporation's inception, the board had been composed of senior personnel from

¹³⁰ Stirling tendered his resignation effective 1 July 1964. Minutes of meeting of Board of Directors, 11 June 1964; *Canadian Who's Who, 1961-63*, 1070-1071.

¹³¹ Chief Engineer L.D. Briden died in mid-1975, while J.C. Gillies, the manager of the Pacific Branch Office since 1966, also died in 1975-76. During the 1976-77 fiscal year, D.W. Laird of the engineering division, who had been with the company since its early major projects, also died. At the end of 1976, N.J. Smith retired from his position as Secretary of DCL, a duty which he had performed since the mid-1960s. At the beginning of the 1977-78 fiscal year, Trevor D. Heavens, who had previously been in the private sector in Montreal, was appointed DCL Treasurer, succeeding Nick Tokaryk, who had been with DCL since the 1950s. In the same year, J.K. Hurst, Chief of the Tender Call and Tender Review section, died. DCL, *Annual Report, 1975-76*, 19-20; *Annual Report, 1976-77*, 19, 20; *Annual Report, 1977-78*, 21.

¹³² One of the measures taken in 1957 was the preparation of a short history of the corporation for the incoming minister. Minutes of meeting of Board of Directors, 9 July 1957.

the Department of Defence Production or some of its other Crown corporations. At the end of May 1965, the existing board, which was composed of DCL and DDP officials, was replaced by a board of senior DDP and DND personnel.¹³³ These changes reflected DCL's new relationship with National Defence that had been formalized by the Memorandum of Understanding, and also arguably marked the end of many of the corporation's direct links with Defence Production. This last point was hardly surprising; as will be seen below, by 1965 DDP was on the way out, supplanted by a new Department of Industry.

External Enquiries and the Promise of Change: The Heeney Report and DCL Employees

While resignations and deaths brought changes in senior positions, the corporation was quite used to comparable turnover in other areas; as discussed earlier, DCL made extensive use of personnel from the private sector to meet its needs for experienced staff,¹³⁴ and came to rely upon using such people, releasing them back to industry as corporate demands dictated. As a Crown corporation, Defence Construction Limited was responsible for implementing its own employment practices, and was thus able to hire and fire employees free from the regulations of the Civil Service Commission (CSC). While some conditions had been laid down by C.D. Howe at the time of the termination of its management agreement with CMHC, the corporation appears to have

¹³³ The composition of the board, and the departmental affiliations of its members, is published at the beginning of every annual report until 1965-66. Minutes of meetings of Board of Directors, 31 May 1965, 1 June 1965. Both Johnson and his successor, A.G. Bland, served on the board of the Crown Assets Disposal Corporation; Johnson from 1958 to 1963, and Bland from 1963 to 1968. CADC, *Annual Report*, 1958-59, 1962-63, 1963-64, 1967-68.

¹³⁴ Johnson, "D.C.L. at Home and Abroad," 111-112; Ben Dworkin, "Ottawa Today: DCL's important roles," *Daily Commercial News and Building Record*, 16 March 1965.

been left largely to its own devices in this field.¹³⁵ A re-examination of government employment practices undertaken as part of civil service reform, however, would challenge these basic elements of corporate policy, and DCL management would react strongly in an effort to protect its interests.

By the early 1950s, the federal government was increasingly concerned about deficiencies with the existing system for personnel management in the growing civil service. "Big government" was beginning to recognize that it needed to modernize its management skills. In 1957, following two committees' investigations of the subject, A.D.P. Heeney, who was at the time Canada's ambassador to the United States, accepted the chairmanship of the Civil Service Commission with a mandate to review and revise the Civil Service Act. While the change in governments later that year brought short delays to the process, by December of 1958 the report on personnel administration in the public service, better known as the Heeney Report, was complete.¹³⁶ It recommended a series of changes to the Civil Service Act and to the role of the CSC; in Heeney's words, "they were aimed at providing a larger degree of independence in administration, decentralizing much of management, providing common standards throughout the service, and introducing a means of employee participation in pay determination; in fact at bringing the service up to date, and all of this without derogating the merit system."¹³⁷

¹³⁵ These conditions were discussed in Chapter One.

¹³⁶ CSC, *Personnel Administration in the Public Service*; J.E. Hodgetts, William McCloskey, Reginald Whitaker, and V. Seymour Wilson, *The Biography of an Institution: The Civil Service Commission of Canada, 1908-1967*, (Montreal: McGill-Queen's University Press, 1972), 233-251.

¹³⁷ Heeney, *The things that are Caesar's: Memoirs of a Canadian public servant*, (Toronto: University of Toronto Press, 1972), 151. The merit system as a basis for classification and promotion and as a defence against patronage and political interference within the Civil Service was a central principle of the 1918 Civil Service Act. Hodgetts *et. al.*, *The Biography of an Institution*, 52-53. See *ibid.*, 461-496, for a discussion of some of the problems arising from the administration of the merit system.

Of the greatest significance for DCL were the report's recommendations concerning the operating autonomy of organizations, including Crown corporations, whose activities were currently exempt from the Civil Service Act. An entire appendix was devoted to the issue, and the commission concluded that with very few exemptions all of the agencies currently exempt from the Civil Service Act should come under its control. A small group of agencies carrying out "commercial or industrial operations to produce goods or supply services for the use of either the Crown or the public or both" were listed for exemption, but DCL was not among them.¹³⁸

The corporation valued its autonomy and flexibility in managing personnel, and the reaction of its senior administration to the report's recommendations was predictably unfavourable.¹³⁹ Part of the procedure for the translation of the report into legislation involved the circulation of first and second drafts to departments and staff associations for their comments, and DCL would appear to have been included in this distribution; at the very least, the corporation received copies of the report itself.¹⁴⁰ At an early February 1960 meeting of the Board of Directors, R.G. Johnson

¹³⁸ CSC, *Personnel Administration in the Public Service*, 140-141. While the report was still being prepared, Heeney had noted in a 1958 speech to the Canadian Political Science Association that "there is one other important question affecting the role of the Commission that can be no more than mentioned. What should be done about the thousands of Federal Government employees now excluded from the operation of the Civil Service Act? What criteria should be used for the exemption of many who work not only for Crown corporations, boards, commissions and other agencies, but also as "prevailing rates" employees and "casuals" for regular departments? This – in the popular phrase – is a \$64 question. Along with the other less challenging questions, it is one which will have to be confronted in the course of Civil Service Reform, 1958." A.D.P. Heeney, "Civil Service Reform – 1958," 44-45, paper delivered to annual meeting of Canadian Political Science Association, Edmonton, 6 June 1958. LAC, MG30 E144, vol. 11, file "Speeches April 1957, 1958 – General". According to his memoirs, and as can be seen from his papers, Heeney delivered a number of speeches across the country on the subject of Civil Service reform. Heeney, *The things that are Caesar's*, 148.

¹³⁹ For examples of these statements on autonomy, see A.G. Bland, speech to ACEC, 27 April 1965, 4-5; Bland address to FMC/CCE conference, 1 March 1978, 4, DCC in-house file "Bland Speeches (historical file)".

¹⁴⁰ Samuel H.S. Hughes, "The New Civil Service Act," *Public Personnel Review*, 23:1 (January 1962), 16.

advised the directors that the Heeney Report had been reviewed by D.C.L. and a memorandum was now being prepared for presentation to the Minister dealing with D.C.L.'s very real need for prompt and effective facilities for hiring and discharging staff. Without these, D.C.L. could not properly service jobs in the field nor maintain the economies it had achieved.¹⁴¹

Late in April, Johnson dispatched the memorandum to Raymond O'Hurley, the Minister of Defence Production.¹⁴² At an October meeting of the board, Johnson advised its members that the memorandum reviewing the Heeney Report had been presented to the minister, and that "it emphasized the necessity for D.C.L. to retain flexibility in hiring and discharging staff in order to continue to operate economically under conditions of fluctuating volume."¹⁴³ In a 1965 speech, Johnson's successor, A.G. Bland, would point to the flexibility of the corporation in hiring and firing in response to demand. In three months in 1955, for instance, the corporation had hired 151 personnel, while in the 16 months after its peak in July of 1956, personnel were reduced from 832 to 453, a reduction of some 45%. In the 18 months before his April speech, staffing had been reduced by 35% from 307 to 197.¹⁴⁴ Those released from the corporation, Bland claimed, had had little difficulty in finding new jobs due to private sector demand for personnel. "Certainly" Bland argued, "we feel that our experience has demonstrated that a Crown Company can have the best of both worlds – the advantages of the corporate set-up – the philosophy of private enterprise in the concepts of urgency, flexibility, hiring, firing – but the benefits of superannuation and the use of government facilities."¹⁴⁵

¹⁴¹ Minutes of meeting of Board of Directors, 11 February 1960.

¹⁴² Johnson to O'Hurley, "Re: Defence Construction (1951) Limited and the Civil Service Commission," 27 April 1960, DCC holding, unlabelled folder.

¹⁴³ Minutes of meeting of Board of Directors, 21 October 1960.

¹⁴⁴ Bland, speech to ACEC, 4.

¹⁴⁵ *Ibid.*, 4-5.

In addition to being the basis for an argument that served DCL's interests, flexibility in staffing was a characteristic often lacking in the civil service; the Royal Commission on Government Organization whose report followed a couple of years after the Civil Service Commission's work would point to time "from identification of need to appointment [that] varies from a low of nine months to as much as two and one-half years," and also noted that the system "encourages the retention of unneeded positions because departments must forecast from nine months to two and one-half years in advance, often without adequate policy direction and in an atmosphere of uncertainty as to whether programmes are to be approved."¹⁴⁶ DCL itself would later point to Department of National Defence experience with delays in filling engineering and architect positions that ranged from six months to two years. As the company's president would explain in 1978, C.D. Howe had been acutely aware of the delays occasioned by the existing Civil Service system at the time he created DCL, and that these had been one of the reasons why he had chosen "the quasi-business structure of the Crown corporation."¹⁴⁷ The subsequent experience of Defence Construction Limited had been that in order to best discharge its obligations in the most economical manner, hiring and firing had to take place much more rapidly than the system described in the Royal Commission's report. Small wonder, then, that the corporation's senior management sought to defend this area of freedom of activity, although the experience and perspective

¹⁴⁶ Canada, Royal Commission on Government Organization (hereafter RCGO), *Report, Volume I: Management of the Public Service*, (Ottawa: Queen's Printer, 1962), 358-359.

¹⁴⁷ "A Memorandum to the Special Committee Considering Recommendations of the Royal Commission on Government Organization – Report #5 – Real Property," n.d., DCC in-house file 011-3, "Information – Historical – DCL Integration with Department of National Defence and Working Arrangements"; Bland, address to 1978 annual FMC/CCE conference, 4. For earlier statements by Howe on these and other perceived benefits of Crown corporations, see Bothwell and Kilbourn, *C.D. Howe*, 89-92.

of senior personnel coming to DCL from the private sector undoubtedly also had a bearing on this point of view.¹⁴⁸

Ottawa had found itself caught in a dilemma – operational expediency versus the merit principle – and in DCL's case the two were irreconcilable. Ultimately, the corporation would retain its autonomy from the Civil Service Act, although it is unclear how persuasive Johnson's memorandum and any arguments made by O'Hurley were in the overall debate.¹⁴⁹ As passed, the new act incorporated most of the recommendations contained in the Heeney Report, with the exception of the modification of preference for veterans, and, more importantly for DCL, the extension of the act to cover parts of the public service to which it did not already apply.¹⁵⁰ As the new Chairman of the Civil Service Commission, H.S.H. Hughes, explained in early 1962, the government had decided against extending the application of the Act "for a variety of reasons, one of them being the number of changes that would be immediately required in other legislation to give effect to it. Consequently, the new act, on proclamation, will apply to the same portion of the public service as did the old act."¹⁵¹ DCL had weathered this external effort at altering its internal operations, but shortly thereafter it would experience a series of

¹⁴⁸ In comments that seem to uncannily describe the situation of DCL and the attitudes of its management, the Heeney Report noted that "recruitment from the upper ranks of business of many administrators for these agencies strengthened the tendency to avoid what were regarded as the rigid and cumbrous rules which governed the Civil Service. Tight labour supply situations, such as existed during and after World War II, led to a shortage of those with the specialized professional and technical training required by these agencies. These conditions provided a strong argument for what was often complete freedom to recruit staff wherever and whenever it could be found and to prescribe conditions of employment which were considered appropriate to the special circumstances of each agency." CSC, *Personnel Administration in the Public Service*, 136.

¹⁴⁹ Once again, the absence of the DDP file block covering DCL, which might have shed further light on this and other issues, must be regretted.

¹⁵⁰ Hughes, "The New Civil Service Act," 19; Hodgetts *et. al.*, *The Biography of an Institution*, 276. In their study of the Civil Service Commission, Hodgetts *et. al.* argue that the basic philosophy of Heeney's report had been substantially altered by the time the legislation was prepared. *Ibid.*

¹⁵¹ Hughes, "The New Civil Service Act," 19. Hughes noted, however, that "the new act has been drawn in such a way, however, that it will be a relatively simple matter to bring other portions of the public service under its jurisdiction if the government so decides."

changes as a result of even more substantial modifications to its external bureaucratic environment.

Civil service review and reform would prove to be but the first of a number of organizational challenges faced by DCL beginning in the late 1950s. The 1957 change in governments that was in part caused by the debate surrounding the Northern Ontario Pipeline discussed earlier in this chapter drove a number of these changes and would have lasting consequences for Canadian politics as well as for DCL. In addition to the obvious transformations associated with government by a different political party and the appointment of new minister, the advent of Diefenbaker's Conservatives also paved the way for a re-examination of government organization through the Glassco Commission, whose recommendations would have far-reaching implications for Defence Construction Limited.¹⁵²

External Changes I: the Glassco Commission

Heeney's recommendations, while a challenge to established DCL employment practices, were made in the pursuit of change that ultimately proved far less substantial than the efforts at reorganization that followed soon afterwards. The restructuring of the federal government and its operations in the mid-1960s that was driven by the report of the Royal Commission on Government Organization and the integration and unification of the Department of National Defence and the Canadian military that followed the 1964 *White Paper on Defence* would both have profound effects on DCL's operational

¹⁵² One of the corporation's immediate reactions to the election was the preparation of a short history of the corporation for the new minister; the document produced is probably "History, Responsibilities & Operations of Defence Construction (1951) Limited," which is dated June 1957. If this is the case, it represents prompt action on the part of DCL to acquaint the incoming minister with the Corporation's history and functions. Minutes of meeting of Board of Directors, 9 July 1957, DCC in-house file.

relationships and its administrative milieu.¹⁵³ By the middle of the decade, the corporation would be responsible to a new minister and would formalize a new understanding of its relationship with the Department of National Defence.

The first of these changes was driven by the Royal Commission on Government Organization. Commonly known as the Glassco Commission after its chairman J. Grant Glassco, a Toronto businessman and chartered accountant, the commission was appointed in September 1960 with a mandate to enquire into and report on the organization and methods of departments and agencies and recommend changes to promote efficiency, economy, and improved service. The commission's five volume report was released in 1962-63 and made sweeping recommendations; its general conclusions were that government should "let the managers manage," that inappropriate central control should be eliminated, that the Treasury Board should be re-organized in order to control and co-ordinate operations, and that senior officials should be rotated from department to department.¹⁵⁴ All promised substantial change from the then current state of organization, and involved far-reaching examinations of government operations.

¹⁵³ While some commentators have pointed to differences between "integration" and "unification" (see below), Minister of National Defence Paul Hellyer did not necessarily see any significant distinction. Holmes' *History of the Canadian Military Engineers*, for instance, quotes Hellyer's 1966 comment that "although integration and unification are sometimes regarded as alternatives, and inherently different, they are, in fact, merely different stages in the same process. Integration was actually the term applied to the first stages of unification of the Canadian Armed Forces." K.J. Holmes, *The History of the Canadian Military Engineers, Volume III: to 1971*, J.R. Newell, ed., (Toronto: Military Engineering Institute of Canada, 1997), 307. Kronenberg, for instance, argues that "Integration" and "unification" are not interchangeable terms; the latter refers to the merging of the armed forces and their supporting structures into a single organization with a unified command structure, while integration was less extensive, although it could involve a range of changes extending from enhancing inter-service coordination to unifying elements of the armed forces such as the supporting services (which could include construction and engineering) and planning staff. Vernon J. Kronenberg, *All Together Now: The Organization of the Department of National Defence in Canada, 1964-1972*, (Toronto: Canadian Institute of International Affairs, 1973), 9.

¹⁵⁴ This commission had its origins in part because of repeated calls by the Conservative opposition for a detailed investigation of the civil service. Similar studies had been undertaken in the United States. After coming to power, they set up such an inquiry, with Prime Minister Diefenbaker having suggested the possibility of a Royal Commission to investigate the subject in January of 1960. Michel C. D'Avignon,

These studies had been extensive, and DCL was not surprisingly drawn in to the committee's review. By March of 1961 the corporation had received "certain questionnaires" to which it was preparing responses.¹⁵⁵ In November, Johnson was reporting to the Board of Directors that

A number of reports had been made to the Commission and members of the Commission have interviewed the senior officers of the Company at considerable length. It is felt that the Commission is well satisfied with the operations of DCL and, indeed, in some instances have commented very favourably on the Company's method of doing business and procedures generally.¹⁵⁶

Johnson's optimism about the commission's view of DCL would ultimately prove to have been misplaced. When the report was released, its far-reaching conclusions and recommendations augured significant change if not outright extinction for DCL as an independent entity. A number of these directly affected DCL operations and its relationships with government departments, particularly the Department of National Defence. The commission recommended that DND form a new organization, responsible to the Deputy Minister of National Defence, to manage the acquisition, construction, and operation of real property for all three services and that this organization absorb DCL, with the corporation's charter being revoked if no continuing need for its independent existence could be determined.¹⁵⁷ These recommendations threatened to terminate Defence Construction Limited as a distinct entity, but would ultimately be overtaken by a series of events that involved significant change within the Department of National

"The Royal Commission on Government Organization: A Study in Bureaucracy and Innovation," (MPA thesis, Carleton University, 1972), 26-36; RCGO, *Report, Volume 1*, 19-21.

¹⁵⁵ Minutes of meeting of Board of Directors, 24 March 1961.

¹⁵⁶ Minutes of meeting of Board of Directors, 23 November 1961.

¹⁵⁷ RCGO, *Report, Volume 2: Supporting Services for Government*, (Ottawa: Queen's Printer, 1962), 62-63; Public Service Commission, Bureau of Management Consulting Services, "Future Status of Defence Construction (1951) Limited," 4, January 1968, DCC in-house file.

Defence as a result of the 1964 *White Paper on Defence* and the transfer of responsibility for the company to the Minister of National Defence.

In the interim, the commission's conclusions drew political attention to the future of DCL. During the debate surrounding Bill C-74, which was to establish the Department of Industry, itself a consequence of Glassco,¹⁵⁸ the issue of the Department of Defence Production and Glassco were raised – one Conservative MP, Marcel Lambert, asked not only what was to happen to DDP in the light of the Glassco recommendations, but also what the future would hold for DCL. “Then again,” he stated,

the crown corporation known as Defence Construction (1951) Limited was to be disbanded, its charter surrendered and its functions transferred to the Department of National Defence. In this connection I am wondering whether the minister could indicate in the course of his reply whether there is any truth in the suggestion that with the retirement of the president of Defence Construction (1951) Limited it is the intention of the government to carry out the recommendation of the Glassco commission in this respect. I know this gentleman very well. I know he has taken a position in industry, and I am wondering whether this is because he has seen the writing on the wall or whether he has been privy to a decision to be announced in the future.¹⁵⁹

Unfortunately, C.M. “Bud” Drury, the Minister of Defence Production who would also become the Minister of Industry, does not appear to have answered the question at this time. In August 1964 Supply Committee discussions of the Department of Industry and its appropriation for DCL's operating expenses, however, Lambert again raised the question of DCL's future. “Mr. Chairman,” he began,

because of the restricted activities of Defence Construction (1951) Limited, other than in respect of maintenance of our defence establishments, obviously we have

¹⁵⁸ DBS, *Canada Year Book 1963-64*, (Ottawa: Queen's Printer, 1964), 677; *Canada Year Book 1966*, (Ottawa: Queen's Printer, 1966), 134.

¹⁵⁹ Canada, House of Commons, *Debates*, 14 June 1963, 1178-1179. Lambert, who was the Conservative MP for Edmonton West, may have known Johnson since the former was born in Edmonton where Johnson had attended high school. Both attended the University of Alberta and practiced law in the province, albeit at different times due to their age difference (6 years) and Lambert's wartime service. In any event, Lambert's comment suggests one reason why Johnson might have accepted his new position in private industry. *The Canadian Who's Who, Volume X: 1964-66*, 549, 599.

reached the point where we must decide whether this corporation is required. Surely we are not going to expand our airports or army barracks, and with the cutback in our forces there will be a lesser requirement for this corporation. Surely this corporation will not be maintained merely for the purpose of constructing a new national defence headquarters. I should like the minister to tell us why Defence Construction (1951) Limited is being continued.¹⁶⁰

Drury, in defending the appropriation, explained that the committee that was looking into Glassco recommendations was also examining DCL's future, and that "one would hope that in the not too distant future they would have a report to make."¹⁶¹ Drury may well have been referring to one of the series of reporting committees had been created in the wake of Glassco in order to discuss the recommendations made by its various studies. DCL's involvement in the committee created to evaluate the recommendations of the Commission's study on real property management – the same recommendations that had prompted Lambert's questions – and its consequences for the corporation is discussed below.¹⁶² In any event, for both DND and DCL, many of the changes that would have arisen from the Glassco Report were overtaken by the ramifications of the 1964 *White Paper on Defence*, which were already making themselves felt at the time of Lambert's second question.¹⁶³ Furthermore, DCL's key role in readying Expo 67 that it had assumed the year before may to some degree have insulated the corporation from the drastic changes being proposed by the Glassco Report and the opposition's members of Parliament.

¹⁶⁰ House of Commons, *Debates*, 28 August 1964, 7413.

¹⁶¹ *Ibid.*, 7438.

¹⁶² D'Avignon, "Royal Commission on Government Organization," 121.

¹⁶³ Holmes, *History of the Canadian Military Engineers*, 312.

External Changes II: The 1964 White Paper on Defence

As noted above, another substantial change in Defence Construction's working environment was the reorganization of the Department of National Defence in the wake of the 1964 *White Paper on Defence*, whose central tenets involved the creation of a single chief of staff to replace the existing Chiefs of Staff Committee as well as the development of an integrated defence headquarters. In the process of presenting the paper and putting forward the resultant legislation, Bills C-90 and C-243, Minister of National Defence Paul Hellyer explicitly invoked the Glassco Commission as part of his rationale for the reorganization of defence headquarters.¹⁶⁴

For DCL, among the most important consequences was that the creation of an integrated defence headquarters led to increased pressures for an integrated construction agency to replace the existing separate works services for the Navy, Army, and Air Force. Such plans were also in keeping with Glassco recommendations that civilian direction of the military needed to be strengthened. The study group formed to examine the issue was chaired by Air Commodore R.B. Whiting, the RCAF's chief of Construction Engineering, and also included representatives from the construction engineering branches of the three services, from the Civil Service Commission, and D.W. Laird from DCL.¹⁶⁵

¹⁶⁴ Bill C-90 established a single Chief of Defence Staff to replace the three Chiefs of Staff, while C-243 provided for the reorganization of the Canadian military. The bills were introduced a couple of years apart from each other. Douglas Bland, *The Administration of Defence Policy in Canada, 1947 to 1985*, (Kingston: Ronald P. Frye and Company, 1987), 33-38. The White Paper, for instance, pointed to more than 200 standing tri-service committees that had been identified by the Glassco Commission. DND, *White Paper on Defence*, 18.

¹⁶⁵ Holmes, *History of the Canadian Military Engineers*, 308-9, 316. Following an early April 1964 call by the Minister of National Defence for the creation of planning groups to develop an organizational structure for a single integrated defence staff at National Defence Headquarters, a study group was formed at the end of May 1964 following a decision by the Minister and Deputy Minister of National Defence. "The Organization Study – Department of National Defence Construction Engineering Branch (Part 1)," 2, DCC

The terms of reference for the study group were broad, and its findings were correspondingly comprehensive. While time for the study had been limited, the study group was able to draw upon recent work and the experience of its members.¹⁶⁶ Only ten weeks passed between the creation of the study group and the production of its initial report, which provided plans for developing a single construction engineering organization to support the unified force proposed by the 1964 White Paper, and also provided plans for the unification of the RCAF and RCN construction services with the Royal Canadian Engineers as a whole rather than with the Army Works Service alone.¹⁶⁷ The new integrated construction organization would report to the Deputy Minister; there was to be greater delegation of financial authority from central offices to the field; the users of the facilities were to establish the military requirements; DCL was to be transferred from the Department of Defence Production to DND as a Crown corporation reporting to the Minister of National Defence; more use was to be made of consulting engineers, who would be selected by the department; and adequate career structures were to be established for military and civilian staffs.¹⁶⁸ One of the consequences of the study group's report was that in comparison with most other groups in the Canadian military, the engineers were in a better position to deal with integration and unification.

in-house file. Whiting would become a director of DCL in June of 1965. Minutes of Meeting of Board of Directors, 1 June 1965.

¹⁶⁶ The earlier studies (the 1962 Green Paper and 1963 tri-service standardization study) were available as background material, and two of the study group's members had taken part in the preparation of the latter. Holmes, *History of the Canadian Military Engineers*, 308-310; 314-317. The terms of reference for the study group can be found in "Organization Study," 2.

¹⁶⁷ Unlike the other services, the Army's military engineering function included substantial military engineering elements – intended to provide field engineering services – in addition to works services intended to provide infrastructure. *Ibid.*, 317-319. The study group report was delivered to the recently integrated CFHQ, and Whiting was appointed Deputy Chief Logistics, Engineering and Development (Construction Engineering), which was composed of directorates responsible for construction, works, and quartering, along with a Military Engineer Advisor group. CLED was short-lived; it was the integrated predecessor to Chief of Technical Services, formed in 1965, which was itself replaced by ADM Materiel in 1972. *ibid.*, 317-318. For a summary of the report's recommendations, see "Organization Study," 24-26.

¹⁶⁸ Holmes, *History of the Canadian Military Engineers*, 316-317.

For DCL, the most significant result of the report was DND's creation of Regional Construction Engineering Offices (RCEOs), which were designed to decentralize the control of construction engineering that the study group had concluded was too centralized in Ottawa. Not only did this new organization conform with the preferences of the services, but it would also work well with DCL's existing scheme of regional offices. The Minister of National Defence approved the concept in March 1965, and over the next year five such offices were created in Canada in Halifax, Montreal, Toronto, Winnipeg, and Vancouver. Although the RCEO system worked well for construction engineering, the various functional commands soon became unhappy with the regional organization of CE and other services, and in early April 1970 the RCEOs were disbanded and their staffs absorbed by the functional command headquarters, where they helped form the new Command engineer organizations.¹⁶⁹ By this time, however, further changes had been made to the relationship between DCL and DND, since the changes fostered by Glassco and the *White Paper on Defence* had brought about a transfer of ministerial responsibility for the corporation and a need to formalize the relationship of the two organizations through a memorandum of understanding.

External Changes III: Transfers of Ministerial Responsibility and the 1965 Memorandum of Understanding

The Glassco Commission and the 1964 *White Paper on Defence*, both prompting significant change within the Canadian government, its bureaucracy, and the military, led to further consequences for DCL than those discussed above. Glassco recommended the

¹⁶⁹ An RCEO was not created in Europe, where DCL also had a presence, but was instead formed within 1 Canadian Air Division and later became the Senior Staff Officer Canadian Engineers organization. *Ibid.*, 332-335.

transfer of DCL's personnel and functions to DND, with the corporation's charter to be surrendered unless there was a need for a separate corporate body, while the White Paper prompted substantial changes to many aspects of DND and the Canadian military, including the organization and delivery of infrastructure construction and maintenance. For DND, the recommendations of the *White Paper* to a large extent overtook the commission's conclusions, but, as has been seen, a number of Glassco's findings were used to justify the White Paper's major arguments. The combined consequences of the two studies for DND and government organization as a whole, however, would bring substantial change for DCL. Between the publication of the Glassco Committee's reports and the middle of the 1960s, responsibility for the corporation would be transferred to the Minister of National Defence, while the creation and signing of a memorandum of understanding between DCL and DND would lead to new responsibilities for the corporation and a redefinition of the relationship between the two entities.

Following the publication of the Glassco Commission's report, a series of committees had been created in order to discuss the recommendations made by its various studies. DCL was involved in efforts to evaluate and act upon the recommendations that affected it; in January of 1964 the company's president was serving as one of the members of the committee that had been convened to deal with Glassco's Report #5, which covered the acquisition, management, and disposal of real property.¹⁷⁰ The corporation also submitted a memorandum to this committee, arguing that "the maintenance of DCL as a corporate body reporting to the Minister of National Defence offers the best solution to the questions posed and is in the best public

¹⁷⁰ D'Avignon, "The Royal Commission on Government Organization," 121; Minutes of meeting of Board of Directors, 30 January 1964; RCGO, *Report, Volume 2*, 25-27.

interest.”¹⁷¹ The advantages of preserving an organization using procedures understood by the construction industry were put forward, and given the discussion earlier in this chapter, it is well worth noting that among the arguments given in favour of maintaining DCL’s corporate existence within DND was its status as a Crown corporation, which would allow the necessary flexibility in hiring and firing personnel as necessary. “Under existing Civil Service procedures,” the memorandum noted, “the average time to fill an established engineering or architect position within the Department is six months and in some cases has taken up to two years.” Furthermore, it was argued, “surrender of autonomy by DCL would mean that the corporation would not be able to administer other special programs as directed by the government.”¹⁷² DCL’s provision of services to other agencies and departments, which had recently been pursued as a means of retaining staff in a time of declining need for the corporation’s services, was again being used to pursue and protect the corporation’s interests. No doubt influenced by this memorandum and DCL’s involvement in its deliberations, the committee would subsequently argue that the interests of the armed forces and taxpayers were served with the greatest promptness and economy by continuing the present contracting arrangements. The committee claimed that there was no inconsistency in this approach: the Department of Public Works did not handle construction for all other government departments, for instance, since the Department of Transport handled all contracts involving airfields and related structures.¹⁷³

¹⁷¹ “A Memorandum to the Special Committee Considering Recommendations of the Royal Commission on Government Organization – Report #5 – Real Property,” 7, DCC in-house file 011-3.

¹⁷² *Ibid.*, 6.

¹⁷³ Minutes of 14th meeting of Special Committee convened to consider the Glassco Report, 8 May 1964, 5-6, file 011-3, “DND Integration,” DCL holding.

In the meantime, other Glassco recommendations had been altering departmental organization, with consequences for DCL. The Department of Industry was created in July of 1963, and its minister was given the powers of the Minister of Defence Production, which included responsibility for Defence Construction (1951) Limited.¹⁷⁴ This situation would not endure; the following year, Cabinet acted upon another Glassco recommendation when it approved the transfer of responsibility for DCL from the Minister of Industry to the Minister of National Defence.¹⁷⁵ When informing staff of the handover, A.G. Bland, the corporation's president noted that

this is in accordance with the recommendation of the Glassco Commission. The Company is to retain its corporate identity. While there will naturally be a number of adjustments in our administrative procedures as a result of the Company's new alignment, our responsibilities and authorities in respect to defence construction will not be diminished and will probably be modestly increased. It is our desire, and also the desire of the Department's new Construction Engineering Branch, that the closest possible liaison and working arrangements be established between us, both at Headquarters and across the country.¹⁷⁶

Shortly afterwards, the corporation and DND formalized these new arrangements and their respective roles and responsibilities in a memorandum of understanding (MOU).¹⁷⁷

The MOU owed its origins to a number of factors. Following the transfer of responsibility to the Minister of National Defence, a formal statement of the roles and responsibilities of DND and DCL was seen as a necessity, especially since the handover involved more than might first be realized. One of the significant changes resulting from these events that was embodied in the MOU was the transfer of responsibility for the administration and inspection of base maintenance contracts from DND to DCL; this was part of the "modest increase" in responsibilities that had been predicted in the April letter

¹⁷⁴ DBS, *Canada Year Book 1963-64*, 677; *Canada Year Book 1966*, 134.

¹⁷⁵ Cabinet Conclusions, 22 April 1965, 6, LAC, RG2, series A-5-a, vol. 6271.

¹⁷⁶ DCL Circular Letter, A.G.. Bland to staff, 30 April 1965, DCC in-house file 011-3.

¹⁷⁷ Public Service Commission, "Future Status of Defence Construction (1951) Limited," 4.

to DCL staff.¹⁷⁸ An August 1965 memorandum from the president to branch managers ascribed the creation of the MOU to “a need for reconsideration of our relationship with the Construction Engineering Organization of the Canadian Defence Force” arising primarily from the transfer of ministerial responsibilities, the integration of Construction Engineering staffs at Canadian Forces Headquarters, and the establishment of the RCEOs. “The memorandum,” Bland wrote, “is a product of much careful thought and consideration and represents, in my opinion, a desirable and workable arrangement between the design authority and the contracting authority. I had no reservations in recommending it to our Minister and I have no reservation in passing it to you as a sound basis for our future operations.”¹⁷⁹ In a subsequent letter to head office managers, Bland stated that

the desirability of a written understanding covering our relationship with the new Construction Engineering Organization is, I think, clear. The Memorandum reflects the new alignment of our Company with the Department of National Defence, the integration of the CE [Construction Engineering] Organization and the establishment of DND Regional Construction Engineering Offices. It establishes our responsibility for the administration of all DCL defence contracts. It underlines the objectives of full cooperation between and best use of the talent and experience of DCL and the CE Organization.¹⁸⁰

In later years, Bland would explain that the MOU was the outcome of an assertion by DND that it wanted DCL to be responsible for all the contracts it entered into on behalf of the department; to that time, maintenance contracts let by DCL had largely been administered by DND’s construction engineering staff. After describing the transfer as a

¹⁷⁸ “Excerpts from Remarks by DCC President at Air Command HQ Conference,” Winnipeg, Manitoba, 18 February 1981, 3-4. Part of materials for DCC Development Seminar, 28 January – 2 February 1990, DCC in-house file “Bland Speeches (historical file)”.

¹⁷⁹ A.G. Bland to D.E. Bastedo, Branch Manager, Halifax Office, copied to other Branch Managers and Paris office, 16 August 1965, DCC in-house file 011-3. The proper title for the integrated and unified Canadian military was still unclear at this time. The title of “Canadian Armed Forces,” which was never adopted, was also bandied about at this time and is often used to this day.

¹⁸⁰ DCL Circular Letter to Division and Section Heads, Main Office, 19 August 1965, DCC in-house file 011-3.

change with benefits for the DCL-DND relationship, he explained that "I said I was happy with this as long as the authority given DCL matched this responsibility. In other words, if DCL was to be fully responsible for its contracts, it must have from the Crown viewpoint the final word in the interpretation of those contracts. This was agreed by the Departmental representatives and the Minister of National Defence."¹⁸¹

DCL summarized its explanation of and justification for the MOU in its 1965-66 annual report, which stated that

rapid progress was made by DND during the year under review toward giving effect to plans for the further integration of real property management functions within the Department. Formulation of these plans required a re-examination of the role of all participants so that the relationship of DCL to the proposed new integrated DND organization became the subject of some of the planning discussions at an early stage. The Company participated in these discussions where necessary, in order to give the fullest possible co-operation with a view to adjusting its procedures to suit the new DND organization as soon as the latter could be established. As a result, the satisfactory arrangements which had been worked out culminated in June of the year under review [1965] with the signing of a new "Memorandum of Understanding" between DCL and DND. This "Memorandum of Understanding", among other things, placed on a regular and formal basis procedures that had evolved over a number of years between DND and DCL.¹⁸²

The Memorandum of Understanding, therefore, brought together the outcomes of many of the changes to Defence Construction's external environment that had taken place since the early 1960s. The recommendations of the Glassco Commission prompted the transfer of responsibility for DCL to the Minister of National Defence, while the integration of the Canadian military and its Construction Engineering function as a result of the 1964 *White Paper on Defence* led to a perceived need for an explicit and formalized statement of the relationship between the corporation and DND. The transfer of responsibility and

¹⁸¹ *Ibid.* See also address to Canadian Military Engineers 1973 Conference, Chilliwack, BC, 3, DCC in-house file "Bland Speeches (historical file)".

¹⁸² DCL, *Annual Report*, 1965-66, 6.

the MOU would establish bureaucratic relationships and an operating environment for DCL that would persist for the next two decades. The broader consequences of the MOU and the changes and reorganizations within the Department of National Defence in the years that followed the unification of the armed forces, while significant for DCL, however, lie outside the ambit of this dissertation.

By the time the Memorandum of Understanding was signed in June of 1965, DCL had weathered a series of internal and external changes and challenges that had at times threatened its autonomy and corporate existence, while at other times had offered it new opportunities for cooperation with the military and industry that it served. Fifteen years after its creation, Defence Construction (1951) Limited was operating with different leadership and in rather different surroundings than it had in 1950. Not only had its corporate and administrative environment been altered, but as CADIN and related continental defence programmes discussed in the previous chapter had demonstrated, by the early 1960s the military environment was greatly changed. The years of massive air defence projects and other major military infrastructure programmes had ended, and DCL would not see another significant upswing in its work and commitments until the latter half of the 1970s. As one of the company's employees would later describe it, the mid and late 1960s were a "low period" for Defence Construction Limited.¹⁸³

DCL had recognized this oncoming "low period" and had sought means to mitigate its effects. While taking advantage of its status as a Crown corporation allowed it to expeditiously reduce its staffing levels – a capability the corporation actively defended – other strategies also proved useful. Foremost among these was the conscious decision to reinvent itself through the provision of services to other government

¹⁸³ Leonard H. Harper to Glen Taverner, 20 July 1992, DCC in-house file.

departments and agencies. Almost from its inception, the corporation had demonstrated an ability and willingness to act outside of its initial areas of responsibility for military infrastructure. Civilian work on the Colombo Plan, the Northern Ontario Pipeline, and Expo 67 had allowed the government to use DCL as an instrument to fulfill its policy goals – a benefit to the government – while at the same time allowing the corporation to retain a vital core of employees – a benefit and almost essential measure for DCL – at a time when defence construction was rapidly declining. As its reactions to the Glassco Commission's recommendations demonstrated, the corporation would also point to its capability to perform such work as a justification for maintaining its status as an independent entity following the transfer of responsibility to the Minister of National Defence.

DCL also faced significant challenges and changes aside from the downturn in military infrastructure requirements. The loss and departure of key figures, the possibility of coming under the control of a revised Civil Service Act, the recommendations of the Glassco Committee, and the consequences of the re-organization of the Canadian military and the transfer of responsibility for the corporation to the Minister of National Defence had all contributed to the shaping of a new future for the corporation. DCL's reactions to the Heeney Report and some of the Glassco Commission's recommendations might imply a basic resistance to all such possibilities of change, but this is not borne out by a closer examination of the corporation's activities. Faced with these significant challenges, DCL not only acted to protect its interests and existence but also to implement recommendations for change. While corporate self-interest obviously played a role in these actions, DCL was not in a position to unilaterally determine the outcome of these

events. Other agencies and government departments were involved in the decision-making processes that were prompted by Glassco and the *White Paper on Defence*, and although there were obvious relationships between some of them and DCL – the presence of senior DDP officials as members of the board of directors is one example – this did not necessarily guarantee the continued existence of the corporation as an independent entity. The Canadian Commercial Corporation, for instance, was a Crown corporation that was reduced to a mere façade as a result of Glassco recommendations, with its staff absorbed by DDP. DCL's skills at negotiating its survival had presumably been more effective, but its utility as an independent entity had also presumably been greater, or its skills harder to replace.¹⁸⁴

The corporation was thus able to negotiate its position within a substantially altered bureaucratic environment, as best evidenced by the 1965 Memorandum of Understanding with the Department of National Defence. The transfer of responsibility and the creation of the MOU provided a stable basis for the corporation's relationship with DND for some two decades; not until the mid-1980s would ministerial responsibility for the corporation be transferred once again.¹⁸⁵ DCL was not only able to act and survive in a favourable environment when defence spending and commitments were increasing, and when senior officials like C.D. Howe were supportive of the widespread use of Crown corporations, but also when its environment was unfavourable, with declining defence spending, reduced military commitments, and significant reassessments of

¹⁸⁴ For a summary of the effects of the Glassco recommendations on the CCC, see Ashley and Smalls, *Canadian Crown Corporations*, 116-119; CCC, *Annual Report*, 1962-63, 5; *Annual Report*, 1963-64, 4-5.

¹⁸⁵ Responsibility for the Corporation was transferred to the Minister of Public Works in 1986 as a consequence of the Task Force on Program Review's study of real property management. For the recommendations, see *Real Property: A Study Team Report to the Task Force on Program Review*, May 1985, (Ottawa: Minister of Supply and Services Canada, 1986), especially 31, 442-443.

government organization. The corporation faced these challenges and changes, and responded in a matter that not only assisted other agencies and departments in meeting their goals but that allowed it to secure its relationship with the Department of National Defence and guarantee its continued existence. For a Crown corporation that C.D. Howe had originally intended would "get into operation quickly, and disband when the crash program had been accomplished," Defence Construction (1951) Limited had demonstrated an ability to survive and the capability to provide services that made it a useful instrument of Canadian government policy.¹⁸⁶

¹⁸⁶ A.G. Bland, speech to ACEC, 27 April 1965, 2.

Conclusion:
Building for Defence, Building for Canada, 1941-1965

By 1965, Defence Construction (1951) Limited could look back on fifteen years of largely successful operation. Within the span of those years, the corporation had, in gross terms, administered military and civilian work worth over \$1.5 billion, in Canada, the Caribbean, France, India, Pakistan, and Ceylon. Its list of accomplishments is impressive and wide-ranging. These projects included 256 barrack blocks, officers' and NCOs' quarters, accommodating some 34,000, 121 mess buildings capable of handling 39,100 personnel, 69 chapels seating 19,400, 9 hospitals, and 41 large and 28 small aircraft hangars.¹ Radar installations, surface-to-air missile facilities, underground command and control installations, and storage facilities for nuclear weapons had also been put in place through DCL, along with foreign aid projects ranging from schools to fish refrigeration plants to dams. At the same time, however, despite this record of accomplishment, DCL appeared to be reaching the end of its utility in Ottawa's eyes. While its work with Expo 67 and a number of smaller military projects was forging ahead, there were no large defence infrastructure projects underway, nor was there any indication of such undertakings in the near future. The welfare state, and not defence, had become the fiscal dominators of the Pearson and Trudeau eras.

While DCL had successfully navigated the challenges of the early 1960s outlined in Chapter Seven, the volume of work it handled had greatly declined from the peaks of the 1950s. Not until the early 1970s would the corporation again experience an upturn in its work for the Department of National Defence, beginning with the expansion of

¹ Defence Construction (1951) Limited, *Annual Report*, 1964-65, I. These are the country names as they were at that time; projects in what was then Pakistan were completed in both modern-day Pakistan and modern-day Bangladesh.

facilities at Canadian Forces Base Valcartier in Quebec and the provision of training facilities for German and British forces at Shilo, Manitoba, and Suffield, Alberta. By the mid-1980s, further defence construction projects resulted in still more work for the corporation. Undertakings like the North American Air Defence Modernization (NAADM) programme, Ship Repair Units on both coasts, the Combat Training Centre at CFB Gagetown, New Brunswick, and new infrastructure for the Canadian Forces in Europe resulted in an increase in work for DCC – 43% more in 1987-88 than in 1984-85. The most dramatic of these ventures was undoubtedly NAADM, which involved the replacement of the DEW Line with the North Warning System and the provision of Forward Operating Locations (FOLs) in the Canadian Arctic to allow fighter aircraft to operate further to the north. Although these projects offered more work for the corporation, moves were also afoot to expand the range of services that could be provided in addition to its traditional contracting functions. As new items – environmental degradation and clean-up – surfaced on Ottawa's agenda, DCL once again displayed its dexterity. Environmental assessment and remediation work, in particular, offered tremendous scope for expansion, particularly given the consequences of decades of defence activity throughout the country.²

In the meantime, Defence Construction encountered and participated in yet more change. In 1980, the Federal Identities Program provided DCL with a new name to add to its existing moniker – Defence Construction Canada / Construction de Défense du

² "Environmental remediation" (also commonly referred to as "environmental restoration") involves the restoration of the environment at contaminated or otherwise damaged sites. This involves more than simply the removal of contaminants; it also requires the restoration of the site to its previous condition.

Canada.³ A few years later, the recommendations of the Task Force on Program Review brought DCL's future into question and ultimately led to its transfer to the Minister of Public Works in 1986. Responsibility for the corporation was transferred to the Minister of Supply and Services in 1990, and was again transferred in 1996-97, this time to the Minister of Public Works and Government Services. The latter, however, was more the result of the consolidation of the Department of Public Works and the Department of Supply and Services than an outright transfer from one minister to another. The same political changes and re-evaluations of government services – including Crown corporations and their use by the Federal government – that had produced the Task Force on Program Review also led to pressure to reduce costs and to increase accountability. Cutbacks in government expenditures, coupled with recessions, led to efforts to decrease DCL's operating costs, while pressures from the Auditor General and the government to increase the accountability of Crown corporations led to a new focus on performance indicators and a move to more accountability in the corporation's activities and its annual reports. Through all this, DCL continued to be a useful instrument in Ottawa's hands. The eighties saw Ottawa shed many of its "Crowns," the consequence of neo-conservative skepticism of the efficiency of the state in the marketplace. But DCL survived these winds of change, its utility long established and defensible in the public policy forum.

Beginning in 1997-98, DCL made the transition to what was called "service billing" or "cost recovery", eliminating the corporation's dependence on Parliamentary appropriations to cover its operating costs. The change was driven in part by the

³ The corporation's legal name had only been made bilingual in 1965; prior to that date it had been "Defence Construction (1951) Limited" in *both* official languages.

Department of National Defence's implementation of "optionality", which gave DND the option of having construction work performed by its own military or civilian personnel or by the private sector contracted through DCC. Optionality brought an end to DCC's previous virtual monopoly on many DND projects, and part of the corporation's instinctual response was to expand its role and provide services in a number of "non-traditional" areas. Involvement with the Canadian Forces Housing Agency began in the mid-1990s, for instance, and by 2001, Defence Construction Canada was providing assistance with environmental services, facilities management, energy performance contracts, and contract management support for the Canadian peacekeeping mission in Bosnia-Herzegovina. While Defence Construction involved itself in a number of major environmental assessment and remediation projects, from the mid-90s onwards the DEW Line Cleanup arguably became the best-known and most significant such undertaking. In an interesting example of events coming full circle, the corporation is now responsible for helping to mitigate the consequences of a project it had facilitated decades before; it has performed similar clean-up functions for former Pinetree Line sites, and will undoubtedly play its role in meeting these requirements for the foreseeable future. Whatever the ethos of the times, crown-held instruments like DCL have given Ottawa the ability to respond in a manner under its own control.

Having passed its fiftieth anniversary in 2001, Defence Construction (1951) Limited remains an active organization meeting the requirements which had originally prompted C.D. Howe to create it.⁴ The corporation, however, is now operating in fields

⁴ The examination of DCL's early history, of course, raises the question of how old the current corporation *actually* is. Do its origins date back to the creation of Defence Construction (1951) Limited, to its predecessor, Defence Construction Limited, or to the corporation whose charter was dusted off and re-used in 1950, Wartime Housing Limited, created in 1941?

that would have seemed highly unusual in 1951. These are measures not only of DCL's continuing utility to the Department of National Defence and the federal government, but also of an ability to adapt to and survive in a changing bureaucratic environment. Crown corporations *can* offer the state a cost-effective and quickly-deployable means of exercising the collective interests of the nation. As is evidenced in this dissertation, these have been long-standing characteristics of the corporation, and traits that belie the oft-asserted neo-conservative arguments that Crown corporations are inflexible, inefficient and inappropriate instruments of government policy and involvement in the Canadian economy.

While the study of business history has handsomely expanded in Canada over the last two decades, relatively little has been written on Canada's Crown corporations and essentially nothing has been written about Defence Construction (1951) Limited.⁵ Crown corporations are often seen as characteristic of the wartime and postwar interventionist Canadian government. They were part of a range of tools available to the federal government, and as such have received at least some attention from political scientists and historians. From their first modern appearance in the Depression to their varied and widespread application in the Second World War,⁶ "Crowns" have been interpreted as a uniquely Canadian instrument of policy – a means to apply the prerogatives of the state to the usually privately-managed demands of a national economy given shorter capital, managerial expertise and technology. Often presented as expedient and pragmatic

⁵ Of the works dealing with crown corporations during this period, a brief description of DCL is provided in C.A. Ashley and R.G.H. Smail, *Canadian Crown Corporations: Some Aspects of their Administration and Control*, (Toronto: Macmillan, 1965), and some passing mentions are made in Lloyd D. Musolf, *Public Ownership and Accountability: The Canadian Experience*, (Cambridge: Harvard University Press, 1959), 94-95.

solutions to problems encountered during the war and afterwards, or as defensive moves by the federal government, by the 1980s the "Crowns" had become neo-conservative "whipping boys" held up as exemplars of everything that was wrong with government involvement in the economy – fodder for Fraser Institute ideologues.⁷ In more recent years, however, historians of Canadian business have taken a more positive view of Crown corporations and the interventionist state, and some have provided some re-evaluations urging a less ideologically-determined examination of Crown corporations, including a history of Polymer Canada presenting that "Crown" as a "persuasive example that contradicts the neo-conservative position," by not only consistently turning a profit but also by acting as a "pump primer" for the development of a petrochemical industry in Sarnia, Ontario.⁸

Any history of Defence Construction Limited also necessarily involves an examination of the Canadian construction industry. The writing of Canadian history has been punctuated by the grand acts of our constructors; canals, railways and highways

⁶ For summaries of the of the wide range Crown corporations created during the Second World War, see J. de N. Kennedy, *History of the Department of Munitions and Supply, Volume 1*, (Ottawa: King's Printer, 1950), 286ff.

⁷ Examples of the "expedient" and "pragmatic" interpretations can be found from a wide range of authors including Peter C. Newman, *The Canadian Establishment, Volume 1*, (Toronto: McClelland and Stewart, 1975), 324-329; Bothwell and Kilbourn, *C.D. Howe*, 133-134; John Knubley, *The Origins of Government Enterprise in Canada*, (Ottawa: Economic Council of Canada, 1987), 88. For a useful corrective on the unconditional application of "pragmatism," see the comments by Allan Tupper and Bruce Doern, "Public Corporations and Public Policy in Canada," in *Public Corporations and Public Policy in Canada*, Allan Tupper and G. Bruce Doern, eds., (Montreal: The Institute for Research on Public Policy, 1981), 11. For criticisms of government involvement in the Canadian economy and the Crown corporation, see, amongst others, Michael Bliss, *Northern Enterprise: Five Centuries of Canadian Business*, (Toronto: McClelland and Stewart, 1987), particularly 445-477; Walter Stewart, *Uneasy Lies the Head: The Truth about Canada's Crown Corporations*, (Toronto: Collins, 1987).

⁸ See, for instance, Graham D. Taylor and Peter Baskerville, *A Concise History of Business in Canada*, (Toronto: Oxford University Press, 1994), 386, 395-396; Matthew J. Bellamy, *Profiting the Crown: Canada's Polymer Corporation, 1942-1990*, (Montreal and Kingston: McGill-Queen's University Press, 2005), 214-215.

have long been portrayed both in their own rights but also as “national dreams.”⁹ In the decades following the Second World War, the construction industry and its products came increasingly to define the environment in which Canadians lived. The postwar era witnessed the growth of private housing and suburbs, of road networks, and of defence projects, to name a few areas. Many of these activities were at the heart of the post-war mixed economy, forming part of a huge exercise in Keynesian pump-priming. DCL receives few mentions in the available literature on the history of the Canadian construction industry, but this is largely a function of the profoundly limited range of work in this field and not an indication of the importance of the corporation’s activities.¹⁰ Given the significance of construction for the postwar era, the absence of any comprehensive historical survey of the industry, even in the form of a book intended for general audiences, is surprising.¹¹ Indeed, given its importance – be it through the building of canals, railways, housing, or other needs – to Canadian history as a whole, the absence of a useful historical survey is startling.¹² This is particularly striking, given the

⁹ The canonical example in this case is, of course, Pierre Berton, *The National Dream*, (Toronto: McClelland, 1970).

¹⁰ In the 1950s, these were felt to be of such significance to the Canadian construction industry that DCL president R.G. Johnson gave talks at the Canadian Construction Association’s annual general meetings that were reprinted in their proceedings.

¹¹ S.D.C. Chutter, “Construction Industry,” *The Canadian Encyclopedia*. Chutter was Johnson’s successor as General Manager of the CCA, holding the position from 1954 to 1975. For a useful, if brief discussion of relations between DCL, the CCA, and the federal government at this time, see Neil John Lawrie, *The Canadian Construction Association: An Interest-Group Organization and its Environment*, (PhD dissertation, University of Toronto, 1976), 247-251, as well as R.G. Johnson, “D.C.L. at Home and Abroad,” *Proceedings of the 40th Annual General Meeting: Quebec City, January 26-29, 1958*, (Ottawa: Canadian Construction Association, 1958).

¹² The most readily available history of Canadian public works does not touch on issues of defence construction. Norman R. Ball, ed., *Building Canada: A History of Public Works*, (Toronto: University of Toronto Press, 1988). The sector study on the Canadian construction industry prepared in the late 1950s for the Royal Commission on Canada’s Economic Prospects, while touching only occasionally on defence construction activities, provides a valuable view of the industry and its operations at this time, as well as providing some useful insights into some of the challenges to an historical survey of construction in Canada, including the dispersed, fragmentary, and often transient existence of many of its component firms. Royal Bank of Canada, *The Canadian Construction Industry*, (Ottawa: Royal Commission on Canada’s Economic Prospects, 1956), *passim*, but especially 46-69.

ironic use of big construction projects like the St. Lawrence Seaway and the “fixed link” to PEI as crucial punctuation marks in post-war Canadian nationalism. Furthermore, the construction of defence infrastructure in Canada since the end of the Second World War has received almost no attention from historians. There has been some examination of the postwar expansion and construction of American military bases and installations by both historians and political scientists, but Canada, unfortunately, appears to fall through the cracks in much of this literature, not being included in studies of domestic American bases, and likewise being ignored in examinations of overseas facilities.¹³ In any event, much of the attention to these projects is paid by historians of diplomatic relations and military policy, and covers the discussions and debates surrounding the planning and operation of such installations.¹⁴ Little or no attention, unfortunately, is paid to the arrangements made for their construction, although there are related areas of study that fortunately shed some light on the matter.¹⁵ This thesis thus offers a “bricks and mortar” contribution to our understanding of modern Canadian construction.

¹³ See, for example, Roger Sarty, *The Maritime Defence of Canada*, (Ottawa: Canadian Institute of Strategic Studies, 1996); Simon Duke, *US Defence Bases in the United Kingdom: A Matter for Joint Decision?*, (London: Macmillan, 1987); James R. Blaker, *United States Overseas Basing: An Anatomy of the Dilemma*, (New York: Praeger, 1990); C.T. Sanders, *America's Overseas Garrisons: The Leasehold Empire*, (Oxford: Oxford University Press, 1999). John Cardoulis' *A Friendly Invasion: The American Military in Newfoundland, 1940-1990* (St. John's, NF: Breakwater, 1990) is a popular history that is an exception to this situation.

¹⁴ See, amongst others, Joseph Jockel, *No Boundaries Upstairs: Canada, The United States, and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987); John Clearwater, *Canadian Nuclear Weapons: The Untold Story of Canada's Cold War Arsenal*, (Toronto: Dundurn, 1997); Ann Denholm Crosby, *Dilemmas in Defence Decision-Making: Constructing Canada's Role in NORAD, 1958-96*, (New York: St. Martin's Press, 1998); Andrew Richter, *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950-63*, (Vancouver: University of British Columbia Press, 2002).

¹⁵ Despite this, there are a few useful sources directly touching on DCL and construction in postwar Canada, most notably K.J. Holmes, *The History of the Canadian Military Engineers: Volume III, to 1971*, ed. J.R. Newell, (Toronto: Military Engineering Institute of Canada, 1997). There are brief mentions of DCL in the history of Canadian telecommunications, largely because of the Trans Canada Telephone System's role in a number of major projects and because of its Chief Engineer A.G. Lester's interesting and extremely useful unpublished memoir of the company's activities in this field. Jean-Guy Rens, *The Invisible Empire: A History of the Telecommunications Industry in Canada*, (Montreal: McGill-Queen's

As this dissertation has made clear, the history of Defence Construction Limited is also located firmly within the realm of military historiography. At the most basic level, DCL owed its creation to the Korean War mobilization and the Department of Defence Production's need for an agency to supervise defence construction projects. But it also fit into a pattern of Canada- US military and economic integration that dated back to the Hyde Park and Ogdensburg Declarations of the Second World War.¹⁶ This integration was both formal, as exemplified by the October 1950 "Statement of Principles for Economic Co-operation," and informal, as evidenced by the use C.D. Howe and other Canadian officials made of informal negotiations with their American counterparts.¹⁷ The most obvious aspect of defence policy related to DCL's activities, and therefore the primary focus of this dissertation was the creation of systems for North American air defence. DCL was born in years when North America's perceived vulnerability to bomber attack was reaching its peak; the corporation was a crucial player in sheltering the continent from Soviet bombers. In recent years, there has been a revival of academic interest in this field, led by Joseph Jockel's 1987 *No Boundaries Upstairs*. These works on the planning and deployment of these systems, however, focus largely on the negotiations for their creation and their implications for defence policy, sovereignty, and the Cold War, rather than on the actual building of the sites, including the motivations,

University Press, 2001); Robert Collins, *A Voice From Afar: The History of Telecommunications in Canada*, (Toronto: McGraw-Hill Ryerson, 1977); A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, DHH 78/512; "Taped Recollections," DHH 77/493.

¹⁶ Danford W. Middlemiss, "Defence Co-Operation," in *Partners Nevertheless: Canadian-American Relations in the Twentieth Century*, Norman Hillmer, ed., (Toronto: Copp Clark Pitman, 1989), 168-172; Cuff & Granatstein, *Ties that Bind*; John Herd Thompson and Steven J. Randall, *Canada and the United States: Ambivalent Allies*, (Montreal & Kingston: McGill-Queen's University Press, 1994), 150-172, 178-199.

¹⁷ Bothwell and Kilbourn, *C.D. Howe*, 257; "Statement on Principles of Economic Co-Operation," in *United States Treaties and other International Agreements, Volume 1: 1950*, (Washington, DC: USGPO,

maneuvering and negotiations about the conditions for their construction.¹⁸ An examination of DCL's history, amongst other benefits, allows a considerable amount of this omission to be rectified. In a sense, DCL's success in helping to provide Canada with a northern Cold War shield is one tangible success story in a decade in which Canadians harkened to the notion of a "northern vision." Its justification perhaps had ghastly anxieties at its centre, but DCL none the less materially contributed to building the vision of Canada as the "true north strong and free" during these years.

The strong and often close relationship between DCL, DDP, and the Canadian construction industry that was both a prerequisite and a product of these projects created the potential for the existence of a military-industrial complex (a term popularized by outgoing President Dwight D. Eisenhower in 1961).¹⁹ The available evidence on DCL's involvement the negotiation, planning and construction of defence installations, however, does not appear to support the existence of such a complex, and is instead strongly congruent with the conclusions drawn by Lawrence Aronsen in his work on Canadian

1952), 716-718; Taylor and Baskerville, *Concise History of Business in Canada*, 402; Middlemiss, "Defence Co-operation," 172-173.

¹⁸ Jockel, *No Boundaries Upstairs*; Crosby, *Dilemmas in Defence Decision-Making*; Richter, *Avoiding Armageddon*. A useful discussion of the broader air defence debate within the United States that also provides an overview of the planning and building of the various air defence systems is found in Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960*, (Washington: Air Force History Support Office, 1991). Jockel, however, does mention DCL in passing when he discusses C.D. Howe's intervention in the 1951 Canadian-American negotiations surrounding the Pinetree Line. Jockel, *No Boundaries Upstairs*, 48-49. See also Secretary of State for External Affairs to Canadian Ambassador, Washington, 30 July 1951, in Canada, Department of Foreign Affairs, *Documents on Canadian External Relations, Volume 17: 1951*, (hereafter *DCER*) Greg Donaghy, ed., (Ottawa: Minister of Public Works and Government Services, 1996), 1273-1274, and related correspondence in the C.D. Howe papers, Library and Archives Canada, MG27 III B20, vol. 195, file SD.10, "Radar Division".

¹⁹ See Eisenhower's "Farewell Radio and Television Address to the American People," 17 January 1961, *Public Papers of the Presidents of the United States: Dwight D. Eisenhower, 1960-61*, (Washington: National Archives and Records Service, 1961), 1037-1039. Taylor and Baskerville, for instance, claim that the Canadian government set out to create a type of mini-MIC centered around the nation's aircraft industry; in a related vein, a number of authors have pointed to the closeness of the government-business "establishment" dating from the Second World War. Taylor and Baskerville, *Concise History of Business in Canada*, 403, 406-409; Newman, *The Canadian Establishment, Volume 1*, 313-346; Wallace Clement, *The Canadian Corporate Elite: An Analysis of Economic Power*, (Toronto: McClelland and Stewart, 1975).

economic mobilization and relations with the United States. Aronsen argues that while Canada had observable military-industrial relations after the Second World War, these relations did not develop into a military-industrial comparable to America's; rather, the country had a national security bureaucracy "that interreacted with and was dependent on cabinet authority and the prime minister."²⁰ DCL's records and actions, and the broader range of documentary records consulted in the writing of this dissertation, argue far more strongly in favour of Aronsen's interpretation than they do for the existence of a miniature, Canadianized, military-industrial complex. But these actions and relationships, however, also took place within a broader context of Canada-US defence co-operation, and in this respect the projects in which DCL was involved – most notably CADIN and BMEWS, and their direct relationship with defence production sharing – also at least partly bear out Ann Denholm Crosby's contention that "the history of Canadian/US defence cooperation during the Cold War...is also the history of Canadian/US cooperation in defence industry production, and the forms that this cooperation has taken, and the relationships it has spawned, have had significant determining effects on Canada's defence policy decision-making."²¹

Any examination of DCL's activities between 1950 and 1965, therefore, must also inevitably raise issues of Canadian sovereignty. Financially, at least, Defence Construction's greatest mandate during this time was the construction of the facilities necessary for North American air defence, and there was considerable, and on occasion overwhelming, American involvement in these and other projects. Coupled with the presence of significant numbers of American service personnel on Canadian soil (fifteen

²⁰ Aronsen, "Canada's Postwar Re-armament: Another Look at American Theories of the Military-Industrial Complex," 193.

thousand in the mid-1950s), these defence projects generated considerable controversy.²²

Connected with concerns about sovereignty were Ottawa's ambitious plans for the Canadian north, which were perhaps most strikingly exemplified by Prime Minister Diefenbaker's "Northern Vision". An examination of the history of DCL permits some light to be shed on aspects of government policy and the Canadian north, most notably in the discussions on the construction and resupplying of the Distant Early Warning Line and the construction of the Strategic Air Command refuelling base at Frobisher Bay (now Iqaluit), which coincided with ambitious plans for the establishment of a planned community that would form the basis for an administrative centre.²³ Outside of the ambitious plans for Frobisher Bay, DCL did not play a significant role in government policy or activities in the Canadian north. These plans and activities did none the less have a substantial effect on the infrastructure projects undertaken through the corporation, and as such must be considered in any discussion of its history.

The history of Defence Construction (1951) Limited between 1950 and 1965, therefore, provides useful insights and observations that support arguments and address lacunae in a number of historiographical fields. An examination of the corporation's

²¹ Crosby, *Dilemmas in Defence Decision Making*, 107.

²² John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, (Montreal & Kingston: McGill-Queen's University Press, 1994), 196-199; David Bercuson, "SAC vs Sovereignty: The Origins of the Goose Bay Lease, 1946-52," *Canadian Historical Review*, 70:2 (Spring 1989), 206-222; United States Air Force, Strategic Air Command, History and Research Division, *History of the Canadian Refueling Base Program*, (SAC Historical Study No. 87, 1962). The best-known example of contemporary criticism of Canada's role is James Minifie, *Peacemaker or Powder-Monkey: Canada's Role in a Revolutionary World*, (Toronto: McClelland and Stewart, 1960).

²³ The most accessible general discussion of the broader consequences of military involvement in the Canadian north is found in Morris Zaslow, *The Northward Expansion of Canada, 1914-1967*, (Toronto: McClelland and Stewart, 1988). For an overview of the administrative elements of northern policy development during the period under discussion, see Graham W. Rowley, *The Role of the Advisory Committee on Northern Development in the Development of Policy and the Coordination of Federal Government Activities in Northern Canada*, (Ottawa: Department of Indian Affairs and Northern Development, 1992). See also Kenneth Coates, *Canada's Colonies: A History of the Yukon and Northwest*

history also reveals its ongoing utility and flexibility as an instrument of government policy, as well as its ability to adapt and survive in a changing bureaucratic environment. In addition to shedding further light on the historiographical fields described above and the themes in the company's history that will be discussed below, the results of such an examination also contradict widespread neo-conservative perceptions of Crown corporations as inflexible, inefficient, and inappropriate instruments of government policy. A history of Defence Construction permits the examination and explanation of a number of themes crucial both to the corporation's history and to broader events: the rationale for DCL's creation and continued existence; DCL's role in Canada's relations with the United States and the defence projects that resulted from them; and the corporation's role in relationships between the government and the private sector, particularly in furthering the interests of the Canadian construction industry and facilitating industry-government relations.

From its creation in 1950, Defence Construction Limited and its successor, Defence Construction (1951) Limited, appeared to be a straightforward case of C.D. Howe's famed pragmatism in action. A closer examination, however, reveals more details that help address Tupper and Doern's invocation of Whitaker's criticism of such explanations as "an excuse for an explanation which remains to be given".²⁴ Insofar as anyone can determine the motivations of a figure noted for scorning lengthy memoranda and detailed correspondence and who preferred to conduct business by telephone, C.D. Howe had clear, well-defined objectives in creating DCL: the corporation was to be formed quickly, handle the infrastructure work necessary for the Korean War rearmament

Territories, (Toronto: James Lorimer & Company, 1985), and John David Hamilton, *Arctic Revolution: Social Change in the Northwest Territories, 1935-1994*, (Toronto: Dundurn Press, 1994).

programme, and then disband. The use of a Crown corporation appealed to Howe for a number of reasons. First, it circumvented cumbersome Civil Service Commission regulations that would have unacceptably delayed the hiring of staff, a characteristic of “Crowns” that had driven him to make use of them in the past. Second, it appealed to his desire for a business style of organization in preference to the departmental form. Third, his wartime experience with “Crowns” created for specific purposes was undoubtedly influential during a time of renewed defence mobilization. A “Crown” offered Ottawa an instrument that could react more efficiently to certain daunting prospects – notably construction in the frozen north – for which the private sector had little appetite or experience.

In addition to streamlining the startup process, the use of the charter of the former Wartime Housing Limited to create the new Defence Construction Limited created linkages and parallels that are interesting if not outright compelling; both corporations had been created to fulfill a specific purpose in Canadian defence mobilization, but later found themselves being used to meet other, related, policy needs. Towards the end of the Second World War, WHL was given the task of helping to meet the burgeoning need for veterans’ housing, while shortly after its creation, Defence Construction (1951) Limited was put to work on civilian projects for the federal government, beginning with the foreign aid projects of the Colombo Plan. In both cases, the corporations were used as instruments of government policy not only to meet the objectives of their original *raison d’être*, but also to fulfill requirements in related fields. The ability to provide infrastructure – be it housing for veterans through WHL or foreign aid through the contracting and supervisory services supplied by DCL – proved to be a useful component

²⁴ Tupper and Doern, “Public Corporations and Public Policy in Canada,” 11.

in the range of policy instruments available to Ottawa. One of the arguments used against Crown corporations in the 1980s was that once established they atrophied and became anachronisms once their moment had passed, a drain on state coffers and a ground for patronage appointments. DCL never fit this stereotype.

The use of DCL to help fulfill Canada's objectives in the Colombo Plan also points to another of the reasons for its continued existence – the emergence of commitments unforeseen at the time of its creation. While original plans had called for DCL to be disbanded within a few years, they appear to have been based on the premise that the only military infrastructure projects that would be required were those outlined in Canada's Korean War rearmament programme – the Pinetree Line and Project Bulldozer for the RCAF, the Home Station programme for the Army, and upgraded facilities on both coasts for the RCN. C.D. Howe and others had not foreseen the Colombo Plan, or, more importantly, the rapid proliferation of continental defence projects that would occupy so much of DCL's efforts throughout most of the 1950s. In 1950, plans for the Mid-Canada Line, the Distant Early Warning Line, Strategic Air Command refuelling bases, CADIN, and BMEWS, if they had existed at all, were mere ideas circulated by ambitious military planners. While the possibility of an all-Canadian natural gas pipeline was beginning to be considered, the prospect of a World's Fair to celebrate the centennial of Confederation – and one as ambitious and fanciful as Expo 67 proved to be – would have been virtually inconceivable to most Canadians in 1950. All of these projects that emerged in the years after 1950 made use of DCL's ready-to-go abilities, and as such helped justify the corporation's continued existence long past its originally intended three-year lifespan.

As Defence Construction's longest-serving president, A.G. Bland, would note, executive competence and corporate self-promotion also helped assure corporate survival. The discussion in Chapter Seven of DCL's efforts to find further work through DND and other agencies of the federal government is perhaps the best example of such measures. Although it remains unclear to what degree these efforts proved helpful in bringing about DCL's involvement with Expo 67 and later projects, among them Telesat Canada, the corporation's actions in this respect substantiate Tupper & Doern's observations on Crown corporations' organizational instincts for survival and how leaders of public corporations will seek to build coalitions of support in their organizations' policy and profit roles.²⁵ The function of interpersonal executive relationships also becomes relevant in examination of these issues, since senior officials with both Expo and Telesat had extensive experience and prior working relationships with DCL.²⁶ The ability to retain a qualified core of personnel through these varied civilian programmes was also beneficial, of course; it meant that when DCL later had need of their services to meet DND's infrastructure requirements, these people and their skills would be available. The cost recovery provisions also helped keep DCL's operating expenses – which had to be covered by a Parliamentary appropriation – lower than they would otherwise have been, which was also undoubtedly beneficial for its long-term prospects.

²⁵ In short, they argue, a viable crown corporation is one that adjusts its initial strategy and finds new rationales for its existence. *Ibid.*, 25.

²⁶ As discussed in Chapter Seven, Robert Shaw, the Deputy Commissioner General of Expo, had earlier served as DCL's Vice-President and Chief Engineer. Telesat was headed by David Golden, who had been Deputy Minister of Defence Production from 1954 to 1962, and was therefore quite familiar with the corporation.

A number of these strategies certainly helped the company's survival, particularly since DCL's quasi-departmental functions as an "agency corporation," resulted in attempts on more than one occasion to have its charter surrendered and its functions taken over by an existing government department.²⁷ The benefits of Crown corporation status were arguably helpful in this respect. Most notably, the flexibility in the hiring and firing of personnel that was possible for a "Crown" but impossible for an agency such as a government department operating under the provisions of the Civil Service Act were useful, especially when the demand for defence infrastructure and related services varied so greatly and so quickly. The strength with which DCL senior management defended this freedom in personnel management against the recommendations of the Heeney Report indicates how crucial and indisputable with the realm of Canadian public policy they believed it was to the corporation's continued effective operation.

Finally, the corporation's low public profile, while perhaps a handicap for historians, may also have helped its survival. Given that government agencies are often the subjects of public attention as a result of misdeed or scandal, relative anonymity to those outside the national security bureaucracy and the construction industry may well have been beneficial. Even though it was intimately involved with a project with great potential for scandal – the Mid-Canada Line, with its administrative infighting and cost overruns documented in *Saturday Night* magazine – DCL emerged essentially unscathed. As discussed in Chapter Three, criticism was directed at the Department of Defence

²⁷ See, for instance, Canada, Royal Commission on Government Organization, *Report*; Canada, *Real Property: A Study Team Report to the Task Force on Program Review*, May 1985, (Ottawa: Minister of Supply and Services Canada, 1986), 442-443.

Production and the RCAF more than at DCL or the Trans-Canada Telephone System.²⁸

Furthermore, during the period examined in this dissertation, when substantial criticism was leveled at such projects in Canada it was, with a few noticeable exceptions, driven by concerns about Canadian sovereignty, the country's position and role in world affairs, or the cost of and justifications for the undertaking, rather than being directed at the Crown corporation that helped provide the infrastructure.

DCL's role in the provision of this defence infrastructure in Canada between 1950 and 1965 has been the central theme of this dissertation. Much of its analysis has focused on the planning, negotiation, and construction of American and joint Canadian-American air defence systems on Canadian territory. These discussions are located within a broad historiographical field, and serve both to confirm a number of established themes as well as to shed light on some previously unexamined areas. For instance, the tensions between the Department of External Affairs and the Department of National Defence on a range of issues related to continental defence, including the process of negotiating diplomatic agreements, concerns about Canadian sovereignty, and the acquisition of nuclear weapons for Canadian forces have by now been widely documented and discussed. The pattern established by these findings has been largely confirmed by this dissertation's examination of DCL's role in these undertakings. A related issue that has not received much if any prior attention, however, is the determination of construction provisions in the diplomatic agreements governing these projects. DCL's involvement in the negotiation and implementation of these provisions was, as has been demonstrated,

²⁸ In later years, DCL was to be involved in other projects that gathered opprobrium, although again much of the criticism was leveled against DND rather than DCL itself. See, for instance, the Auditor General's comments on the St. Jean Megacomplex. Auditor General, *Report of the Auditor General to the House of*

essential. Coupled with the Department of Defence Production's role in these undertakings, an examination of DCL's history provides new insights into the process whereby the infrastructure for continental defence was actually *built* in Canada. DCL was thus an active projector of Canadian sovereignty.

Such an examination also reveals the degree to which the Canadian government sought to obtain benefits from the rapid proliferation of continental defence installations on Canadian territory. Ottawa's beliefs about the work to which Canadian firms ought to be entitled expanded over time, but perhaps more importantly its ability to secure this work for domestic construction companies and their suppliers increased as the 1950s progressed. DCL and its president, R.G. Johnson, argued strongly that such work should be awarded to Canadian firms, advocating a form of what Hugh Aitken would come to describe as "defensive expansionism" intended to protect the Canadian construction industry against its American counterpart.²⁹ In addition to the efforts of government agencies, including DCL, success in this field was also due in part to geography. If Canada's position along the direct air routes from the Soviet Union to the United States helped drive American interest in facilities on Canadian territory and Canada's involvement in these projects, it also gave Ottawa considerable influence in negotiations with the United States. Radar lines, facilities for tanker aircraft, and communications links all required the use of Canadian territory.³⁰ This dissertation also reveals, however,

Commons for the Fiscal Year Ended 31 March 1984, (Ottawa: Minister of Supply and Services, 1984), 2-22, 6-12-6-13, 12-2, 12-34.

²⁹ R.G. Johnson, "The Position of the Canadian Construction Industry in 1958," DCC in-house file "US-CDN Diplomatic Agreements Affecting DCL"; Hugh G.J. Aitken, "Defensive Expansionism: The State and Economic Growth in Canada," in *The State and Economic Growth: Papers of a Conference Held on October 11-13, 1956, under the Auspices of the Committee on Economic Growth*, Hugh G.J. Aitken, ed., (New York: Social Science Research Council, 1959), 79-114.

³⁰ For a contemporary comment on this matter, see Memorandum, R.A.J. Phillips (Secretary, CDC), to Bryce, "Proposed establishment by the U.S.A.F. of nine additional temporary radar stations in Canada," 15

the problems encountered during these negotiations and the limitations to the benefits that Ottawa was able to obtain. While not directly related to DCL's area of responsibility, the ultimate failure of the Canadian government to secure a significant portion of the electronics and equipment supply contracts for Canadian firms stood in sharp contrast with its successes in the construction field, and also contributed to the establishment of the Defence Production Sharing and Development Agreements that shaped Canada's subsequent defence production relationship with the United States. DCL thus gave Canada considerable "low tech" leverage in Cold War infrastructure development, success that was not replicated in "high tech" areas.

The issue of American ownership of many of the Canadian construction and supply firms that did benefit from the construction conditions, however, makes the initial appearance of Canadian success in this area more ambiguous. To what extent could the Canadian government and DCL be said to be protecting the interests of the domestic construction industry and its suppliers against their American competitors if members of that industry were themselves subsidiaries of larger American firms? DCL president R.G. Johnson argued strongly for preferential treatment of Canadian contractors on a number of occasions, accompanied by a specific opposition to the involvement of American construction firms in northern defence projects; in this respect, Johnson's definition of "Canadian" firms appears to have been predicated on Canadian ownership. A more accommodating stance, however, also existed within the corporation and was demonstrated in a 1955 memorandum about suppliers for the DEW Line construction effort. While many of the "Canadian" suppliers might be "American in origin, and Head

February 1954, LAC, RG2, series B2, accession 90-91/154, box 28, file D-28-3-, pt.2, "Department of National Defence - Canada-United States Defence Relations - Official".

Office administration," a head office employee argued, they were at least located in Canada and employed Canadian labour.³¹ Rather than demonstrating the concerns evinced by Walter Gordon and his associates over the consequences of American ownership and control, this view reflects Howe's pragmatic attitude towards the benefits of American investment.

In a related area, this dissertation has touched on new ground in the history of the construction of the North American air defence system during the 1950s and early 1960s. A number of these areas merit further research, including the planning, negotiation, and construction of the CADIN projects, as well as Canadian involvement in BMEWS and early plans for North American ballistic missile defence. In a related area, the links between the building of the infrastructure for continental defence and Canadian government policies, plans, and programmes for increasing and expanding its involvement in and control of the Canadian Arctic is another field where further exploration is warranted. While the most obvious example is Frobisher Bay, where DCL was involved with ambitious plans for a planned community and administrative centre, the development of northern telecommunications and its relation to military activities also provides indications that it could be an area for useful new research.

Finally, the third theme brought forward in this dissertation has been the role played by Defence Construction (1951) Limited in the development and maintenance of relationships between the government and the private sector, especially the Canadian construction industry. Particularly in the 1950s, DCL played an important role in facilitating linkages between the government, the federal bureaucracy, and the

³¹ For one such statement by Johnson, see R.G. Johnson to D.A. Golden, 4 November 1954; DCL Inter-Office Memorandum, J.A. Head to R.G. Johnson, "Re: Dew Line," 28 February 1955, DCC in-house file

construction industry. The corporation acted as an intermediary, benefiting both from its relationship with government agencies such as the Department of Defence Production and its officials on the one hand and from its close ties to and knowledge of the Canadian construction industry on the other. DCL, for instance, provided lists of Canadian suppliers for DEW Line work, and in some cases determined which firms were qualified to be asked to bid on contracts. While its role in choosing the engineering consulting firms for Colombo Plan work may have been the most notable example, the day-to-day exchange of correspondence with government officials and the construction industry that survives in some files gives an indication of the extent to which the corporation fulfilled this role of intermediary.

In other respects, DCL similarly acted as an instrument of government policy in addition to acting as a handmaiden of the Canadian construction industry. From its outset in 1957-58, the Department of National Defence and hence DCL were involved in the federal government's winter works programme that was intended to alleviate seasonal unemployment and counter the effects of the recession that had begun in 1957. Defence construction contracts were also used in other attempts at mitigating imbalances; during the construction of Camp Gagetown, for instance, the large contracts awarded through DCL were broken down in an effort to provide more opportunities for Atlantic Canada contractors to make successful bids in competition against the larger central Canadian firms. When the bidding and contracting process emerged as an obstacle to the members of the construction industry, especially smaller firms, DCL worked in conjunction with the Canadian Construction Association to simplify and streamline the tender call process, a change that also promised to expedite the completion of projects, and to implement

security deposit procedures that protected government interests while reducing the financial burden on construction firms that had been awarded contracts.

In all these instances, in its role as an intermediary, as well as in a number of respects discussed above, Defence Construction Limited was able to benefit from close relationships with the Canadian Construction Association and individual construction and consulting firms that were made possible in part by personnel in the corporation, especially members of its management and its senior personnel. Many of them had come to the corporation from the private sector or from other government agencies, and in addition to well-established personal ties they brought with them an understanding of the construction industry and the private sector or of the functioning of other agencies. Furthermore, those whose background lay outside of government also brought with them expectations about how a corporation was to be operated that undoubtedly carried over to DCL's management and activities. While the paucity of information in the minutes of board and shareholders' meetings, and the infrequency of the meetings themselves for much of the 1950s limits insights into these issues, the Heeney Report certainly commented in general terms on such tendencies among the management of Crown corporations, and it would be unusual had DCL not been roughly comparable. While the corporation was not in a position where it could turn a profit, even at times when the emphasis of the Canadian government and the Department of National Defence was on the urgent completion of continental defence projects rather than the most cost-effective means of implementing them, a preference for "business-like" operation would certainly have been an asset for Defence Construction Limited.

In much the same way, Defence Construction (1951) Limited proved to be a protean asset for the federal government and for the Canadian construction industry. It served as a prime instrument in facilitating the building of new military infrastructure in Canada. Furthermore, through its involvement in civilian projects, the corporation demonstrated its continuing utility and flexibility as an instrument of government policy, as well as an ability to adapt to its changing bureaucratic environment and to survive through the fostering of relationships with the private sector and other government agencies. Between 1950 and 1965, DCL played an instrumental role in the planning, negotiation and construction of Canadian, American, and joint Canadian-American defence infrastructure in Canada, as well as for the provision of facilities for Canada's NATO commitments in Europe. Defence Construction also played an important part in the relationships between the government and the private sector, particularly in furthering the interests of the Canadian construction industry and acting as an intermediary between the two groups. Originally created as an expedient organization that would deploy rapidly, carry out limited tasks, and then disband, Defence Construction (1951) Limited instead survived. As Canada's Cold War commitments grew through the early and mid-1950s and as the federal government took on new tasks ranging from foreign aid projects to natural gas pipelines, DCL continued to be needed, not only because it helped provide military and civilian infrastructure but because it had demonstrated its utility as an instrument of government policy – Ottawa's "Cold War handyman," as it were. It had done so, however, virtually unnoticed by the Canadian public. Given this low profile, and its important role in the creation of North American air defence networks, by 1965 DCL had become a corporation that in more than one respect was "under the radar".

A Note on Sources

This dissertation was initially derived from a portion of the research conducted for an already-written 160 page history of Defence Construction (1951) Limited.¹ In the process, its scope was narrowed and considerable additional research was undertaken. The author has thus had the benefit of unqualified access to DCL's archival resources. Defence Construction (1951) records are incomplete and the surviving records are not entirely available to the public. As an active corporation, DCL retains the minute books for all of the meetings of its shareholders and board of directors, as well as a number of other records. Some of these files have been deliberately preserved in an effort to create an historical record while others have survived at head office by accident or oversight. Deliberate preservation, of course, raises the issues of selectivity and the deliberate exclusion of unfavourable materials. Some files covering large areas of operations no longer exist – in the early 1970s, for instance, DCL's European Branch destroyed most of its files relating to Canadian bases in France. Other holdings at head office include files of selected presidential speeches, some news clippings, and historical summaries and comparisons of major construction programmes. Despite these shortcomings, a solid base of material exists to support the research endeavour.

Significant holdings of corporate and departmental files relevant to DCL's history can be found at Library and Archives Canada (LAC) in Ottawa. Unfortunately, access to the majority of these files has required review under the *Access to Information Act* and *Privacy Act*. At the time of writing (May 2005), the current delay for informal access requests at Library and Archives Canada is some *twenty months*, although recent measures appear to be rapidly clearing this backlog. A considerable portion of the

¹ *Fifty Years and More: Defence Construction (1951) Limited, 1951-2003*.

surviving DCL files for the period under consideration are held by LAC in its RG 83 record group.² The subject matter of these files is varied – volumes 65, 66, and 67, for instance, consist almost entirely of biweekly reports on steel deliveries for the first three quarters of 1952. Other volumes, however, contain material of broader significance, and materials covering the construction of the Mid-Canada Line are particularly well represented.

Survival of documents relating to the daily administration of the corporation is unfortunately spotty at best. Files from the Department of Defence Production, RG 49, also contain information on DCL because of the latter's status as an agency corporation responsible to the Minister of Defence Production. Unfortunately, the file block dealing specifically with DCL (file block 170) no longer appears to exist, at least not within the DDP records held by LAC. Furthermore, the DDP file block dealing with major United States Air Force projects in Canada (file block 350) is likewise unavailable.³

Given DCL's role as contracting and supervisory agency for the Department of National Defence, selected files from that department's records (RG 24) are also useful. Other departments whose records have been consulted include the Privy Council Office (RG 2), for materials related to Cabinet discussions and the operation of various senior committees, and the Department of Transport (RG 12), which, among its other duties, was concerned with the construction of airfields and the allocation of radio frequencies for communications projects. The files of Office of the Auditor General (RG 58) often contain succinct summaries of various projects, although prior to the late 1950s they may

² DCL and other record groups have within the past few years been converted to collections of fonds, but for consistency will be referred to by their initial record group numbers.

³ These file blocks are contained in finding aid 49-6, a subject card index originally used by the department itself, but the other finding aids (49-1 through 49-5) do not indicate their continued existence. The files do not appear to be contained in the records of DDP's successor departments held by LAC.

well suffer from Watson Sellar's preference for pursuing the settlement of irregularities in the accounts of departments and agencies rather than reporting the questionable transactions in his annual reports.⁴

These departmental records are supplemented by the personal papers of a number of historical figures held by LAC. Most notable among these are ministerial and prime ministerial papers. The C.D. Howe Papers (MG 27 III B20), the Brooke Claxton Papers (MG 32 B5), and the Louis St. Laurent Papers (MG 26 L) all cover the period of DCL's origins and early operations. Papers from subsequent ministers, including Gordon Churchill (MG 32 B9), Alvin Hamilton (MG 32 B40), and Douglas Scott Harkness (MG 32 B19), cover later years of DCL's operations. The papers of ADP Heeney (MG 30 E144) proved useful for the discussion of Civil Service reform in Chapter Seven.

The Department of National Defence's Directorate of History and Heritage (DHH) holds a number of permanent reference files, along with holdings of personal documents that have proved tremendously useful. Foremost among these are the rich and varied papers of Robert Louis Rymont (73/1223), former secretary of the Chiefs of Staff Committee, which contain materials on a wide range of Canadian military policy and related activities. The manuscript of A.G. Lester's *Special Contract: A Story of Defence Communications in Canada*, (78/512) which details Bell Canada's involvement in a number of DCL's major projects, most notably the Mid-Canada Line, is also particularly useful, as is a transcript of Lester's recollections on this and related subjects (77/493). For researchers, the greater speed of access to documents at DHH and the ease of obtaining photocopies is also a tremendous boon.

⁴ Sonja Sinclair, *Cordial but not Cosy: A History of the Office of the Auditor General*, (Toronto: McClelland and Stewart, 1979), 48-49.

Given the joint Canadian-American nature of many of the projects discussed in this dissertation, the records of a number of joint committees are also tremendously useful to the researcher. The summaries of the Canada-US Military Co-Operation Committee meetings (84/540), for instance, provide valuable if rather brief summaries of joint discussions and actions on defence issues. The Permanent Joint Board on Defence discussed these issues in considerably more detail, and the Journals recording its discussions and decisions should be tremendously useful to researchers. Unfortunately, the journals from 1950 onwards remain closed. The brief excerpts that appear in other records, however, provide ample evidence of the value of PJBD discussions for the study of many aspects of joint defence programmes, including their construction. If these journals are ever opened to researchers, many fields will require substantial reconsideration and revision.

Given the close relationship between DCL and the Canadian Construction Association, the published proceedings of the CCA's annual conferences are well worth consulting, especially for the 1950s when they contain the speeches given by R.G. Johnson on DCL activities and its relationship with the CCA. The reports of two major Royal Commissions during this period—the 1955-1957 Royal Commission on Canada's Economic Prospects (also known as the Gordon Commission) and the 1960-1962 Royal Commission on Government Organization (Glassco Commission) — are relevant to DCL and the Canadian construction industry.⁵ In particular, sector studies for the Gordon Commission on the construction industry and American investment, and the materials

⁵ Canada, Royal Commission on Government Organization, *Report*, 5 vols., (Ottawa: Queen's Printer, 1962-1963).

used in their creation, provide useful insights into the Canadian construction industry in the late 1950s.⁶

Defence Construction featured intermittently in Parliamentary debates, usually as an adjunct to debates about the projects with which it was involved, although in the early 1960s the question of its future in light of government reorganization was openly questioned on a number of occasions.⁷ The 1953 Committee on Defence Expenditure features some testimony from DCL president R.G. Johnson, but much of it is related to the RCAF base at Penhold, Alberta, and the delays and cost overruns encountered at that site, and a number of Parliamentary committees on general and defence expenditures through the 1950s also touch on the corporation's activities.⁸ Unfortunately, the early 1960s Special Committee on Defence, (frequently called the "Sauve Committee" after its chair) makes virtually no mention of the corporation, nor does it receive any significant attention in the extensive testimony and presentations published by the committee.⁹ Defence Construction's annual reports, however, along with the annual reports of the Department of Defence Production and the Auditor General, provide useful basic information for the researcher. Annual reports from related Crown corporations, including the Central Mortgage and Housing Corporation, the Canadian Commercial Corporation, and the Canada Overseas Telecommunication Corporation are also useful.

⁶ Royal Bank of Canada, *The Canadian Construction Industry*, (Ottawa: Royal Commission on Canada's Economic Prospects, 1956); Irving Brecher and S.S. Reisman, *Canada-United States Economic Relations*, (Ottawa: Royal Commission on Canada's Economic Prospects, 1957); LAC, RG 33-35, volumes 49 and 50.

⁷ Canada, House of Commons, *Debates*, 14 June 1963, 1178-1179; 28 August 1964, 7413, 7438.

⁸ Canada, House of Commons, Committee on Defence Expenditure, *Minutes of Proceedings and Evidence*, (Ottawa: Queen's Printer, 1953).

⁹ Canada, Parliament, House of Commons, Special Committee on Defence, *Minutes of Proceedings and Evidence*, (Ottawa: Queen's Printer, 1963-1965).

Finally, DCL received some attention, however peripheral, in the news media. For the most part this consisted of coverage in the *Daily Commercial News* and *Financial Post*, although on occasion other articles, like Arnold Edinborough's 1959 exposés of problems on the Mid-Canada Line, discussed the company's operations.¹⁰ In general, while considerable documentation exists for some projects such as the Mid-Canada Line, other areas of DCL's history are at least thinly documented. In many cases, short "in-house" summaries and histories of various programmes in the 1950s and 60s have been available and have been very useful. Despite the inconsistent availability of research materials, however, a broad picture of DCL's activities in the years down to 1965 can be assembled.

¹⁰ Arnold Edinborough, "A Story of Waste on the Mid-Canada Line," *Saturday Night*, 74:6 (March 14, 1959), 9-13, 49; Edinborough, "The Administrative Muddle of the Mid-Canada Line," *Saturday Night*, 74:7 (March 28, 1959), 9-11, 48.

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