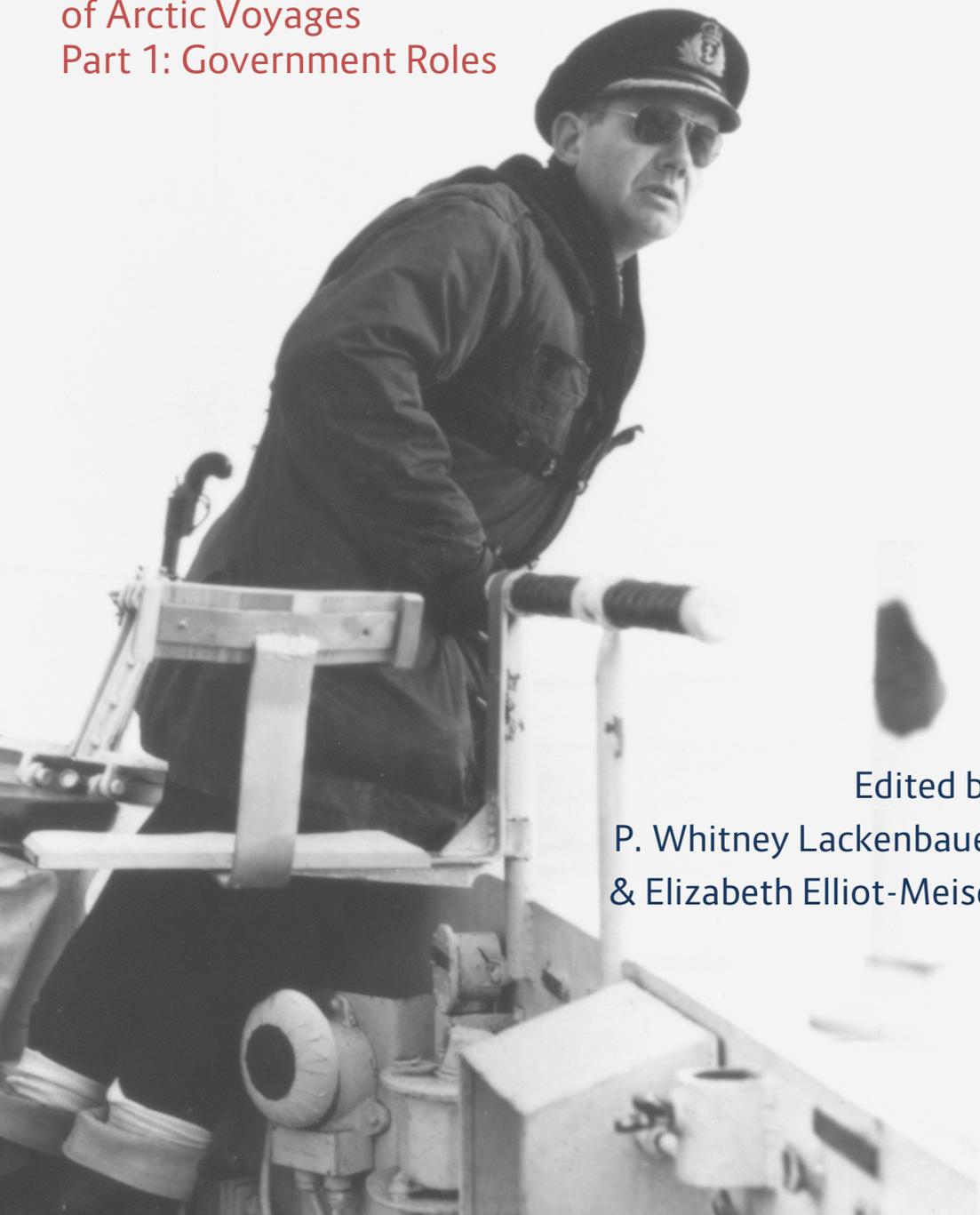


DOCUMENTS ON CANADIAN ARCTIC SOVEREIGNTY AND SECURITY

“One of the Great Polar Navigators”

Captain T.C. Pullen's Personal Records
of Arctic Voyages
Part 1: Government Roles



Edited by
P. Whitney Lackenbauer
& Elizabeth Elliot-Meisel

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P. Whitney Lackenbauer and Elizabeth Elliot-Meisel

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Pullen’s Personal Records of Arctic Voyages

Volume 1: Official Roles

P. Whitney Lackenbauer, Ph.D.

and

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Table of Contents

Introduction	i
Acronyms.....	xlvi
Part 1: H.M.C.S. <i>Labrador</i>	1
Pullen’s Personal Record of HMCS <i>Labrador</i> , 1956-57	3
1956 Diary.....	5
1957 Arctic Voyage	64
Proceedings for June 1957	65
Diary, 25 June-30 July 1957	68
Proceedings for July 1957	74
Diary, 1 August – 30 August 1957.....	84
Proceedings for August 1957.....	100
Diary, 1 September – 11 October 1957	111
Part 2: <i>Manhattan</i> Voyage.....	122
Draft Memorandum for the Cabinet, “Canadian Sovereignty in the Arctic,” 20 March 1969.....	123
Memorandum: Letter of Instruction to Pullen from Admiral A.H.G. Storrs, 11 July 1969.....	159
Memorandum from Captain T.C. Pullen, 25 July 1969	162
1969 Northwest Passage Voyage of S.S. <i>Manhattan</i> : Personal Journal.....	163
Pullen, Northern Associates Registered Report to the Canadian Hydrographic Service, “The Northwest Passage Voyage of the S.S. <i>Manhattan</i> , 1969.....	287
Report on the Arctic Tanker Test (S.S. <i>Manhattan</i>) August-November, 1969, compiled by Pullen, 13 January 1970	317
Appendix A: Captain T.C. Pullen - Record of Service	349
Appendix B: Captain T.C. Pullen, <i>curriculum vitae</i> (1999).....	354

Appendix C: List of Northwest Passage Voyages, 1906-89	362
Appendix D: Sea Ice Glossary	371
Further Reading.....	377
About the Editors.....	380

Introduction: “Pullen of the Arctic”

[Captain T.C. Pullen, RCN] had become, and to the last remained, one of the great polar navigators.

- Graham Rowley (1992)¹

Captain Thomas Charles Pullen (1918-1990), RCN, OC, CD, D.Sc., FHSC, a fifth generation naval officer, commanded numerous ships during his career with the Royal Canadian Navy (RCN) from 1936-65. He became a noted authority on and explorer of the Arctic after he took command of the naval icebreaker HMCS *Labrador* in 1956. Retiring after thirty years of active naval service, Pullen served as an advisor and consultant to government and industry on arctic marine operations for another twenty-four years. An officer of the Order of Canada and the recipient of the Massey Gold Medal of the Royal Canadian Geographical Society for his contributions to Arctic knowledge, “Pullen of the Arctic” (as he became widely known) earned the reputation as North America’s foremost expert on Arctic navigation and icebreaking over the course of his life.²

A note on Pullen’s biographical file at the Department of National Defence observes that he was a “compulsive diary writer dating back to 1931.”³ Consequently, his personal writings provide unparalleled, first-hand insights into seminal moments in the naval and maritime history of Canada’s Arctic during the latter half of the twentieth century. Drawing upon this rich resource, this volume publishes key documents on Arctic operations that Pullen wrote in various official capacities over his career. The first part documents his role as the commanding officer of the *Labrador*, as senior officer of the United States Navy, US Coast Guard, and Canadian ships deployed to the Eastern Arctic during the construction phase of the Distant Early Warning (DEW) Line in 1956 and 1957, as well as his role as US Navy Task Group Commander for Operation *Bellot* in 1957. The second part reproduces his observations as the Government of Canada’s official

¹ Graham Rowley, “Captain T.C. Pullen, RCN: Polar Navigator,” *The Northern Mariner* 2/2 (April 1992), 47.

² W.O. Kupsch, “Thomas C. Pullen,” *The Musk-ox* 38 (1991), 69; David Maclellan, “Pullen of the Arctic,” *Canadian Geographic* 104/2 (1984), 26.

³ “Captain T.C. Pullen: Naval Service,” notes on DHH 2004/55, file 1.

representative onboard the icebreaking tanker *Manhattan* during its two transits of the Northwest Passage. His diaries and reports cut through the hyperbole that surrounded this controversial voyage, addressing both legitimate concerns and unwarranted criticisms, and pointed the way forward for Canadian Arctic policy. By bringing more of his ideas into public circulation, we hope to stimulate informed discussion and debate on the history of maritime operations in the Canadian Arctic, and to ensure that “Pullen of the Arctic” gets the credit that he so richly deserves for his contributions to polar navigation, knowledge, and practice.

Background

Thomas Charles Pullen was born in Oakville, Ontario, on 27 May 1918, into a proud nautical family with a record of naval service dating back to the eighteenth century. His great-great-grandfather, Nicholas Pullen, and sixteen of his shipmates aboard a small vessel trading in the West Indies were press-ganged into the Royal Navy in 1780. Subsequently, sixteen of Nicholas’ descendants became naval officers, including four flag officers, two captains and two commanders. The Arctic brought the family particular fame, beginning with Tom Pullen's great-uncles Commander (later Vice-Admiral) W.J.S. Pullen, who commanded the depot ship *North Star* on the 1852-54 Belcher expedition to find Franklin, with his younger brother T.C. Pullen (later Captain) as his second-in-command.⁴ Thanks to their exploits, when Tom Pullen sailed in the Arctic a century later, “there were four Pullen place-names to remind him of his great-uncles.”⁵

After attending Lakefield College School, a private boarding school in the picturesque Kawartha Lakes region of Ontario, from 1929-35, Tom Pullen spent one year at Oakville High School where the principal prepared him for the Royal Navy officer cadet entrance examination.⁶ He entered the RCN as a cadet in 1936, sailed in RMS *Ansonia* to the United Kingdom in

⁴ Maclellan, “Pullen of the Arctic,” 27.

⁵ Captain Tom Pullen obit, Daily Telegraph [London].

⁶ James Goodwin, *Our Gallant Doctor: Enigma and Tragedy – Surgeon Lieutenant George Hendry and HMCS Ottawa, 1942* (St Catharines: Dundurn, 2007), 96.

August, and took his early training on ships of the Royal Navy.⁷ First he was sent to the British training cruiser HMS *Frobisher* where he developed his skills in the North Sea, Norwegian Sea, Atlantic Ocean, and West Indies. The next two years he spent in the First Cruiser Squadron of the British Mediterranean fleet onboard HMS *Shropshire* and *Sussex*, as well as three-months of destroyer training with HMS *Hotspur* and *Hostile* of the Second Destroyer Flotilla. His first appointment came onboard *Shropshire* at the rank of Midshipman. He went on to serve on the Nyon Patrol off the Iberian Peninsula during the Spanish Civil War, assigned to coastal patrolling and evacuating civilians. “We were running boats from shore out to the ship and on one occasion there was a bombardment from seaward and shells were whistling overhead,” he recalled. “It was really a minor overture to World War II.” The Royal Navy was training hard for a war that everyone knew was coming, with Pullen observing “a steady procession of all the ships of the Mediterranean Fleet, in and out, doing exercises every day, and night exercises.”⁸ Pullen then returned to England in 1939 for a subs course, emerging as an Acting Sub Lieutenant.⁹

When the Second World War broke out on 3 September, Pullen was qualifying as a gunnery officer at Whale Island, Portsmouth. He was soon appointed to the newly-commissioned RCN destroyer HMCS *Assiniboine* on 23 October, captained by Commander E.R. Mainguy. “It was a great fun, it was a great learning process,” Pullen later recalled. “You had to learn fast in those days because the Navy was expanding and there were not enough experienced and trained officers to go around ... so prospects were bright and it paid to pay attention!”¹⁰ As gunnery officer/watchkeeper on the destroyer, Pullen was involved with the capture of the German merchant ship *Hanover* in the West Indies in March 1940, followed by convoy escort duties running

⁷ Directorate of Public Relations (National Defence) Armed Forces News, 22 November 1954, DHH 2004/55, file 3 – Press clippings & news releases.

⁸ Report of Interview with Captain Thomas Charles Pullen in Ottawa, DHH 2004/55, folder 2, pp.12, 15-16.

⁹ See “Captain T.C. Pullen: Naval Service,” notes on DHH 2004/55, file 1; and Report of Interview.

¹⁰ DHH, Pullen interview with Cdr (ret’d) Tony German, 26 January 1985; also quoted in Goodwin, *Our Gallant Doctor: Enigma and Tragedy*, 97.

from Halifax to Iceland, which entailed “three days in and three days back.”¹¹ He departed *Assiniboine* on 20 January 1941 so that he could return to Britain for a specialist course in gunnery. After he fell ill with epistaxis (bleeding from the nose) and was hospitalized for a short time, he was tasked staff duties at HMCS *Niobe* – a “lunatic asylum” (hospital) at Greenock requisitioned by the RCN in 1941 to serve as the headquarters of the senior Canadian naval attaché and advisor in the UK. Pullen was unhappy with the posting. “I bitched and grumbled as much as I could,” he recalled, “then asked and requested to go to sea” – as he saw it, “the proper place for a young officer.”¹²

His wish granted, Pullen swapped positions with the Executive Officer (second in command, or First Lieutenant) of the destroyer HMCS *Ottawa* in February 1942. It was a trying time for the RCN ships on Mid Ocean Escort Force operations at the height of the Battle of the Atlantic. Historian Marc Milner describes how:

1942 was a very anxious period in the battle against the U-boats in the Atlantic. By the summer of that year the products of Germany's first wartime building program were pouring forth at a rate of nearly twenty U-boats a month ... the number at sea on any given day was increasing, from an average of twenty-two in January to eighty-six in August, reducing the potential for successful evasive routing of convoys The prospect of the mid-ocean filling up with U-boats among which convoys could only be safely routed by very precise intelligence, was worrisome to say the least.... As early as August it was clear ... that the confrontation in the mid-Atlantic air gap would soon escalate rapidly.... Unfortunately for the Allies, a substantially higher casualty rate in the U-boat fleet was not in the offing in late 1942, and the exchange rate between Allied shipping losses and U-boats destroyed continued to favour the Germans heavily. Through the last months of 1942, U-boats exacted a punishing toll from North Atlantic Shipping.¹³

¹¹ Report of interview, pp.33-42.

¹² Report of interview, pp.45-46; “Captain T.C. Pullen: Naval Service,” notes on DHH 2004/55, file 1 and Directorate of Public Relations (National Defence) Armed Forces News, 22 November 1954, DHH 2004/55, file 3 – Press clippings & news releases.

¹³ Marc Milner, *North Atlantic Run: The Royal Canadian Navy and the Battle for the Convoys* (Toronto: University of Toronto Press, 1985), 158.

As the RCN official history later noted, “practically no convoy at sea, especially in mid-ocean, could now help standing into danger” at this stage in the war. “An average of 100 U-boats operated in the Atlantic in September [1942].”¹⁴

Ottawa sailed from Londonderry on 5 September with ON 127, escorting thirty-four merchant ships across the North Atlantic. “Up until that time I had bemoaned the fact that we never seemed to have any excitement in all my trans-Atlantic voyages with convoys,” Pullen later reminisced. “I was going to live to regret that statement.”¹⁵ Several of the merchant ships were sunk by German U-boats before the fateful night of 13 September, when U-91 hit the *Ottawa* with two torpedoes (thirty minutes apart) about five hundred nautical miles east of St. John’s. “Everything happened so swiftly,” Pullen remembered. When the captain gave the order to abandon ship, “some over-burdened floats capsized, throwing their occupants into the water and adding to the death toll.” It was a tragic scene:

During those final moments some grim dramas were being played out. The pitiable entreaties emanating from the voice pipe to the bridge from the two young hands trapped in the asdic hut far below became unbearable to those on the bridge, who were totally helpless to do anything for them. What could, what should, one do other than offer words of encouragement that help was coming when such was manifestly out of the question? What happened at the end is hard to contemplate for the imprisoned pair, as that pitch black, watertight, sound-proofed box rolled first 90 degrees to starboard and then 90 degrees onto its back before sliding into the depths and oblivion. It is an ineradicable memory.¹⁶

The sinking ship took 137 lives with her, and only sixty-five survivors were pulled from the numbing waters of the Atlantic. Pullen was the senior surviving officer. “Pullen was one of the last to leave [the sinking ship]—having tried his sailor’s luck by wanting to leave after the captain—and was

¹⁴ W.A.B. Douglas et al, *No Higher Purpose*, 508.

¹⁵ Report of interview, p.47.

¹⁶ T.C. Pullen, “Convoy O.N. 127 & the Loss of HMCS *Ottawa*, 13 September 1942: A Personal Reminiscence,” *Northern Mariner* 2/2 (April 1992): 15.

fortunate to spend only five hours on a raft before being rescued,” an obituary later recounted.¹⁷

The same story also noted that Pullen “had strong reason to survive, as he was on his way home to marry Elizabeth Wheelwright, who was to bear him a son and a daughter.” Tom had met Helen Elizabeth (Betty) Wheelwright, who was born and raised in Toronto, in Oakville, Ontario in the summer of 1936. “We’d only known each other a couple of weeks and off I went [to England],” Pullen later recalled. He wrote her a postcard from Quebec on the voyage overseas, which served as “the trigger ... for a correspondence” that went on “non-stop” for a half century. When he next returned to Oakville in 1938, they “picked up where we left off” before he went off again. On survivor’s leave after his harrowing ordeal with ON 127, he followed through on tying the knot. “Ralph Hennessey lent me his cap” and a Toronto tailor produced a uniform for Pullen in a couple of days, he recalled.¹⁸

After a year’s duty ashore as officer-in-charge of the Gunnery School at HMCS *Cornwallis* (the RCN training establishment in Nova Scotia), Pullen returned to sea as the Executive Officer of the River-class destroyer HMCS *Chaudière* when it was transferred to the RCN in November 1943. The following March, operating as part of the mid-ocean escort force, she was involved in a thirty-hour battle that ultimately led to the sinking of German submarine U-744 off the Normandy coast. “It was a long hunt,” Pullen recounted. “The contact was being gained, lost, regained, and at all times I think there were concerns that we were chasing the wrong sub echo. But, in fact, it was the real thing. It was apparent that she was coming up. You could hear her blowing tanks and she hit the surface, and of course everybody opened fire.” A few months later, after workup training in Northern Ireland for “The Blood Bath to Come” (as they jocularly referred to the impending Allied invasion of Europe), Pullen was onboard when *Chaudière* joined

¹⁷ Captain Tom Pullen obit, Daily Telegraph [London]. On the sinking of HMCS *Ottawa*, see also Douglas et al, *No Higher Purpose*, 518-24.

¹⁸ Report of Interview, p.4, 53. Pullen noted that once his survivor’s leave was over, Tom and Betty found themselves apart once again—a frequent dynamic in their life together.

Western Approaches Command for invasion support duty and ensured that u-boats did not penetrate the English Channel on the lead-up to D-Day.¹⁹

In August 1944, at the age of 26, he became one of the youngest destroyer captains in the RCN when he took command of HMCS *Saskatchewan*.²⁰ “At the end of the war, I was transporting men from Newfoundland to Quebec City for demobilization and I established a record for the fastest runs from Father Point to Quebec City, doing about twenty-six knots,” Pullen recalled. “Coming down from Quebec City with the tidal current, we were doing it even faster. It was a tremendous experience.” Because of its excessive speed, the ship became popularly known as the “Terror of the St. Lawrence” for the huge wash that it would generate, rolling yachts up on beaches and provoking locals to “run for the woods” when the ship approached. “I had to undergo a Board of Inquiry, as a result of this excessive speed,” he noted, “but I assume that I got off quite lightly [as] nothing ever happened.”²¹

After relinquishing command of *Saskatchewan* in the early fall of 1945, Pullen took a gunnery course in the UK with the acting rank of Lieutenant-Commander before returning as the officer in charge of the gunnery course at HMCS *Stadacona* in Nova Scotia and staff gunnery officer on the Atlantic Coast. This was followed by Royal Navy staff courses in 1948, command of the destroyer HMCS *Iroquois* and the frigate *La Hullose*, and executive officer of the training base HMCS *Cornwallis*. In September 1953 Pullen took command of the tribal-class destroyer HMCS *Huron* during her second tour of duty as a member of the Commonwealth Task Force in the Korean theatre, and remained in this appointment until June 1954. For part of this period he acted as Commander Canadian Destroyers Far East (the senior Canadian naval officer in the Korean theatre) in the acting rank of captain. In the summer of 1954 he became the Staff Officer (Strategy) to the

¹⁹ Report of Interview, pp 56-58, 60-61; For Posterity’s Sake, “HMCS Chaudiere H99,” http://www.forposterityssake.ca/Navy/HMCS_CHAUDIERE_H99.htm; Keith Butterley and Ken Macpherson, *River Class Destroyers of the Royal Canadian Navy*, 2nd ed. (St. Catharines: Vanwell, 2008).

²⁰ Captain Tom Pullen obit, Daily Telegraph [London].

²¹ Report of Interview, pp. 61-62.

Director of Naval Plans (Strategy and Operations) at RCN Headquarters in Ottawa before assuming the position of Director of Gunnery Division on the staff of the Assistant Chief of Naval Staff (Warfare) that December. In July 1955, Pullen was officially promoted to a Captain in the RCN.²² This set the stage for him to perpetuate his family's long history of Arctic service when he assumed the command for which he would become best known: that of the Royal Canadian Navy icebreaker HMCS *Labrador* on 13 February 1956.

Commander of HMCS *Labrador*

Although Canada is a coastal state bordered by three oceans, its official motto *a mari usque ad mare* refers only to two. The Canadian navy has traditionally mirrored this national emphasis on the Atlantic and the Pacific. The Royal Navy was at the forefront of the epic search for a Northwest Passage (NWP) in the mid-nineteenth century which, after great cost and frustration, led to the “discovery” of one-half of the Arctic and three northwest passages.²³ By the end of that century, however, the viability of the route as a passage to “the Orient” was dismissed. Norwegian explorer Roald Amundsen's 1903-6 transit of the Passage was not repeated until Henry Larsen's transits in the RCMP schooner *St Roch* in 1940 and 1942,²⁴ and for the first four decades of its existence no Canadian government or admiral dispatched any element of the RCN to Canada's Arctic seas.

²² Directorate of Public Relations (National Defence) Armed Forces News, 22 November 1954, DHH 2004/55, file 3 – Press clippings & news releases. On RCN operations during the Korean War, see Thor Thorgrimmson and E.C. Russell, *Canadian Naval Operations in Korean Waters, 1950-1955* (Ottawa: Naval Historical Section, Canadian Forces Headquarters, 1965).

²³ For an excellent scholarly overview, see Hugh N. Wallace, *The Navy, the Company, and Richard King* (Montreal: McGill-Queen's University Press, 1980).

²⁴ RCMP officer Bill White suggests that Larsen's achievement was preceded by other Canadian ships. White alleges that “the so-called Northwest Passage was a busy bloody highway by this time with trading posts all along it and supply ships like the *Chimo* and the *Aklavik* going this way and that way every year. Not too many crossed through from west to east, but I know the *Aklavik* did it in 1938 and Henry [Larsen] knew it too.” Patrick White, *Mountie in Mukluks: The Arctic Adventures of Bill White* (Madeira Park, BC: Harbour Publishing, 2004), 227-28.

At the end of the Second World War, Canada's maritime domain factored heavily into United States' security considerations. The Canadian government in general, and the military in particular, were at a crossroads. The government had sacrificed men, money, equipment, and political capital to the victorious Allied cause. The military in general stepped "out of the shadows" and made contributions, both at home and abroad, that garnered well-deserved praise.²⁵ The RCN, in particular, was now a first-rate blue water navy. When, at war's end, the RCN was downsized dramatically, it had to choose between concentrating its resources in either the Atlantic or the Arctic Ocean. It chose the former.

The North American Arctic, however, was emerging as a front line in the new Cold War. The Canadians had negotiated the departure of their wartime American partners in the Canadian North, but continental defence now vaulted the Arctic into a status of indisputable importance in an era of superpower rivalry. In early February 1946, the US Army Air Force Chief of Staff, General Carl Spaatz, enunciated the "Polar Concept," establishing "the security of the polar approaches, namely the North Atlantic and Alaska," as a chief guiding principle in American grand strategy.²⁶ Although Canada's Arctic waters were largely uncharted and frozen for most of the year, the flightpath over the North Pole now represented the shortest gateway for an attack by Soviet bombers. Simply ignoring the region was no longer an option for North American strategists.

While the northern dominion pondered its needs and options in the early postwar period, the U.S. Navy and Coast Guard sailed into Canada's Arctic to build and resupply the Joint Arctic Weather Stations (JAWS) and to conduct exercises designed to increase polar knowledge and operating

²⁵ Brereton Greenhous and W.A.B. Douglas, *Out of the Shadows: Canada in the Second World War* (St. Catharines: Dundurn, 1996).

²⁶ On this concept, see Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960* (Washington: Office of Air Force History, United States Air Force, 1991), 58; and John T. Farquhar, "Arctic Linchpin: The Polar Concept in American Air Atomic Strategy, 1946-1948," *Air Power History* 61/4 (2014): 34-45. For early expressions, see Charles J.V. Murphy, "The Polar Concept is Revolutionizing American Strategy," *Life*, 20 January 1947: 61-62; and Anthony Leviero, "The Polar Concept in Air Strategy," *Army Information Digest* 2/1 (Dec. 1947): 45-48.

capabilities. The emotional appeal of the region – and attempts to draw attention to its dwindling numbers and budget – eventually drove the RCN to conduct a Northern Cruise in September 1948, which saw the aircraft carrier HMCS *Magnificent* and two destroyers venture into Hudson Strait and then the destroyers into Hudson Bay. The Canadian media made much of this cruise and a subsequent voyage by the frigate HMCS *Swansea* the following year.²⁷

Consistent with concerns over increasing American interest in the region and at a time of regular discussions within Arctic circles in Ottawa about the benefits of “Canadianization,”²⁸ the RCN decided early in 1948 to begin making plans for the construction of its first Arctic Patrol Vessel. Former Clerk of the Privy Council Jack Pickersgill credits Prime Minister Louis St. Laurent with the decision to give the RCN an Arctic-capable ship that could serve as an all-season icebreaker, facilitate research, and “show the flag in the high Arctic waters.”²⁹ In January 1949, the Cabinet approved the letting of a contract to Marine Industries, Limited, Sorel, P.Q., to begin work on the ship. RCN experts decided to base their design on the “Wind” Class icebreakers of the US Navy and Coast Guard that had proven effective in

²⁷ Elizabeth Elliot-Meisel, “Arctic Focus: The Royal Canadian Navy in Arctic Waters, 1946-1949,” *Northern Mariner* 9/2 (April 1999): 23-39. On the contributions of HMCS *Cedarwood* in 1949, see Isabel Campbell, “Making a Difference in Arctic Naval Research: HMCS *Cedarwood*, 1948 to 1956,” *Canadian Naval Review* 8/1 (Spring 2012): 10-14.

²⁸ On this theme, see Shelagh Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936-1950* (Vancouver: UBC Press, 1988); Peter Kikkert, “Pragmatism and Cooperation: Canadian-American Defence Activities in the Arctic, 1945-1951” (unpublished M.A. thesis, University of Waterloo, 2009); Peter Kikkert and P. Whitney Lackenbauer, “Setting an Arctic Course: Task Force 80 and Canadian Control in the Arctic, 1948,” *Northern Mariner* 21/4 (October 2011): 327-58; and P. Whitney Lackenbauer and Daniel Heidt, eds., *The Advisory Committee on Northern Development: Context and Meeting Minutes, 1948-67*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 4 (Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015), <http://cmss.ucalgary.ca/sites/cmss.ucalgary.ca/files/dcassv4.pdf>.

²⁹ Elizabeth Elliot-Meisel, *Arctic Diplomacy: Canada and the United States in the Northwest Passage* (New York: Peter Lang, 1998), 104-105.

Canadian Arctic waters in recent operations.³⁰ The 269-foot ship would have a maximum breadth of 63' 6", with a draught (full load) of 29' 1", a maximum displacement of 6,490 tons, and a maximum speed of 16 knots. "Her twin screws were driven by six diesel-electric engines delivering a total of 10,500 shaft horse-power," an official history described. "The ship possessed heeling tanks which enabled her to be rocked from side to side, thereby facilitating release when frozen in or closely beset by ice. Three reversible-propeller type pumps literally threw the water from one set of tanks to the other at the rate of approximately 40,000 gallons per minute." The design also incorporated a trimming system which used water tanks fore and aft to allow the ship to charge an ice-floe and then, with the bow resting on the ice, to pump water forward again to give added weight and break through.³¹

HMCS *Labrador* was launched in December 1951 and commissioned into the RCN in July 1954. Her initial commander was Captain Owen Connor Struan Robertson, a seasoned merchant mariner before the war who went on to command several RCN ships during the conflict and petitioned successfully for command of the icebreaker after commanding a fleet destroyer in the early postwar period. Building experience on American icebreakers during their Arctic operations each summer during the two years that the *Labrador* was under construction, he immediately developed a reputation as a skilled Arctic navigator during *Labrador's* "legendary maiden voyage" in

³⁰ HMCS *Labrador* also incorporated improvements based upon lessons learned from US Arctic operations. As a 1960 history of the *Labrador* described: "The stem of the Canadian ship ... was given a knife edge instead of the U shape of the American vessels, and the bow propeller fitted in the original "Wind" Class was omitted. The flight deck was made about half as big again as those fitted in the American ships and could accommodate three helicopters. Another major deviation from the US design was the fitting of retractable Denny-Brown stabilizing fins in an attempt to cut down the excessive roll of the 'Wind' Class ships in rough weather. A great many changes involving accommodation of personnel were also made in order to provide better quarters and more recreational space for the ship's company. Further modifications were necessitated by the fact that the RCN communications and radar requirements were about twice as great as those of the American ships." "History of HMCS Labrador" (28 July 1958), 3-4, DHH 81/520/8000.

³¹ "History of HMCS Labrador," 2.

1954.³² From the onset, the ship charted previously uncharted Arctic waters, conducted oceanographic and hydrographic surveys, erected LORAN (long-range navigation) beacons, served as a research platform for scientists, resupplied RCMP outposts and Arctic weather stations, and supported salvage and rescue operations. In 1954, it became the first deep draft ship and first naval vessel to transit the Northwest Passage, as well as only the second ship to circumnavigate the North American continent.³³ “Her scientific accomplishments marked the beginning of Arctic exploration by Canadians, using one of the world’s finest floating scientific platforms,” extolled J.M. Leeming, the Executive Officer of *Labrador* until January 1956. This statement was overzealous in overlooking previous Canadian scientific expeditions, but his next observation was not. “*Labrador* had established that it was possible to take a large ship through the Northwest Passage. Moreover, the information gained was destined to enhance the RCN’s ability to conduct high latitude operations with submarines, merchant ships, and naval vessels.”³⁴ After a refit in January 1955, the ship was ready to play a prominent role in the construction of the largest mega-project in Arctic history.

As the Cold War heated up in the 1950s, the Americans sought extensive air defence systems extending to the northernmost reaches of the continent. The Distant Early Warning (DEW) Line, which would stretch across the 70th parallel to provide advanced warning of the manned bomber threat from the Soviet Union, “was an extraordinary feat of geographical engineering, planned and sequenced in minute detail,” observed historical geographer Matthew Farish.³⁵ Constructed in just over two years, the project

³² See Lieutenant (Navy) Jason Delaney and Michael Whitby, “The Very Image of the Man of the Arctic: Commodore O.C.S. Robertson,” *Canadian Naval Review* 4, no.4 (2009): 25-29.

³³ For more details, see Michael Whitby, “Showing the Flag across the North: HMCS Labrador and the 1954 Transit of the Northwest Passage,” *Canadian Naval Review* 2/1 (Spring 2006): 21-24.

³⁴ J.M. Leeming, “HMCS *Labrador* and the Canadian Arctic,” in *The RCN in Retrospect: 1910-1968*, ed. James A. Boutillier (Vancouver: UBC Press, 1982), 295.

³⁵ Matthew Farish, “Frontier engineering: from the globe to the body in the Cold War Arctic,” *The Canadian Geographer* 50/2 (2006), 187.

dramatically altered the military, logistic and demographic characteristics of the North American Arctic. “Stretching for 2500 miles across the Arctic, it required the biggest task-force of ships since the invasion of Europe and the largest air operation since the Berlin airlift to take in the supplies,” Department of Northern Affairs and National Resources official C.J. Marshall trumpeted in a 1957 magazine article. “More than 7000 men laboured through two short Arctic construction seasons to complete the work on schedule. Small wonder that many consider the project one of the most dramatic engineering achievements of our time and a milestone in the development of the Arctic.”³⁶

The seaborne reconnaissance, site survey, and initial construction for Project 572 (as the DEW Line was initially known) in the eastern Canadian Arctic began in the summer of 1955. “For weeks prior to the arrival of the support convoy from the USN’s Military Sea Transportation Service (MSTS), *Labrador* plied the ice-choked Foxe Basin where the force would land tons of material ‘over the beach,’” historians Jason Delaney and Michael Whitby explain. “The crew worked tirelessly with the ship’s hydrographic survey team and embarked underwater demolitions unit to clear beaches, survey approaches and set up navigational markers for the impending offloading of construction material, heavy equipment, fuel and supplies. Establishing standard operating procedures as she went, *Labrador* operated as an ice escort, survey and research vessel as well as a command platform from which task group activities were coordinated.”³⁷

Captain Pullen, then the Director of Naval Gunnery, joined the ship for a three-day visit in mid-September 1955, observing first hand its role in supervising sea-lift operations in northern Foxe Basin.³⁸ Morale was high, RCN personnel gained valuable Arctic navigational experience, and *Labrador*’s five and a half month mission had been an unequivocal success. “The undertaking was a stupendous effort with the accepted hazards of ice, weather, and unknown hydrography,” the Chief of Naval Operations wrote

³⁶ C.J. Marshall, “North America’s Distant Early Warning Line,” *Geographical Magazine* 29/12 (1957), 616.

³⁷ Delaney and Whitby, “The Very Image of the Man of the Arctic,” 26.

³⁸ “History of HMCS Labrador” (28 July 1958), 2.

to Captain Robertson. "The successful attainment of all objectives is a tribute to your professional attainment and courage."³⁹ The stress of operation also took its toll on Robertson's health, forcing his evacuation from the ship as it wrapped up its mission to receive emergency surgery on a perforated ulcer.⁴⁰

When Captain Pullen assumed command of *Labrador* on 13 February 1956, he had big shoes to fill. His friend Graham Rowley later recounted how:

Captain T.C. Pullen must have felt the universe was unfolding as it should when he was appointed in 1956 to the command of H.M.C.S. *Labrador*. Life in a peacetime navy is likely to become a routine of maintenance, training, and exercises. H.M.C.S. *Labrador* had a much more interesting and exciting role. She was on the one hand to assist shipping in ice-infested waters, and on the other to conduct and support scientific activities in the north. Her work was largely in the Arctic, where even the most frequented parts were little known scientifically, and where many years of work would be needed to bring naval charts and other defence needs up to acceptable standards. He also appreciated the opportunity to carry on a family tradition ... and this must have been one reason that both he and his brother had developed a long-standing interest in exploration and the history of the north.⁴¹

Pullen spent nearly two years in command of the *Labrador* and certainly earned his entrée into the annals of Arctic seamanship. Initially, he was a novice in ice navigation, as his diary entry on 24 February 1956 made clear. "I am sufficiently new to the icebreaking world not to be accustomed to officers handling the ship without so much as by your leave," he noted after the ship got into brash ice and stopped off the coast of Cape Breton. "The old hands ... were heard at breakfast-time to scorn the excitement of the novices and their non-Arctic ice.... But the ship and her experts have never before worked in this type of ice and it is a melancholy fact that *Labrador* became stuck within 130 miles of Halifax." By mid-July of that year, Pullen could boast of "real icebreaking, ice sometimes loose, then tight, soft and slushy,

³⁹ Quoted in Leeming, "HMCS *Labrador* and the Canadian Arctic," 299.

⁴⁰ Delaney and Whitby, "The Very Image of the Man of the Arctic," 27.

⁴¹ "Captain T.C. Pullen, R.C.N.," draft biographical sketch by Graham Rowley. DHH 99/36, box 35, file 10.

and then great floes frozen tight, hard ice, blue and 12 to 15 feet thick. Every size, shape and variety.... Tired but thoroughly happy in the knowledge that I can handle the ship in her element.”⁴²

The *Labrador* had departed Halifax for the Arctic on 3 July 1956 with a complement of 21 officers, 210 men, and 9 civilian oceanographers and hydrographers. As Pullen’s diaries recount, the ship’s primary task was assisting with the sea supply of the DEW Line stations in the Eastern Arctic. “The captain of the *C.D. Howe*, sitting comfortably off Coral Harbour, is reputed to have said that because ice conditions were so bad this year the sealift ships would never get through and that *Labrador* would not make it either,” Pullen noted on 1 August. “Well, here we are! Silly old man.” After erecting beacons in Foxe Basin, the ship joined the US Coast Guard icebreaker *Edisto* to convoy supply ships to the DEW Line sites. Operating in largely uncharted waters, they began a hydrographic survey of Fury & Hecla Strait, a welcome “break from the flat monotony of Foxe Basin, rocky and interesting,” as Pullen recorded on 16 September.⁴³ Subsequently, the *Labrador* made four attempts to push through Bellot Strait but each time encountered waters shoaled to within twenty feet of the bottom of the ship. In discovering a deep channel on the side of the channel, the *Labrador* also identified “Magpie Rock” in the middle – a menacing rock “over which the water is boiling and frothing at six to eight knots, maybe ten.” Pullen noted that his ship “must have been within feet of this rock and with the current behind us too. I flew over it and it was a sight to make one’s blood congeal.” It had been a “near miss,”⁴⁴ but future navigators now knew the location of this dangerous obstacle to navigation.

When Pullen and the *Labrador* docked in Halifax on 13 October, the captain took stock of his achievements:

103 days away, 100 days at sea, two days at St. John’s, Newfoundland, and one night at anchor at Brevoort. Steamed 18,606 miles, approximately 12,000 of which were in uncharted waters. Had several close calls-the worst occurring in Foxe Basin when we were within seven

⁴² Pullen diary, 14 July 1956.

⁴³ Pullen diary, 16 September 1956.

⁴⁴ Pullen diary, 25 September 1956.

feet of taking the ground off the southwest corner of Rowley island, and in Bellot Strait when prudence kept us from attempting a passage which would have seen us on Magpie Rock (named by us). The ice passage off the western entrance to Fury & Hecla Strait was the worst we encountered. The rescue of USS *Edisto* was another highlight and a satisfaction too.⁴⁵

Pullen was proud of his leadership role – and that of his crew – in the first sustained Canadian effort to chart its northern waters. In 1956 alone, naval historian E.C. Russell recounted, *Labrador* performed “an immense amount of hydrographic work, running some 12,000 miles of soundings, preparing numerous charts and sailing directions, taking many panoramic photographs,” and other activities contributing to safe navigation. “The oceanographic work ... constituted the most extensive program ... ever taken in the Canadian Arctic. Other scientific work of great importance was conducted in the fields of marine biology, ice physics and ice observation.” Russell observed that this spate of scientific achievements was all “the more impressive since the [DEW] Line resupply operation was *Labrador's* primary commitment, and scientific work was on a ‘not to interfere’ basis.” Dr. Neil Campbell, the chief scientist on *Labrador*, observed that this thorough oceanographic, hydrographic, and other scientific research catapulted Canada to “the forefront of those nations engaged in Arctic research.”⁴⁶

After minor repairs and routine maintenance in Halifax, a fresh coat of paint in Jamaica, and winter operations in the Gulf of St. Lawrence, the ship prepared for an ambitious 1957 summer season:

She was to survey and prepare landing beaches at ten radar detection sites stretching from northern Newfoundland along the Labrador coast to Resolution Island. Following this she was to conduct surveys and support resupply operations on the south-east coast of Baffin Island. After a short goodwill visit to three Greenland ports, her third and most important mission was to make a complete survey of Bellot Strait to determine whether it could be used by deep draught ships. She was then to make a reconnaissance of Barrow Strait and Wellington Channel before returning to Halifax. Oceanographic and other scientific work was, of

⁴⁵ Pullen diary, 13 October 1956.

⁴⁶ Both are quoted in Maclellan, “Pullen of the Arctic,” 28.

course, to be carried on throughout the cruise when circumstances permitted.⁴⁷

In total, the ship would steam 18,500 miles over 108 days at sea.

With Pullen at the helm, *Labrador* met and exceeded its primary missions. The ship began the season by finding a new, “deeper, wider, straighter and safer channel through the upper reaches of the island-studded upper bay” leading into Frobisher Bay.⁴⁸ Pullen considered the sounding and proving of the Pike-Resor Channel as an important achievement, facilitating safe and direct shipping to supply the airport and settlement at the head of Frobisher Bay (now the city of Iqaluit). Less than a week later, *Labrador* began its operations in Bellot Strait, successfully sailing through it on 24 August. Pullen was duly appointed the Senior Officer of the supply convoy and also commanded the US Navy Task Group during Operation “Bellot,” ensuring the safe navigation of the Northwest Passage by three US Coast Guard ships. He gathered extensive hydrographic and oceanographic information in Foxe Basin, helping to facilitate the opening of new deep channel routes for shipping by conducting a “survey primarily to establish an escape route for ships trapped in the central and western arctic.”⁴⁹ This knowledge served as a key enabler for subsequent maritime operations in the Arctic, both for Canadian and American mariners.

Pullen admired the cooperative bilateral working relationship, which made the continent safe for all North Americans, regardless of borders and boundaries. The completion of the NWP transit and the 1957 operation “received a good measure of publicity, but one important aspect was glossed over or ignored in the kaleidoscopic unfolding of events in the past 15 years,” Pullen wrote in 1971:

During the three brief summer navigation seasons when the DEW Line was built, no fewer than 324 ships carried one-and-a-quarter million tons of supplies north of the Arctic Circle into area where in some instances no ship had ever been. In addition, ten-and-a-half million barrels of petroleum products were also transported by tanker. This was a logistic

⁴⁷ History of HMCS Labrador” (28 July 1958), 95-96.

⁴⁸ Pullen diary, 13 August 1957.

⁴⁹ Pullen CV, HBC Archives, E3461/60. See also Graham Rowley, “Captain T.C. Pullen, RCN: Polar Navigator,” *The Northern Mariner*, 2 (April 1992), 29.

feat of great significance. During this frenetic period of activity there was not one major oil spill into the sea, a feat that in fairness some unrestrained environmentalists might acknowledge.⁵⁰

Despite all of the *Labrador's* successes during its 1957 mission, it ended on a dour note. While the ship was operating in Lancaster Sound on 23 September, Pullen recorded in his diary how he, Commander C A . Law, and Commander D.E. Fairney were sitting in the captain's "cabin at about 2100 having our evening cup of coffee when a signalman handed me one of the most shattering messages I have ever received and which explained why a lot of things to us up here have seemed odd." It hit him "like a kick in the stomach," reading:

1. As a measure of economy it has been decided to transfer the operation of *Labrador* to the Department of Transport about 1 April 1958.
2. It is realized that this step will be deeply regretted by officers and men of the RCN particularly those who are now serving or have served in the ship.
3. However such considerations must give way to those of economy if we are to make our most effective contribution to the defence of Canada and NATO.
4. The exploits of *Labrador* and the reputation she has gained for efficiency have done much for the prestige of Canada and the RCN. As the development of the Arctic continues this work will not be forgotten. (?)
5. Further information on the programme up to 1 April will be promulgated.⁵¹

The message left Pullen and his fellow officers "stunned." The captain was dismayed at the thought of having to communicate the news to the ship's company, lamenting that this would "put the cat among the chickens." He cursed "those devils" at Naval Headquarters in Ottawa, noting specifically Captain W.M. Landymore, the Director of Naval Plans and Operations, and

⁵⁰ Capt. T.C. Pullen, "Canada and Future Shipping Operations in the Arctic," *Canadian Defence Quarterly* 3/2 (1971), 10.

⁵¹ Pullen diary, 23 September 1957.

Figure 1

H.M.C.S. LABRADOR- 1956-57 HIGHLIGHTS

--ooOoo--

- First hydrographic survey of narrow, swift flowing, Bellot Strait which separates continental America from the arctic islands. First transit by a deep draft ship and later the locating and naming of hazardous Magpie Rock, on which both M'Clintock's Fox (1858) and Larsen's *St Roch* (1942) nearly came to grief.
- Appointed commander of a U.S. Naval Task Group for the Bellot survey primarily to establish an escape route for ships trapped in the central and western arctic. Also ensured completion of the Northwest Passage by the U.S. Coast Guard ships *Storis*, *Spar* & *Bramble*, excluding submarines, the first United States ships to do so.
- First east to west transit of Fury & Hecla Strait and the extrication from the pack in the Gulf of Boothia of the US Navy icebreaker *Edisto* which had lost a propeller in heavy ice.
- Penetration and sounding of Wellington and Queens Channels reaching Penny Strait (Pelham Bay). Most northerly such probe to date since Sir Edward Belcher in HM Ships *Assistance* and *Pioneer* in 1852 during the Franklin search.
- The sounding and proving of a much-needed deep water channel for shipping, the Pike-Resor Channel, providing the first safe and direct route to the airport and settlement at the head of Frobisher Bay.
- Continuation of the hydrographic survey of uncharted Foxe Basin, begun in 1955 by Labrador (Capt. O.C.S. Robertson), for the safe navigation of cargo ships to new DEW-Line sites. Surveyed unsounded "Navy" and "Labrador" Channels, developed a direct route between Hall Beach and Rowley Island and first circumnavigated the Spicer Islands.
- The ship and her hydrographers and oceanographers produced 17 new arctic charts and occupied more than 360 oceanographic stations.
- Sounded 35 miles of uncharted water through heavy pack to Brevoort, east Baffin. Surveyed the harbour, erected navigational aids, distributing the resulting charts and sailing directions to ships bearing DEW-Line construction materials and supplies.

- First navigation of Peel Sound since Sir John Franklin in 1846 and Roald Amundsen in 1903, in the process sounding the waters for the first time. First circumnavigation of Somerset Island.
- Carried out the first oceanographic survey of winter ice conditions in the St Lawrence to determine, *inter alia*, the feasibility of year-round shipping operations there, a state of affairs since considered routine.
- Re-assertion of Canadian arctic sovereignty, years before it became an issue exercising Canadians, by taking under her command U.S. Navy and Coast Guard ships formerly operating at will in Canada's arctic waters.

Source: T.C. Pullen, DHH File

Rear Admiral H.N. Lay.⁵² “Blast their eyes. Why couldn't they have waited until we got back?” In the midst of this angst, *Labrador* rescued five survivors from *Pamir*, a German four-mast barque that capsized in the North Atlantic two days earlier. Pullen ended his diary entry for 23 September by noting: “What a black day this has been.”

In the end, the RCN's foray into the Cold War Arctic proved brief. The RCN had little operational interest in the North, and *Labrador* was an anomaly in an anti-submarine navy. The RCN preferred to focus on the Atlantic theatre, and opted out of an Arctic role by 1958 when it paid off *Labrador* as a naval ship and transferred it to the Department of Transport.⁵³ The RCN chose to prioritize its NATO contributions (anti-submarine warfare and protection of sea lanes across the North Atlantic) over a naval presence in the Arctic waters. The controversy centered on many in the government and the RCN characterizing *Labrador* as a “symbolic gesture of sovereignty through presence,”⁵⁴ while other government and naval personnel viewed it as an invaluable contribution both operationally and symbolically.

⁵² On these deliberations, see DHH 81/520-8000, file: “Notes used in preparing History HMCS Labrador.”

⁵³ See also Kenneth C. Eyre, “Custos Borealis: The Military in the Canadian North” (unpublished Ph.D. thesis, University of London - King's College, 1981), 187-96, and J.M. Leeming, “HMCS *Labrador* and the Canadian Arctic,” in *RCN in Retrospect, 1910-1968* ed. James Boutillier (Vancouver: UBC Press, 1982): 286-307.

⁵⁴ Eyre, “Forty Years,” 295.

Among the latter was *Labrador's* captain. "No ship has done more for Canada than *Labrador*," Pullen wrote in his diary on 11 October 1957. "No ship is better known to the people in Canada and abroad than *Labrador*, and yet the experts, in their purblind wisdom, have decided that she has nothing to contribute in a war that will never be fought. And so she is got rid of so that a couple of obsolete frigates can be commissioned." Even the news that the US submarine *Nautilus* had reached 87°N via Kennedy Channel "has had no effect" on senior decision-makers, he lamented. "All our inspired leaders can think of is fighting World War II over again in the N. Atlantic."⁵⁵ Pullen appealed to his brother, Rear Admiral H.F. Pullen, the Flag Officer Atlantic Coast, in hopes that he could reach up the chain of command and convince senior leadership to reverse the decision, but his effort came to naught. *Labrador's* transfer to the Department of Transport was completed in 1958.⁵⁶

Capt. Pullen called his tenure as *Labrador's* captain "the most challenging and interesting one I ever had," with the ship's "accomplishments ... of significance to Canada and the product of all her dedicated and enthusiastic officers and men."⁵⁷ Commander (retired) J.M. Leeming, who had been on board *Labrador* for her first year and a half in service, was more directed in his praise, concluding that the icebreaker's "accomplishments were due entirely to her two commanding officers, Captain Robertson and Pullen. Their professional skill, leadership, and determination to succeed were the keys to *Labrador's* success as that hardy vessel moved through a polar world filled with challenges and dangers."⁵⁸ The icebreaker's list of achievements (which Pullen summarized in Figure 1) were impressive by any measure. Naval historian E.C. Russell, paying tribute to *Labrador* in 1964, extolled

⁵⁵ Pullen Diary, 11 October 1957.

⁵⁶ Minister of National Defence George Pearkes, on the occasion of paying off *Labrador*, applauded "the splendid record established by the ship under the White Ensign." She had been the only naval icebreaker in the Commonwealth but "now, with her transfer, trained and experienced personnel will be made available to help man our fighting ships, whose operation is our primary task." Priority message, Minister of National Defence to *Labrador*, 21 November 1957, DHH 81/520-8000.

⁵⁷ H.M.C.S. *Labrador*" E346/8/1 HBC Archives.

⁵⁸ J.M. Leeming, "HMCS *Labrador* and the Canadian Arctic," in *RCN in Retrospect, 1910-1968* ed. James Boutillier (Vancouver: UBC Press, 1982), 307.

how:

HMCS *Labrador* has become a part of the history of the Arctic, her name forever linked with those of *Discovery*, *Fury*, *Investigator*, *Gjoa*, *St. Roch*, and the many great names of the North. Her achievements during her short but illustrious career in the Royal Canadian Navy are too many, varied, and important to be briefly summarized; but it is perhaps no exaggeration to say that during her four years in the RCN she contributed more to man's knowledge of the Canadian Arctic than any ship this century.⁵⁹

Pullen, at the helm for two of those years, certainly deserves much of the credit.

From Naval Officer to Arctic Consultant

After Pullen relinquished command of *Labrador*, he attended the year-long senior staff officer course at the Imperial Defence College (now the Royal College of Defence Studies) at Seaford House, Belgrave Square, in London, England.⁶⁰ Subsequently, he returned to HMCS *Niobe*, the asylum-turned-RCN-establishment in London, on 15 December 1958, this time as Executive Officer (XO). His supplemental appointments over the next two years included Chief Staff Officer to the Naval Member Canadian Joint Staff, London, and Canadian Naval Member to the Military Agency for Standardization. Returning to Canada in July 1960, he was appointed Commanding Officer of the naval air station HMCS *Shearwater* before returning to Naval Headquarters in Ottawa to serve on the staff of the Vice Chief Naval Staff and then of the Assistant Chief Naval Staff Air and Warfare as the Director Naval Ship Requirements. He assumed his last sea-going command on HMCS *Provider*, the RCN's first dedicated auxiliary oiler replenishment ship, when it was commissioned in September 1963. At the end of the following year, he returned to Ottawa and the recently-unified Canadian Forces Headquarters as Director Maritime Operations.

⁵⁹ E.C. Russell, 1964, quoted in Maclellan, "Pullen of the Arctic," 31.

⁶⁰ See United Kingdom, Ministry of Defence, "A History of RCDS," archived on 11 December 2009, http://webarchive.nationalarchives.gov.uk/20091211061225/http://www.da.mod.uk/colleges/rcds/About_Us/A%20History%20of%20RCDS.

Pullen's "career ended with the amalgamation of the Canadian Armed Forces in 1964," his obituary in the London *Daily Telegraph* observed. "Like most naval officers he regarded it as totally misguided, and hardly relished the prospect of wearing a bottle-green uniform and being addressed as 'Colonel.'"⁶¹ Although the RCN would continue as a separate service until 1968, the creation of Maritime Command (MARCOM) on 7 June 1965 as part of the reorganization of the services into six functional commands portended the major shift that was occurring. "In the integrated [National Defence Headquarters]," historian Tony German notes, "the small naval component was all but submerged."⁶² Although the changes brought by "unification" were designed to remain at the command level, long-serving personnel like Pullen saw the dismantling of time-honoured naval traditions as an abomination. He had held nearly every appointment available to a naval captain, and with his brother as a rear-admiral "the odds were against appointment of a second Pullen to the same small circle of flag officers."⁶³ In August 1965 he went on rehabilitation leave, and the following April he took his honourable release from naval service.

"When Captain Pullen retired from the Royal Canadian Navy in 1965, he was 47 years old and anxious to find new and interesting employment," recalled Graham Rowley, then with the Department of Northern Affairs and National Resources. Tom had called Graham in June to see if the latter had any suggestions about consulting opportunities. Rowley, who had an extensive network by virtue of his role as secretary to the federal Advisory Committee on Northern Development, had spoken to Arctic mining engineer and prospector Murray Watts a few days earlier, who had noted the "exceptionally rich iron mines he had recently discovered near Mary River in northern Baffin Island and we discussed the problems that would have to be faced if they were

⁶¹ Captain Tom Pullen obit, *Daily Telegraph* [London]. The obituary notes that "although he never personally vented his feelings to the Liberal minister of national defence Paul Hellyer, his mother, who met the minister on an aircraft without realizing who he was, made her son's opinions extremely clear."

⁶² Tony German, *The Sea is at Our Gates: The History of the Canadian Navy* (Toronto: McClelland & Stewart, 1990), 284.

⁶³ Maclellan, "Pullen of the Arctic," 31.

to be exploited.” When Rowley asked Pullen if he would be interested in investigating what would be required to transport the ore out of the North, Pullen “replied that this was just the sort of work he would most liked to do.” Watts jumped at the opportunity to recruit a man of Pullen’s knowledge and experience, thus launching the retired naval captain’s “new career as an advisor and consultant on arctic marine operations.”⁶⁴

With the DEW Line completed, Pullen noted that the emphasis in Northern affairs had “shifted from exploration and defence to commerce. The search for minerals, for oil and gas to satisfy a growing demand on a worldwide scale is being pushed hard from Prudhoe Bay, Alaska, to the Fosheim Peninsula in the east.”⁶⁵ Postwar geological surveys revealed the resource riches of Canada’s Arctic, with exploitation contingent on modern transportation to carry marketable products to more populated areas.⁶⁶ Pullen’s extensive consulting work to industry, listed in his *curriculum vitae* (Appendix B), yielded many key reports and insights into Arctic operations that reinforced his reputation as one of the Western world’s foremost authorities on Arctic navigation and icebreaking.⁶⁷ In the late 1960s, Pullen set to work anticipating the problems in shipping large quantities of ore from Arctic mines, selecting possible dock locations, and determining the limits of the navigation season. For example, during the summer of 1968, Pullen accompanied Watts on a long trip for Coppermine River Ltd. which took them from Coppermine (Kugluktuk) to Eureka, on to Axel Heiberg Island, and then to Point Barrow on the Alaska coast before returning to the Mackenzie Delta. Rowley, who accompanied Pullen on the latter leg of the journey, recalled how:

On our way back from Point Barrow we had stopped at Prudhoe Bay, then a small drilling camp. I believe it was the day when the discovery of the immense oil and gas field there became common knowledge. The

⁶⁴ Graham Rowley, “Captain T.C. Pullen, RCN: Polar Navigator,” *The Northern Mariner* 2 (April 1992), 38.

⁶⁵ Pullen, “Canada and Future Shipping Operations in the Arctic,” 10.

⁶⁶ See, for example, W.W. Nassichuk, “Forty Years of Northern Non-Renewable Natural Resource Development,” *Arctic* 40, no.4 (1987), 275.

⁶⁷ We hope that excerpts from these reports, coupled with the regular diary that he kept on each voyage, will be the subject of a companion DCASS volume at a later date.

activity at the camp, where we had difficulty finding anyone awake, must have contrasted strongly with that on the world's stock exchanges, where the value of the shares of the companies involved was increasing by hundreds of millions of dollars the same afternoon.⁶⁸

Pullen and the *Manhattan* Voyage, 1969

The unprecedented discovery of oil at Prudhoe Bay on Alaska's North Slope in December 1967 ultimately led to Pullen's next Arctic assignment. Should the oil be transported from the Arctic to the U.S. east coast by a pipeline or ship? The trans-Alaska pipeline was under development, but Humble Oil, a subsidiary of Standard Oil (now Exxon), chose to explore the feasibility of having commercial tankers deliver the Alaskan crude through the fabled Northwest Passage. The proposed route was round-trip from Halifax, Nova Scotia to the Chukchi Sea and back again. This was no ordinary transit; as *National Geographic* reporter Bern Keating (who sailed aboard the ship) contended, this was "possibly the largest gamble of any commercial enterprise in history."⁶⁹ No regular tanker could make the journey. To attempt such a feat, the project required ship modifications to create an icebreaker-oceanographic ship capable of a Northwest Passage transit, an appreciation of competing interpretations of sovereignty and transit rights in the region, and the best Arctic captains to lead the way.

Pullen noted that "until the *Manhattan* appeared on the scene, the largest ship to sail around the top of America had been the [CCGS *John A. Macdonald* displacing 9,000 tons." By contrast, the tanker displaced 155,000 tons. The *Manhattan* was 1,005 feet long and 150 feet wide, with a draft of 55 feet, making it "truly a remarkable ship and unquestionably the world's finest icebreaker" in Pullen's opinion.⁷⁰ The plan for the test run was to fill six

⁶⁸ "Captain T.C. Pullen, R.C.N.," draft biographical sketch by Graham Rowley, DHH 99/36, box 35, file 10.

⁶⁹ Bern Keating, *The Northwest Passage* (Chicago: Rand McNally and Company, 1970), 140.

⁷⁰ Pullen, "S.S. Manhattan's Northwest Passage Voyage." The spelling of the *Johnny Mac* differs among sources: Coen spells it *MacDonald*, while Pullen, Keating, and the Canadian Coast Guard spell it *Macdonald*.

inner tanks with oil, surrounded by 39 tanks filled with sea water.⁷¹

The Northwest Passage courses 2,850 nautical miles from the Bering Sea to Greenland, through the waters of the USA, Canada and Greenland. The status of the 1200 nautical miles in the Canadian Arctic are the source of competing legal positions between the United States and Canada. In May 1969, Prime Minister Pierre Elliott Trudeau stated in Parliament that the waters were “internal waters over which Canada has full sovereignty,” but no legislation was introduced to formalize this position. The Americans, by contrast, considered the entire Passage as an international strait, which means that ships or submarines have the right to transit the various straits running through Canada’s Arctic Archipelago because they connect one part of the high seas with another.⁷² The impending voyage of the *Manhattan* thrust these differing legal positions, which both countries had quietly managed through diplomatic channels, into public debate.⁷³

The S.S. *Manhattan*, the largest ship of its day, was specifically modified

⁷¹ T.C. Pullen, “What Price Canadian Sovereignty?” *U.S. Naval Institute Proceedings* 113 (September 1987): 71.

⁷² An international strait is a body of water that connects the high seas and is used for international navigation. How useful it is for international transit (or potentially useful) is the crux of the debate over the Northwest Passage. See International Court of Justice *Corfu Channel* case (1949) and Richard Grunawalt, “United States Policy on International Straits” in *Ocean Development and International Law* 18, no.4 (1987): 445-458 for context. In 1969, the right of transit passage did not yet exist (that came with the 1982 Law of the Sea Convention). In 1963 Canada extended its 3 nautical mile territorial sea to 12 nautical miles, but it did not include the Arctic in that new delineation. At the time of *Manhattan*’s transit, the Arctic territorial sea was still 3 nautical miles wide. For a masterful overview, see Donat Pharand, *Canada’s Arctic Waters in International Law* (Cambridge: Cambridge University, 1988).

⁷³ There is an extensive literature on this topic. See, for example, Thomas M. Tynan, “Canadian-American Relations in the Arctic: The Effect of Environmental Influences upon Territorial Claims,” *The Review of Politics* 41, no.3 (July 1979): 402-427; John Kirton and Don Munton, “The *Manhattan* Voyages and Their Aftermath,” in *Politics of the Northwest Passage*, ed. Franklyn Griffiths (Montreal and Kingston: McGill-Queen’s University Press, 1987), 67-97; P. Whitney Lackenbauer and Paul Kikkert, eds. *The Canadian Forces and Arctic Sovereignty: Debating Roles, Interests and Requirements, 1968-1974* (Waterloo: Laurier Centre for Military Strategic and Disarmament Studies, 2009); and Ted McDorman, *Salt Water Neighbors: International Ocean Law Relations between the United States and Canada* (Oxford: Oxford University Press, 2009).

to possess ice-breaking capabilities for service in the Arctic, where multi-year ice can slice through steel and sink even the largest of ships. In order to convert the tanker in time for a mid-summer test (which was missed nonetheless by two months), it was cut into four parts and simultaneous construction was parceled out to four different U.S. shipyards.⁷⁴ *Manhattan*'s "original bow was cut off and replaced by an ice breaking version," Pullen and A.H.G. Storrs explained, "which achieves its purpose by breaking ice downwards as opposed to ... ploughing the ice up and thrusting it aside." The ship's original hull was made of mild steel, but a high tensile steel "ice belt" provided extra strength "in the event that she might become crushed in the ice," as well as "internal stiffening for the wing tanks [and] a double skin around the engine room and the boiler room." The 10,000 tons of additional steel converted *Manhattan* into "an ice-breaking tanker."⁷⁵

Humble Oil, a privately-owned company, "consulted closely with Canadian officials, seeking advice and requesting that a Canadian icebreaker accompany *Manhattan*," Pullen noted. "Canada agreed and gave the voyage full concurrence and support."⁷⁶ Importantly for Canada, Humble Oil's request for Canadian cooperation implied acknowledgment that the Passage cut through Canadian waters. Its instructions for the voyage also stated that if the ship entered Canada's territorial waters, "such an event is regarded as a normal part of the whole operation which has the concurrence and support of the Canadian Government."⁷⁷ As part of its support, the Canadian government appointed Pullen as its official representative aboard the ship—as the "on scene" representative of Transport Canada's Director of Marine

⁷⁴ Captain T.C. Pullen, "S.S. *Manhattan*'s Northwest Passage Voyage—Observations by Canada's Representative," *The Empire Club of Canada Addresses* (Toronto: Empire Club), 12 February 1970, 260-272. Available online at <http://speeches.empireclub.org/61281/data>.

⁷⁵ A.H.G. Storrs and T.C. Pullen, "S.S. *Manhattan* in Arctic Waters," *Canadian Geographic Journal* 80, no.5 (1970): 171.

⁷⁶ Pullen, "What Price Canadian Sovereignty?," 71. See also "Memorandum: *Letter of Instruction to Captain T.C. Pullen* from Admiral A.H.G. Storrs, Director of Maritime Operations, Department of Transport to Captain T.C. Pullen, 11 July 1969," Pullen Papers, Hudson's Bay Company Archives, Winnipeg, Manitoba, reprinted in this volume.

⁷⁷ Letter of Instruction to Pullen from Storrs, 11 July 1969.

Operations. In practice, Pullen also acted as the link between the tanker and the Canadian icebreaker, “and as ice adviser to the *Manhattan's* master.”⁷⁸ In return for his professional services, the oil industry promised to share data with the Canadian government on ice and ship performance collected during the voyage.⁷⁹

The third requirement for this venture – that the most competent Arctic officers be at the helm of the ship – also made Pullen a natural leading actor. Known in some circles as “Mr. Arctic,”⁸⁰ journalist Bern Keating noted that Pullen was “possibly the most experienced ice officer still active in the non-Communist world.”⁸¹ Pullen joined ship Master Captain Roger Steward and Staff Captains Don Graham and Arthur Smith on the *Manhattan's* bridge, but he was initially unsure of what his role as “official observer” actually entailed—as no one had bothered to specifically define it.⁸² Even the Canadian government admitted that “the matter of command relationships ... poses a problem [and] it is impossible to give helpful direction as to how such a situation should best be handled.”⁸³ It soon became clear that adherence to protocol, and respect for Canadians, by the ship's captains and crew reigned supreme.⁸⁴

“Day One of the long-awaited Arctic Tanker Test for Canada's official representative. The first day of how many, I wonder?” So wrote Pullen in his diary on 28 August 1969, after *Manhattan* arrived from Chester, Pennsylvania.⁸⁵ Despite missing a chance for an Arctic trial in mid-summer, Pullen was ready to be “well and truly on our way.”⁸⁶ After stopping in Halifax, Nova Scotia and Thule, Greenland, the tanker entered the Passage at

⁷⁸ Letter of Instruction to Pullen from Storrs, 11 July 1969.

⁷⁹ Pullen, “What Price Canadian Sovereignty?,” 71.

⁸⁰ Ross Coen, *Breaking Ice for Arctic Oil: The Epic Voyage of the SS Manhattan through the Northwest Passage* (Anchorage: University of Alaska Press, 2012), 85

⁸¹ Keating, *Northwest Passage*, 145.

⁸² Coen, *Breaking Ice for Arctic Oil*, 98-99

⁸³ Letter of Instruction to Pullen from Storrs, 11 July 1969.

⁸⁴ Coen, *Breaking Ice for Arctic Oil*, 105-106

⁸⁵ Capt. T.C. Pullen, RCN, “Personal Record,” 28 August 1969, Pullen Papers, Hudson's Bay Company Archives, E 346/8/1 vol. 1, Winnipeg, Manitoba.

⁸⁶ Captain T.C. Pullen “Personal Record” 28 August 1969, Pullen Papers, Hudson's Bay Company Archives, E 346/8/1 vol.1, Winnipeg, Manitoba.

the beginning of September—“the easiest time of the year for ice navigation.”⁸⁷ The whole purpose of the *Manhattan* venture was to test the ship’s performance in difficult conditions, and the transit brought many challenges: encounters with second year and multi-year ice, difficulties with “pancake ice [whose] sticky consistency clung to the ship’s side ... [producing] a mountain of gelatinous slush”⁸⁸ that stopped the ship completely, and “stern power ... so limited that she couldn’t back off far enough so that she could get a really good rush at the ice when she went ahead again.”⁸⁹ In a subsequent speech to the Empire Club in Toronto, Pullen put the significance of the Arctic Tanker Test into focus:

Altogether the *Manhattan* became stopped by ice on 25 occasions, requiring assistance from an icebreaker to free her by loosening the accumulated ice around her stern and quarters. But, and I am bound to emphasize, on many occasions the tanker sought the worst ice conditions for test purposes and in the process quite intentionally got herself stuck. These were planned forays, not misadventures, though this may irk those who, for secret reasons of their own, wanted the project to fail. Achievement of [transiting] the Northwest Passage as such was incidental to Humble’s purpose. But this more than anything else was what caught the public’s imagination. *Manhattan* was, and is, a test vehicle. The object of the exercise was to carry out tests in Arctic ice to achieve a figure of merit for her in various types of ice. The data thus obtained will be extrapolated to provide the characteristics of the ultimate tanker for the trade capable of defeating the ice. Whether or not *Manhattan* got into difficulties, by accident or design, was otherwise not meaningful.⁹⁰

The Canadians dispatched the icebreaker *John A. Macdonald* (affectionately called the “*Johnny Mac*”) to accompany *Manhattan* on the voyage, both to “wave the Canadian flag” and to guide the tanker through the ice and break a path as needed.⁹¹ Aably captained by ice-breaking veteran Captain Paul Fournier, the two ships met in Davis Strait on 31 August and

⁸⁷ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

⁸⁸ Storrs and Pullen, “Manhattan”, 176-177.

⁸⁹ Storrs and Pullen, “Manhattan”, 174.

⁹⁰ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

⁹¹ Coen, *Breaking Ice for Arctic Oil*, 82.

became “inseparable companion[s] for the next ten weeks.”⁹² *Manhattan* and *Macdonald* pushed westward, successfully tackling increasingly heavy ice until 9 September when they sailed into Viscount Melville Sound and became complete stuck. On various occasions during the transit, Captain Steward asked Pullen to request help from the *Macdonald* (a protocol established in Storrs’ Memo to Pullen before the voyage), which he did and which Fournier promptly – and successfully – provided. But neither ship could get through McClure Strait, so the decision was made to take the less ice-infested Prince of Wales Strait.

Manhattan’s east-west transit was completed on 20 September when she reached Point Barrow, Alaska.⁹³ There, a single barrel of crude oil was loaded in Prudhoe Bay the day before for ship embarked on its return trip to New York. Continuing with her icebreaker-oceanographic tasks during the return transit, *Manhattan* arrived in New York on 12 November; she had completed her “nearly 12,000 miles in 80 days and made history with the process.”⁹⁴

Impressed by the performance of the *Manhattan* and its crew, as well as the synergy between the behemoth and the workhorse accomplishments of the *Johnny Mac*, Pullen proclaimed the great pride he saw in the “unbeatable team” of the two ships. When he heard that Humble Oil and the *Manhattan* personnel held the Canadian icebreaker crew “in the very highest regard,” he “bathed in the reflected glory of their achievements and I confess I enjoyed it

⁹² Coen, *Breaking Ice for Arctic Oil*, 82.

⁹³ For historical context, this was exactly two months after Neil Armstrong had first walked on the moon.

⁹⁴ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.” Technically, according to Professor Lawson Brigham, *Manhattan* did not transit the whole Passage, as the ship’s western-most point was the Beaufort Sea, not the Pacific Ocean. See Coen, *Breaking Ice for Arctic Oil*, viii. But such technicality is rarely noted, and Coen’s statement that “Amundsen Gulf, whose waters marked the end of the Northwest Passage” is more common (*Breaking Ice for Arctic Oil*, 127). Humble Oil spoke of Amundsen Gulf as the terminus of a complete voyage. See Humble Oil and Refining Company Media Relations, 10 November 1969. Pullen’s own works spoke of “completing the passage in both directions in a single season with the icebreakers *John. A. Macdonald* and *Northwind*” and listed it among all other full transits in his “Report to The Canadian Hydrographic Service Marine Sciences Branch, Department of Energy, Mines and Resources” in March 1970 (reprinted in this volume).

immensely.”⁹⁵

From this enviable vantage point as the Canadian representative and ice advisor, Pullen saw history in the making—and sought to set the record straight about this controversial voyage. It was not just the Arctic elements that had presented challenges. An uproar in Canada over perceived American challenges to Canadian sovereignty created political obstacles and ill will in some Canadian nationalist circles—even though Canada had not officially claimed the waters of the Passage as internal waters in 1969 and the Trudeau government had officially “welcomed the Manhattan exercise, has concurred in it and will participate in it.”⁹⁶ On the American side, Pullen did not see any nefarious motives underlying the U.S. government’s support for the voyage. In his view, Canada was well-represented on a transit conducted by private enterprise, was instrumental to its successful transit, and had received valuable information from the ship that fostered a better understanding of waters that Canada saw as its own.

Pullen also noted the synergy of the voyage: Canada made the voyage possible, and the Americans gave the Canadians a “free ride” in facilitating “resource development” while proving that “the Northwest Passage is not invincible to commercial ships.”⁹⁷ Ultimately, he noted that

Canadians can take pleasure in the knowledge that, without the help of the *Macdonald*, the *Manhattan* would never have made it. It’s true. What is also true is that the *Macdonald* would never have made it without the tanker to blast a track through the really heavy ice. So Americans, too, can take pleasure. It was a classic example of teamwork.⁹⁸

Pullen was aware and interested in sovereignty and environmental issues, but he felt both were overblown during the *Manhattan* transit. Dismayed by “the considerable measure of acrimony and uproar” over the *Manhattan* voyage, he asserted that “most critics, although no doubt well meaning and sincere, simply don’t know what they’re talking about. I have been astonished

⁹⁵ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

⁹⁶ Canada, House of Commons *Debates*, 15 May 1969, Vol. 8, 8720.

⁹⁷ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

⁹⁸ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

to hear and read a stream of opinions on this and related Arctic topics from people who know nothing about the subject.” In his important Empire Club address delivered in February 1970, Pullen informed Canadians about sovereignty, protocols, customs, and courtesies:

Much has been made of the fact that *Manhattan* did not fly the Canadian flag during her voyage. Here was another instance where a splendid blend of emotion and ignorance affected some people whose patriotism outstripped their knowledge of ships and the sea. I received a telegram onboard the tanker from a politician asking me to fly the Canadian flag while the ship was in, quote "Canadian Arctic waters" unquote—whatever that may mean. This telegram went on to tell me that we had enough flag trouble without American interference. Politicians surely have an obligation to instruct themselves thoroughly on matters which catch their interest and which they intend to air. Foreign ships are under no obligation to fly a Canadian flag and the fact they do so when entering or leaving, or while in a Canadian port is purely a matter of custom and courtesy. It is a well established custom but there is no binding requirement to do so. The only occasions when *Manhattan* flew our flag was when she lay off Sachs Harbour on Banks Island and at that she was five miles off the beach because of her great draft.

Incidentally this prompted a plaintive message from the Eskimo mayor of that little community to the effect that he had a very good harbour available for our use if we wanted. Captain Steward sent back a message that he had to stay where he was because “his kyack was bigger than their kyacks.” Some kyack!⁹⁹

To counter what he saw as misinformed nationalism, Pullen explained that the *Manhattan's* master had been “meticulous in matters of protocol, and flew the Canadian flag as appropriate. The sponsors ... did their best to offend no one” and “unfavorable Canadian press reports greatly surprised the *Manhattan's* crew”—and Pullen himself. To the Canadian government, he admonished that practicality needed to trump abstraction. “Bickering and acrimony will not resolve the dispute over the status of the passage,” he insisted, and Canada needed a polar icebreaker to operate in a region increasingly transited by foreign submarines – both friend and foe. Without the means “to respond swiftly to the emergency that will inevitably arise

⁹⁹ Pullen, “S.S. Manhattan's Northwest Passage Voyage.”

somewhere in the far reaches of the Arctic,”¹⁰⁰ Canada’s Arctic sovereignty would “be exposed for what it is – meaningless.”¹⁰¹

Pullen also addressed concerns about potential pollution from oil spills. “Heavy seas cannot build up in the *Arctic* and the risk of a ship breaking up and losing her entire cargo of oil, as in the case of the *Torrey Canyon*, is nil,” he noted.¹⁰² *Manhattan* had hit a rock-hard ice-floe in Lancaster Sound which tore a hole in the “mild steel portion of the old hull,” but there was no damage anywhere to the high-tensile steel.¹⁰³ He noted that this damage was far removed from the six barrels of oil in the center of the ship, and the only water to leak from the breach was ballast. Furthermore, there was no conspiracy to hide the hole in the hull, as some commentators alleged.¹⁰⁴ If there was an environmental threat during the transit, it was posed by the accompanying Canadian icebreakers, “which were more likely to spill fuel oil in the event their hulls had ruptured.”¹⁰⁵ In his assessment, *Manhattan* “was over-engineered for the job and that no matter how roughly she was handled in the ice the risk of pollution from ice-inflicted damage was nil. The risk ... is from striking an uncharted rock or shoal.” Charting needed to be upgraded, not the ship, to avoid oil spills.¹⁰⁶ Future shipping requirements would not

¹⁰⁰ Pullen, “What Price Canadian Sovereignty?,” 71

¹⁰¹ T.C. Pullen, “Why we need the Polar 8,” *Canadian Geographic* 57, no. 2 (April-May 1987), 84. See also Pullen, “What Price Canadian Sovereignty?” and “That Polar Ice-breaker,” *Northern Perspectives* 14, no.4 (1986), available online at <http://www.carc.org/pubs/v14no4/5.htm>.

¹⁰² Pullen, post-voyage “Report to the Canadian Hydrographic Service.” The *Torrey Canyon* was an oil supertanker that ran aground on a reef between the Cornwall coast of southern England and the Scilly Isles in March 1967, spilling over 119,000 tons of crude oil into the sea and devastating both sea and coast, wildlife and coastal livelihoods.

¹⁰³ Storrs and Pullen, “SS Manhattan in Arctic Waters,” 179. On the hole, which was described as “big enough to drive a truck through” when discovered in the port of Halifax, see Coen, *Breaking Ice for Arctic Oil*, 153.

¹⁰⁴ This public denial of a conspiracy (for example, Pullen, “Empire Club” 1970 speech) is contradicted in his 1970 Report to the Director of Marine Operations, where Pullen noted that Humble Oil’s policy of secrecy included the damage to the ship. Pullen, “Report on the Arctic Tanker Test (S.S. Manhattan) August-November 1969,” 13 January 1970.

¹⁰⁵ Pullen, review of Franklyn Griffiths, *The Politics of Northwest Passage in Canadian Geographic* (Feb/March 1988), 74.

¹⁰⁶ Pullen, post-voyage “Report to the Canadian Hydrographic Service.”

only require “very high standards of strength and quality”¹⁰⁷ (high-tensile steel ships), but the assurance of “much more than ‘run of the mill’ professional competence from ship’s officers.”¹⁰⁸

The documents included in this volume present both the day-to-day account of *Manhattan*’s transit and the post-voyage assessments. While Pullen was always the consummate professional, the juxtaposition of these different sources – his personal record and formal reports – makes for a fuller picture of the man and the expedition. His diary recounts daily developments as the transit unfolded; there is no lack of awe of *Manhattan*’s power and palatable suspense as the behemoth sought out challenges during the test voyages. There is similarly no lack of pride in Canadian contributions to the venture, specifically in terms of teamwork and expertise. As Pullen proudly noted on 27 October when the ships reached Beechey Island (“this most famous of all Arctic meeting places”), those who sailed on *Manhattan* and her “indomitable icebreaker escort” CCGS *Macdonald* had taken “part in a magnificent achievement.”¹⁰⁹ His official “Report to the Canadian Hydrographic Service” and his “Report on the Arctic Tanker Test” for the Department of Transport were written with the benefit of hindsight and offered a more detached assessment. The former is a comprehensive, summative narrative laid out topically for reference and potential future plans. In the latter, Pullen delivered a thorough report of the ship’s challenges and accomplishments, as well as sober recommendations for future ships that might transport oil through the Northwest Passage.

“What Price Canadian Sovereignty?” Pullen’s Reflections on Arctic Sovereignty

As the years passed, and the cycle of “the-more-things-change-the-more-they-stay-the-same” continued, Pullen’s tone became increasingly impatient. “Canadians should be pre-eminent” in their Arctic waters, given that “we possess the operational experience and the ship design capability,” he asserted

¹⁰⁷ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

¹⁰⁸ Pullen, “S.S. Manhattan’s Northwest Passage Voyage.”

¹⁰⁹ Pullen, “Personal record,” 27 October 1969.

in a 1973 article, simultaneously emphasizing that “time is no longer on our side We have now no naval arctic capability whatsoever” and “Canada simply must start looking to her maritime responsibilities in the far north.” The Arctic Waters Pollution Prevention Act (AWPPA), introduced by the Canadian government in 1971, was an empty law without an enforcement mechanism.¹¹⁰ He painted a sorry picture of “the unenviable and embarrassing position of calling on the ... U.S. Coast Guard icebreakers for assistance” to help a ship in distress in waters that Canada claimed as its own.¹¹¹ Canada’s “dolorous record in maritime affairs” was an embarrassment, and he prodded the government to take action. “Having defaulted on our general maritime responsibilities ... [and continuing] a similar path in respect to the exercise of effective control over our arctic waters,” he alleged that Canada seemed “determined to abdicate again our maritime responsibilities.”¹¹² He wanted action, not simple rhetorical displays extolling the importance of “sovereignty.”

After the *Manhattan* voyages, Rowley noted, “Pullen found his services as a consultant on marine operations in high demand as companies began to assess the shipping dimensions of large-scale resource development projects. His expertise made him a highly-coveted consultant on icebreaker operations, arctic towing, convoying in ice, arctic hydrography and oceanography.” He extended his experience to Alaska waters by advising the Lost River Mining Corporation on a potential port to handle ore at a site on the Seward Peninsula, joining the US Coast Guard icebreaker *Glacier* for a mid-winter survey of ice conditions in the Bering Sea in 1971. “In subsequent years he undertook the duties of Ice Master in ships engaged in a number of interesting and often pioneering voyages,” Rowley noted. These included the *M/S Gothic Wasa*, which became the first ship to load lead/zinc ore concentrates at the Nanisivik mine on northern Baffin Island in 1977; conducting a reconnaissance of uncharted waters in Prince Albert Sound onboard CCGS *Sir John Franklin* in 1979 in support of the Polar Gas

¹¹⁰ Pullen, “Canada and Future Shipping Operations,” 9, 13.

¹¹¹ T.C. Pullen, “In the Wake of the Manhattan,” *Canadian Shipping and Marine Engineering* (1970), 16.

¹¹² Pullen, “Canada and Future Shipping Operations,” 8, 13.

Project; and assisting CCGS *J.E. Bernier* which ran track soundings for potential beach landing sites in Minto Inlet and Prince Albert Sound the following summer.¹¹³ Pullen ultimately produced more than fifty reports and papers for clients on Arctic issues (see Appendix B), as well as serving as an expert witness in litigation involving the mishandling of ships at sea and testifying before Canadian parliamentary committees on Arctic marine issues.

His work also led to active involvement in the introduction of cruise tourism to the North American High Arctic. In 1984, Lindblad Travel, a New York agency, organized and conducted the first tourist cruise through the Northwest Passage in the Canadian Arctic. Captain Pullen participated in planning the expedition and also served as Ice Master and lecturer as the ice-strengthened passenger ship *M/S Lindblad Explorer*¹¹⁴ transited the Northwest Passage on its voyage from St. John's, Newfoundland to Yokohama, Japan. With 98 passengers aboard, the cruise ship traversed the Passage in 23 days, representing only the thirty-third time a vessel completed a full passage and the first time that the Northwest Passage was used as a route to Asia. Other companies sought to capitalize on this demonstration of feasibility, but only two crossings succeeded during the next four years.¹¹⁵ Fitting this pattern, Pullen was onboard the cruise ship *M/V World Discoverer* during its unsuccessful attempt to transit the Passage from east to west in 1986.

¹¹³ Rowley, "Captain T.C. Pullen: Polar Navigator," 44; Department of Fisheries and Oceans, *Report of the Institute of Ocean Sciences 1980* (Sidney, BC: Institute of Ocean Sciences, Patricia Bay, 1981), 14; and T.C. Pullen, "A 3000-mile Arctic Towing Odyssey," *Canadian Geographic* 51, no.6 (1981-82): 16-23.

¹¹⁴ The *Lindblad Explorer*, built in 1969 and known as "the little red ship," was the first vessel specifically designed and built for cruise tourism in the polar regions. She earned "an esteemed reputation in the niche polar travel sector" before becoming the first cruise ship to sink in polar waters when off the coast of the Antarctic Peninsula in 2007. All onboard were safely evacuated. See Emma J. Stewart and Diane Draper, "The sinking of the *MS Explorer*: Implications for Cruise Tourism in Arctic Canada," *Arctic* 61, no. 2 (2008), 224.

¹¹⁵ J. Marsh and S. Staple, "Cruise Tourism in the Canadian Arctic and its Implications," in *Polar tourism: Tourism and the Arctic and Antarctic regions*, eds. C.M. Hall and M.E. Johnston (Chichester: John Wiley and Sons, 1995), 63-72. See also C.S. Jones, "Arctic ship tourism: An industry in adolescence," *The Northern Raven* 13, no.1 (1999): 28-31.

“I’m hooked on the Arctic,” Pullen admitted to a journalist in 1984. “It’s a part of Canada few people know well, and it is a challenge. It does exert a fascination. I’m having so much fun.”¹¹⁶ At the same time, he was the consummate professional. “While he displayed a broad knowledge of the Arctic and a genial personality, Pullen’s role called for considerable tact, as he had to give captains the often unwelcome warning that they were pushing their luck in the pack ice,” an obituary later noted. “He was obliged, too, to take a strong line with stout American tourists who started behaving like children when they approached icebergs in small boats.”¹¹⁷

Taking a hard line with misbehaving American tourists, however, did not mean adopting a similar line with the US Government. Pullen’s writings and speeches reveal a clear-eyed, unsentimental, and pragmatic view of sharing the continent with a superpower. He touted Canada’s long history of cooperation with the United States Navy and Coast Guard, and harboured disdain for politicians who sought to whip up Canadian nationalism based on simplistic anti-Americanism that preyed on popular Canadian ignorance about Arctic issues. Rather than casting the Americans as an existential threat to Canadian sovereignty, Pullen was a tireless critic of Ottawa’s unwillingness to invest in capabilities that would allow Canada to exercise control over its Arctic areas.

In Pullen’s view, the Canadian government’s decision to not accompany the US Coast Guard icebreaker *Polar Sea* through the Northwest Passage in 1985 – a transit that again triggered a tsunami of reactions in Canadian nationalist circles – did not represent an American violation of Canada’s Arctic, but symbolized Canada’s inability “to exercise ... full sovereignty in and over the waters of the Arctic archipelago.”¹¹⁸ In response to the impassioned public response, the Mulroney government announced that

¹¹⁶ Maclellan, “Pullen of the Arctic,” 26.

¹¹⁷ Captain Tom Pullen obit, *Daily Telegraph* [London].

¹¹⁸ Pullen, “That Polar Ice-breaker,” quoting Joe Clark’s House of Commons statement on 10 September 1985. The *Polar Sea* voyage, undertaken for reasonable operational reasons relating to the resupply of the American base at Thule, Greenland, launched another Canadian “crisis” over the Northwest Passage. The Americans refused to seek official permission from Canada prior to making the transit, recognizing that this would prejudice their own legal position.

Canada was officially implementing straight baselines around the Arctic Archipelago effective 1 January 1986, thus claiming full sovereignty over the Northwest Passage as “historic, internal waters.” Concurrently, it outlined an aggressive plan to exercise control over its waters and assert its Arctic sovereignty, including a “Polar 8” icebreaker, new maritime patrol aircraft, a new northern training centre, improved northern airfields, a dozen nuclear-powered submarines, and a fixed sonar detection system at the entrances to the Passage.¹¹⁹

Pullen leapt into the debate, offering blunt analysis about what he saw as the real, practical imperatives of sovereignty. In his landmark 1987 article pondering the “price” of Canadian sovereignty, Pullen observed that:

What in former times were simply matters of concern between governments now routinely become public controversies, with the public more agitated than informed thanks to sensational media coverage. The Arctic is an issue guaranteed to agitate Canada nowadays, and [Canadians] particularly resent encroachments, whether real or perceived—especially in the so-called Northwest Passage. The villain of the piece ought to be the Soviet Union, with its surreptitious use of our straits and sounds [by submarines]; but no, Canadians focus their concerns squarely on the United States.¹²⁰

He urged Canada and the United States, as “friends, neighbors, and allies,” to reach an agreement. Ottawa agreed, and opened negotiations with the United States—a prudent move that, owing to Prime Minister Brian Mulroney’s close relationship with President Ronald Reagan, yielded the 1988 Arctic Cooperation Agreement that pragmatically solved the delicate issue of icebreaker transits.¹²¹

¹¹⁹ See Rob Huebert, “A Northern Foreign Policy: The Politics of *Ad Hocery*,” in *Diplomatic Departures: The Conservative Era in Canadian Foreign Policy, 1984–93*, eds. Nelson Michaud and Kim Richard Nossal (Vancouver: UBC Press, 2001), 84–99.

¹²⁰ Pullen, “What Price Canadian Sovereignty?,” 66.

¹²¹ By “agreeing to disagree” on the legal status of the Passage, the two countries ultimately reached “a pragmatic solution based on our special bilateral relationship, our common interest in cooperating on Arctic matters, and the nature of the area” that did not prejudice either country’s legal position nor set a precedent for other areas of the world. David L. Larson, “United States Interests in the Arctic Region,” *Ocean Development and International Law* 20 (1989), 183.

The other component of Pullen's solution was practical: he vigorously supported Canada's plans to build a Polar 8 icebreaker, which would be capable of year-round Arctic operations. "One compelling reason for building such a powerful ship is that Canada needs the means to respond swiftly to the emergency that will inevitably arise somewhere in the far reaches of the Arctic," he argued. "If a foreign submarine were in distress, for example, and we had no ship to send to her rescue, Canada's Arctic sovereignty would be exposed as meaningless."¹²² Having an icebreaker capable of maintaining headway at three knots through hard, level ice up to eight feet thick would provide Canada with "unequalled flexibility" and "a matchless arctic presence," and allow the country to assert "effective command and control over a wide area" of the Arctic. "This is what sovereignty is about, not, as some seem to imagine, the assumption that the Polar 8 will park in the ice, hoist a large Canadian flag, and conduct non-stop cribbage tournaments," he vented in an obvious critique of Canadian commentators who falsely equated sovereignty with superficial symbolism.¹²³

In his final years, Pullen remained an active supporter of Arctic cruise tourism, satiating his passion for the region and for adventure. In 1988, at the age of 70, he served as ice master for the successful Northwest Passage voyage by the ice-strengthened expedition ship *M/V Society Explorer*, which cruised from Dutch Harbour, Alaska, to Narsarsuaq, Greenland, via Provideniye in Eastern Siberia. He considered this west-to-east transit to be his most successful, serving as a fitting capstone on his career. The following year, Pullen joined the cruise ship *World Discoverer* from Iceland to the Eastern Canadian Arctic, and then from Greenland to Churchill, Manitoba. He made plans to transit the Northeast Passage or Northern Sea Route, running north of the Soviet Union, in 1990, in hopes of checking yet another item off his "bucket list" of desired experiences.¹²⁴ Unfortunately, ill health prevented him from realizing this final dream.

¹²² Pullen, "What Price Canadian Sovereignty?," 71-72.

¹²³ T.C. Pullen, "Why we need the Polar 8," *Canadian Geographic* 57, no.2 (1987): 85-86.

¹²⁴ Rowley, "Captain T.C. Pullen, RCN," 46.

Honours and Achievements

“Pullen of the Arctic” died of cancer on 3 August 1990 in Ottawa at the age of 72. Recognized as one of the world’s foremost authorities on the Arctic, he “did more in Arctic navigation than any individual in North America” according to historian and retired naval commander Tony German.¹²⁵ Of all of Pullen’s remarkable achievements, he identified several as holding particular significance:

- The double transits in one season of that enormous 155, 000 ton icebreaker Manhattan
- The successful tow, from the St Lawrence to the high Arctic, of the 12,000 ton process barge in the face of so many critics who were determined it could not be done
- The completion of four Northwest Passage transits
- Circumnavigation of Baffin Island including the navigation of Fury & Hecla Strait, late in the season, and totally unaided.¹²⁶

Pullen’s distinguished contributions earned him specific Canadian accolades, affirming the national importance of his leadership and expertise. On 25 June 1984, Pullen was appointed officer of the Order of Canada, his citation reading: “Known as ‘Pullen of the Arctic,’ Captain Thomas Charles Pullen accumulated a prestigious record of Arctic achievements during his career in the RCN. Since his retirement he has gone on to a second career as one of North America’s foremost authorities on Arctic navigation and ice breaking.”¹²⁷ Earlier that year, Pullen had received the Royal Canadian Geographical Society’s prestigious Massey Gold Medal “for personal achievements in contributing to the knowledge of the marine environment and ice navigation in ice-infested Canadian waters.”¹²⁸ Similarly, when Royal

¹²⁵ Mohammed Adam and Alana Kainz, “Pullen of the Arctic,” *Ottawa Citizen*, August 1990, C1.

¹²⁶ Pullen resumé, July 1999, DHH 2004/55, folder 1.

¹²⁷ Governor General of Canada, “Order of Canada: Thomas C. Pullen,” <http://archive.gg.ca/honours/search-recherche/honours-desc.asp?lang=e&TypeID=orc&id=1376>.

¹²⁸ Massey Medal awarded in 1984 by the Royal Canadian Geographical Society, “Massey Medal,” http://www.rcgs.org/awards/massey_medal/previous_winners.asp.

Roads Military College conferred Pullen with the degree of Doctor of Science *honoris causa* in 1985, it highlighted that “Captain Pullen is ranked by the Geographical Society with [Henry] Larsen and [Roald] Amundsen as one of the great pathfinders of Arctic seas.... He is often referred to as the western world’s foremost authority on Arctic navigation and icebreaking, and has been involved in marine and industrial projects spanning the North from Greenland waters to the Bering Strait.”¹²⁹ Soon after his death, Pullen was awarded the Admirals’ Medal for his “significant contribution to navigation, exploration, geographical knowledge and the advancement of science in the Arctic.” The citation explained that he “was noted for applying his rare expertise and remarkable intellect to problems of Arctic operations and for his tireless efforts in becoming a leading expert in his field through intensive study, which was considered to be of extraordinary and special importance to Canada and to maritime affairs.”¹³⁰

It was in his blood—both love of country and a commitment to service: Captain Thomas C. Pullen’s distinguished naval career was matched by his ardent support and advocacy for Canada taking its rightful place as an Arctic power. To Pullen, whose naval career began in 1936, and whose life ended in the last gasps of the USSR, it was clear that “sovereignty and security are inseparable” and that cooperation with the United States was the way “to find a mutually palatable solution to the issues of Arctic sovereignty and North American security.”¹³¹ This point remains relevant in the twenty-first century, as Canada and the United States – now officially embracing each other as “premier partners” in Arctic affairs¹³² – face opportunities and challenges in a

¹²⁹ Thomas Charles Pullen, OC, CD, RCN (Retd) citation, reprinted in *The Northern Mariner* 2/2 (April 1992), 28.

¹³⁰ Royal Canadian Navy, “Admirals’ Medal Recipients,” <http://www.navy-marine.forces.gc.ca/en/about/in-depth-admirals-medal-recipient.page>. Established in 1985, in conjunction with the 75th anniversary of the Naval Service of Canada, the Admirals’ Medal is bestowed upon individual Canadians in recognition of their outstanding achievements in the advancement of maritime affairs in Canada.

¹³¹ Pullen, “What Price Canadian Sovereignty?,” 66.

¹³² Whitney Lackenbauer and Rob Huebert, “Premier Partners: Canada, the United States and Arctic Security,” *Canadian Foreign Policy Journal* 20, no. 3 (2014): 320-333. For recent developments on this theme, see U.S.-Canada Joint Statement on Climate, Energy, and Arctic Leadership, 10 March 2016, <http://pm.gc.ca/eng/news/2016/03/10/us-canada->

circumpolar world that is being reshaped by climate change and surging international interest.

In his writings, Pullen encouraged Canadian decision-makers to look to the future and anticipate changes—not sit passively and expect that past apathetic or reactive behaviour, with few follow-through investments in substantive Arctic maritime capabilities, can suffice. “A lot of key decisions affecting Arctic development must be made in the coming months and years,” Pullen anticipated in 1970. “Let’s hope that in Canada ‘dog in the manger’ attitudes on matters such as sovereignty will give way to a bolder spirit which those who went before bequeathed us. And anyway, in my view, the dog doesn’t even own the manger. Not all of it.”¹³³ Fifty years later, Canadian commentators and Arctic experts continue to push Ottawa for a sustained commitment to the kinds of Arctic sovereignty, security, and safety-related practices and capabilities that Pullen promoted in his writings and lectures. Rear-Admiral John Newton, the Commander Maritime Forces Atlantic, has been a strong advocate for a more robust RCN Arctic presence in light of “the significant changes being felt in the environment, industry, commerce, tourism, society and culture.”¹³⁴ The keels have been laid for the first two *Harry DeWolf*-class Arctic Offshore Patrol Vessels, and the new Canadian Coast Guard icebreaker *John G. Diefenbaker*, which will be the world’s most powerful diesel-electric icebreaker (36,000 kW / 48,000 HP), is expected to join the fleet in 2021-22.

Over the past decade, the Royal Canadian Navy has resumed the process of developing a cadre of sailors with Arctic experience to conduct armed sea-borne surveillance of Canada’s Arctic waters, provide situational awareness, and cooperate with other partners to “assert and enforce Canadian

[joint-statement-climate-energy-and-arctic-leadership](#); and United States-Canada Joint Arctic Leaders’ Statement, 20 December 2016,

<http://pm.gc.ca/eng/news/2016/12/20/united-states-canada-joint-arctic-leaders-statement>.

¹³³ Captain T. C. Pullen, “S.S. Manhattan’s Northwest Passage Voyage—Observations by Canada’s Representative,” 12 February 1970, *The Empire Club of Canada Speeches 1969-1970* (Toronto, Canada: The Empire Club Foundation, 1970): 260-272.

¹³⁴ Newton quoted in Darlene Blakeley, “New ships prepare RCN for Expanded Arctic Operations,” *The Lookout* (CFB Esquimalt Navy News), 17 November 2016, <http://www.lookoutnewspaper.com/new-ships-prepare-rcn-expanded-arctic-operations/>.

sovereignty, when and where necessary.¹³⁵ In the summer of 2016, for example, the coastal defence vessel *HMCS Moncton* patrolled in Hudson Bay, while *HMCS Shawinigan* ventured west along the Northwest Passage. “For several years now our crews have been increasingly busy familiarizing themselves with Arctic waterways and the communities that struggle with shifting economies, climate, and human activities,” Newton explained.¹³⁶ Developing this human capacity is as important as building the ships, as Pullen’s distinguished career proves. “Men such as Pullen give a nation its strongest claims to greatness: the deeds of those who live life greatly in the service of their country and of all mankind, and who add immensely to our knowledge of the world we live in,” David Maclellan, the senior editor of *Canadian Geographic* magazine, extolled in 1984.¹³⁷ We hope that his successors – both men and women – will find interesting stories, practical insights, and inspirational examples of bold leadership and initiative in the diaries and reports that “Pullen of the Arctic” produced.

P. Whitney Lackenbauer and Elizabeth Elliot-Meisel
Otterville, Ontario, and Omaha, Nebraska
July 2017

¹³⁵ Royal Canadian Navy, “Arctic and Offshore Patrol Ship Project,” <http://www.navy-marine.forces.gc.ca/en/fleet-units/aops-home.page>. On recent RCN activities in the Arctic, see for example, P. Whitney Lackenbauer and Adam Lajeunesse, “The Canadian Armed Forces in the Arctic: building appropriate capabilities,” *Journal of Military and Strategic Studies* 16, no. 4 (2016): 7-66; and Adam Lajeunesse and P. Whitney Lackenbauer, eds., *Canadian Armed Forces Arctic Operations, 1945-2015: Historical and Contemporary Lessons Learned* (Fredericton: Gregg Centre for War and Society, 2017).

¹³⁶ Newton quoted in Blakeley, “New ships.”

¹³⁷ Maclellan, “Pullen of the Arctic,” 33.

Acknowledgements

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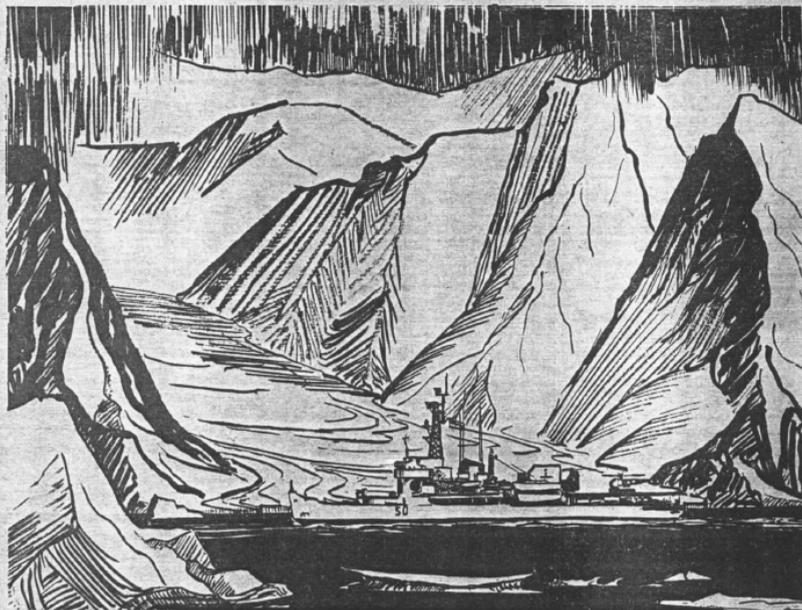
List of Acronyms

bbls	barrels
Bos'un	Boatswain
CCGS	Canadian Coast Guard Ship
CD	Canadian Forces Decoration
Cox'n	Coxswain
CJTG	Commander, Joint-Task Group
CTF	Commander, Task Force
CTG	Commander, Task Group
DEW Line	Distant Early Warning Line (radar station chain)
Deg.	Degrees
D/F	Direction Finding
D.M.O	Deputy Minister's Office
DOT	Department of Transport
DSC	Distinguished Service Cross
E.O.	Executive Officer
EPI	Electronic Position Indicator
Exec.	Executive Officer
Etc	Excreta
FOAC	Flag Officer, Atlantic Coast
Ft	Feet
GAP/PINE	Pine Tree Line (radar station chain)
GM	George Medal
HUP	Piasecki H-25 Helicopter
helo	Helicopter
HMCS	Her Majesty's Canadian Ship
HQ	Headquarters
Knots	nautical mile per hour
LCVP	Landing craft, vehicle, personnel
LSD	Landing Ships Dock
Lt Cdr	Lieutenant Commander
Min	Minutes
NATO	North Atlantic Treaty Organization
N.W.T.	Northwest Territories
Ops	Operations
OOW	Officer of watch
P.D.	Position Doubtful
pdrs	Pounders

PJBD	The Permanent Joint Board on Defence
P.O.	Petty Officer
Radm.	Rear Admiral
RCAF	Royal Canadian Air Force
R.C.M.P	Royal Canadian Mounted Police
RCN	Royal Canadian Navy
RCNH	Royal Canadian Navy, Hospital
recce	reconnoitre
RDF	Radio Direction Finder
RN	Royal Navy
R/T	Radio Transmission
Sub	Sub-Lieutenant
SS	Steamship
UHF	Ultra-high frequency
USAF	United States Air Force
USCGC	United States Coast Guard Cutter
USN	United States Navy
USNS	United States Navy Ship
U/S	Unserviceable
USS	United States Ship
USSR	Union of Soviet Socialist Republics
VCNS	Vice Chief of the Naval Staff
VHF D/F	Very high frequency, direction finding
VP	Vehicle Personnel
Z	Zulu Time (Coordinated Universal Time)

Part 1:
H.M.C.S. *Labrador*

H.M.C.S. LABRADOR



Pullen's Personal Record of HMCS *Labrador*, 1956-57

HBC Archives E 346/8/1

These Volumes are the record of my service in command of Her Majesty's Canadian Ship *Labrador* from 13 February 1956 to 4 November 1957. They consist primarily of my Reports of Proceedings and of my personal record written at the time.¹

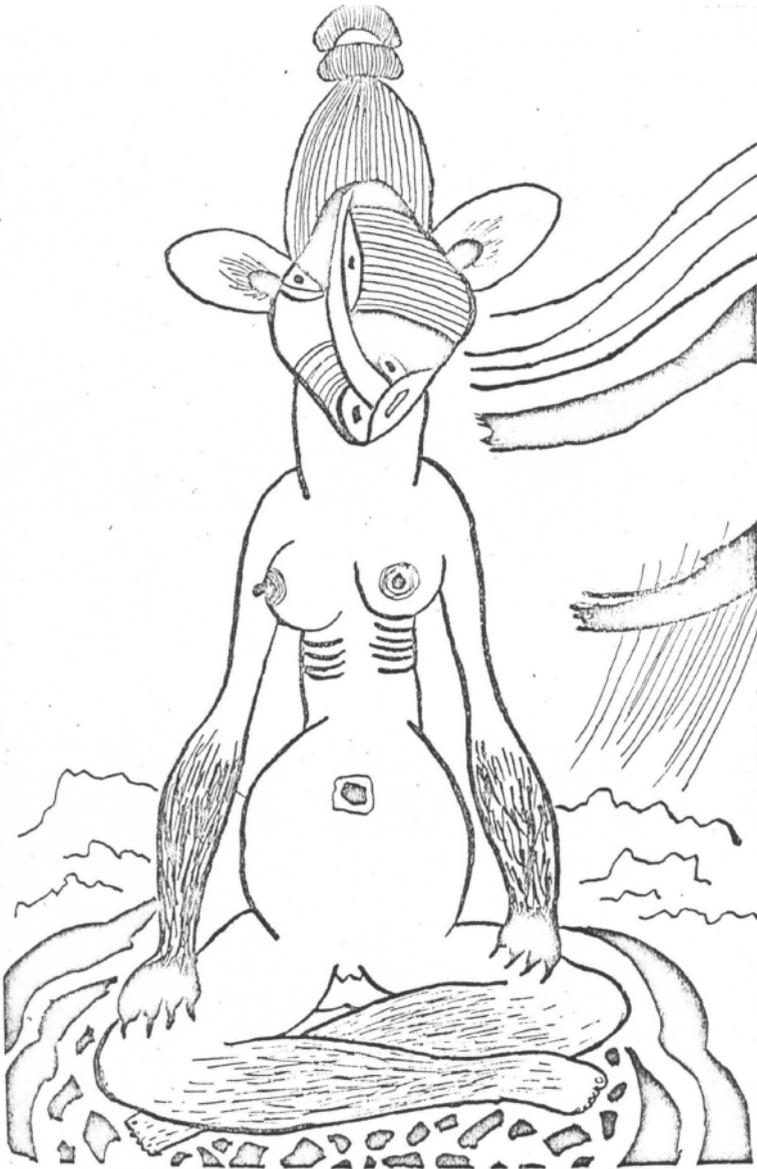
This appointment, my first as a post-captain, was the most challenging and interesting one I ever had. HMCS *Labrador's* accomplishments were of significance to Canada and the product of all her dedicated and enthusiastic officers and men. Someday I hope Canadians will learn of her work in our northern waters on their behalf. This material could serve as a starting point certainly for the latter half of her career under the White Ensign.

My original Reports of Proceedings were duplicated at the time by a system which seems to fade out over the years. During 1979 I retyped my deteriorating copies and in the process improved the punctuation and smoothed the syntax in certain places. In no way was the meaning altered.²

T.C. Pullen
Ottawa, 30 January 1980

¹ Editors' note: We have reproduced Volume 1 – 1956 : Part 1 – pp.1-7 and Part 3 – pp.17-57; and Volume 2 – 1957, Part 6 – p.76-137.

² Pullen noted that “it is my hope eventually to offer these ‘HMCS Labrador Papers’ to the Public Archives of Canada” (now the Library and Archives Canada). Instead, he appears to have deposited most of his papers with the Hudson's Bay Company Archives in Winnipeg. The editors have only acquired incomplete excerpts from his diaries, and are seeking a complete run of them.



ASIAQ

Asiaq, legend says, "is the Eskimo goddess of weather and lives somewhere out in the ice pack. When the ice fails to crack in the springtime, the sorcerer must go to her and pacify her so that she may unloose the warm mountain winds and rain, break up the ice and send it out to sea." Photograph of a print which hung in Labrador's wardroom.

1956 Diary

13 February, 1956

Halifax, Nova Scotia

At 0900 on this day I assumed command of HMC Ship, relieving Captain O.C.S. Robertson, GM, RD, CD, RCN, who has been in command since the ship commissioned in Sorel, P.Q., 8 July, 1954.

Rear Admiral R.E.S. Bidwell received our calls at 1000 and returning my call at 1100 the following day. During the week I called on Combrax Halifax, Commodore E.P. Tisdall, Captain D.G. King, Commanding Officer, HMCS *Shearwater* and acting/Commodore H. Quinn, Chief of Staff to Canflaglant.

20 February

Halifax

Today was the first occasion the ship has moved under her own power with me at the 'throbbles'. At 1600 we got under way to proceed to the Imperoyal Jetty to embark avgas and diesel oil.

Our berth was the south end of Jetties 2 & 3, HMC Dockyard, bows south. Astern of us were HMCS *Huron* (Commander R.A. Webber, DSC, CD, RCN) and HMCS *Iroquois* (Commander D.L. Hanington, DSC, CD, RCN) both bows north.

Leaving the jetty was too easy really as by heaving In the head rope and letting go the remainder of the lines the ship pivoted nicely on the 'cat'. In came her stem and out went her stern. My first throttle movement was 'astern starboard', then 'astern both' and off we went. This ship, being diesel/electric, is not controlled in the customary fashion but has engine (or motor) controllers which the captain, or whomever is handling the ship, moves to make the motors work. Ahead for 'ahead' and astern for 'astern'. One handle for the port screw, the other for the starboard. The further the handles are pushed the more rpm is produced at the screws.

The wind was northerly and so once the stern came out the wind assisted to keep us clear of the destroyers.

A stately eight knots down harbour towards Imperoyal³ where we were to berth bows north (starboard side to) wind still northerly (and) the tide at the beginning of the ebb. We rounded to our approach course - a bit cramped - our 'alongside' was alright but there is a great deal to learn in the handling of this 'unorthodox' ship.

After handling destroyers and a frigate the momentum of this ship takes some getting accustomed to but our berthing at No. 4 Jetty, Imperoyal, was uneventful. I am assured by all concerned that if one did hit a jetty very hard it, not the ship, would suffer the damage.

At about 2330 the engineer officer reported that the avgas tank had been damaged during fuelling and that the cofferdam was partially full of gas, and that the fumes were very noticeable.

Fuelling was stopped and extra precautions taken. The ship will have to go to sea to pump out the tank and it appears as though we are going to be delayed sailing for the Gulf of St. Lawrence.

21 February

Halifax Area

0830 slipped and proceeded to sea where, off Chebucto Head,⁴ gasoline and water (were) pumped overboard from the damaged tank. A beautiful day, calm, cold and sunny giving me an opportunity to maneuver the ship clear of hazards.

Returned to harbour and secured alongside our original berth at No. 2 Jetty at 1340- bows south.

I turned the ship above the bridge and made a dead straight run to my berth, allowing for a flooding tide. It was a satisfactory alongside and she really berthed herself. I feel much more confident as a result of this maneuver.

22 February

at Halifax and at sea

HMC Ship sailed at 1400 for our little expedition to the Gulf of St. Lawrence to carry out oceanographic surveys but as far as I am concerned, the

³ A small neighbourhood on the eastern side of Halifax Harbour in the community of Dartmouth, Nova Scotia.

⁴ A headland on the Chebucto Peninsula located within the community of Duncan's Cove, Nova Scotia, which forms the southwestern limit of Halifax Harbour.

real reason is for myself and the new members of the ship's company to get the feel of the ship and, more particularly, for me to handle the ship in ice.

23 February

at sea

We encountered our first ice in the Cabot Strait at 2245; mostly small pancake ice in floes of a mile or so in length and half that in width. I also saw a seal in the distance. The ship, with two engines on the line, advanced through this (ice) without a tremor.

24 February

at sea

During the middle watch the ship steamed (or is it dieselled?) down the west coast of Cape Breton, parallelling it, heading for George Bay where Dr [L.M.] Lauzier, Senior Scientist, wants to collect data on water temperatures, salinity, etc.

Brash ice⁵ was encountered at 0410 in considerable quantity and when I arrived on the bridge, having been informed by my Officer of the Watch (OOW) that “we were in a little more ice”, I was somewhat irked to find the ship stopped and said officer busy maneuvering. I am sufficiently new to the icebreaking world not to be accustomed to officers handling the ship without so much as by your leave.

Without too much difficulty the ship shouldered her way through and proceeded. By 0700 we were in quite a heavy ice field, a foot in thickness, snow-covered, and for several hours I, and my OOW's who are new to the ship, exercised our skill in shiphandling in ice, all the while heading in the general direction of George Bay.

Turning the ship over to the Navigator I made Captain's Rounds between decks at 1045 and was so employed until 1230. The ship, which is very much cut up and crowded, was not in very good condition, not really clean and (also) ill-stowed. The Commander has this matter in hand.

⁵ Accumulations of floating ice made up of fragments not more than 2 meters across, the wreckage of other forms of ice. See Nathaniel Bowditch, *American Practical Navigator: Glossary of Marine Navigation* (Springfield, VA: National Geospatial-Intelligence Agency, 2017), 330, https://msi.nga.mil/MSISiteContent/StaticFiles/NAV_PUBS/APN/Bowditch_Vol_2_LoRes.pdf.

On returning to the bridge, or Command Position as it is called In this ship, I found the Navigator cold and grumpy and the ship stuck in the ice. We were situated midway between Port Hood and Cape George in the entrance to George Bay. In 'bay ice', land-fast, snow-covered, under pressure though not a great deal, and between two and three feet in thickness with ten tenths coverage. No water to be seen as far as the horizon.

After relieving Pilot I tried, with four engines on the line, to get the ship moving but the ice became so sticky and clinging it was like porridge and the ship would not move. I therefore stopped engines, put them to ten minutes notice and went below.

The old hands in *Labrador* were heard at breakfast-time to scorn the excitement of the novices and their non-Arctic ice; such statements as 'minor league stuff' etc were (reported). But the ship and her experts have never before worked in this type of ice and it is a melancholy fact that *Labrador* became stuck within 130 miles of Halifax.

I decided to get six engines on the line and use the heeling and trimming tanks to break our way free, as I felt certain we could do relatively easily with all that power, and also to acquaint myself with the performance of the ship using these devices. And, finally, to see if they would work, they not having been used since trials period in 1954. If they prove to be as bad as the Bofors guns, which likewise haven't been used for the same period, I'm sure they will not work.

At 1550 under way with four engines on the line, a defect in one delaying the availability of the other two, and working the heeling and trimming tanks, the ship started to move ahead. When she stopped because her power was not enough to keep her moving then she would be put astern and would back down the slush-filled lane she [had] just made [extending] it further and further back, Then advancing [again] gaining as much momentum as possible, hurling herself [ahead] maybe 50 yards, maybe 500, seldom more. The heeling and trimming tanks work well and were of real assistance, particularly the former.

At 1700 five engines were in use and at 1725 six engines were on the line. It then became apparent what real power is - the ship thereafter was only stopped twice.

When working in ice the ship is controlled from the bridge wings where the best view of conditions can be obtained. It was bitterly cold, the temperature 10 degrees F. and the wind westerly at 17 knots. My face became very chilled and my eyes sore. By 1900 open patches of water were

commonplace and the ship was clear. Course was shaped for Cape Anguille, Newfoundland, where we will start our oceanographic work.

This day was a most interesting and instructive one and even our old stagers had their eyes opened.

25 February

at sea

During this day the ship ran from Cape Anguilla, Newfoundland, across to the Island of Anticosti stopping at five selected positions to take oceanographic stations making her landfall at dusk.

We have a gale warning so the plan is to run up between the island and the north shore to get a lee from the island and also to be ready for further oceanographic work in this area. The storm is expected to pass to the south'ard of us.

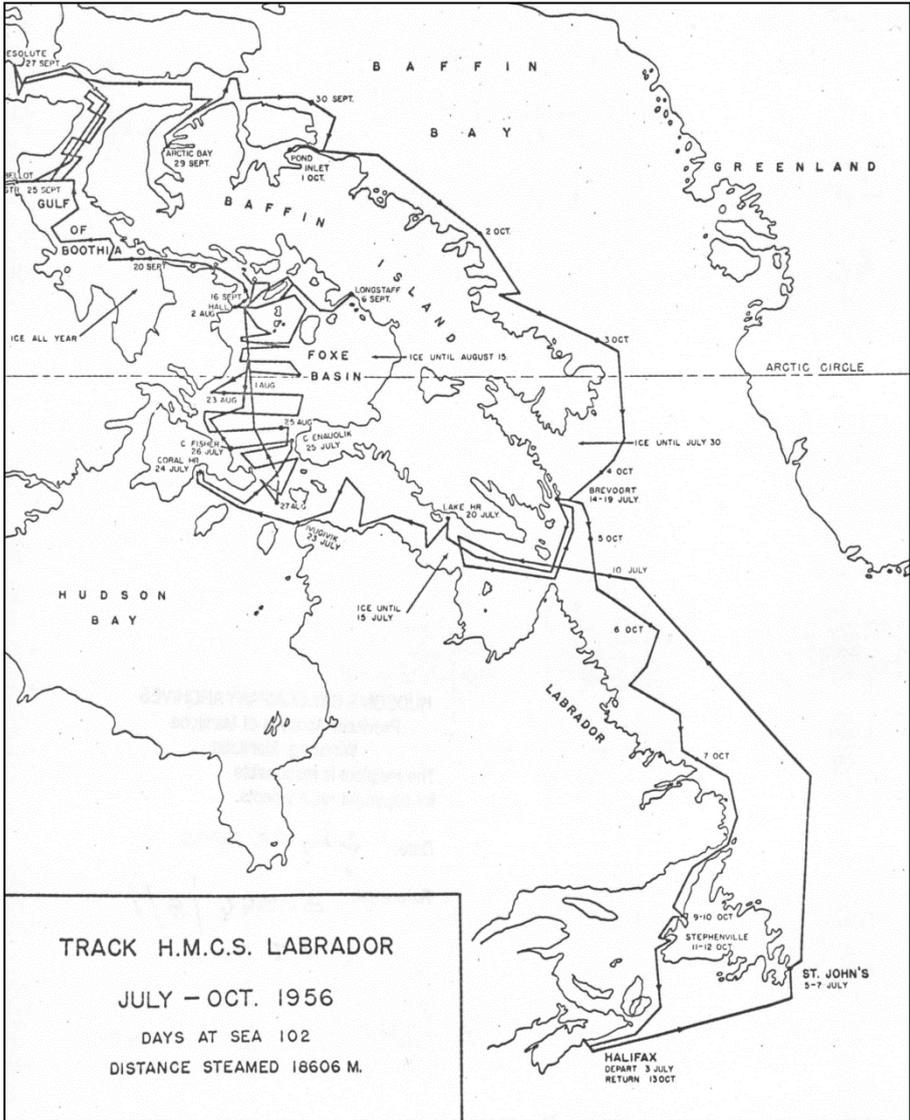
26 February

at sea

All our plans have had to be modified because of the storm. We altered course to run northwest up Jacques Cartier Passage to get through the area of bad weather as quickly as possible. Wind and sea increasing.

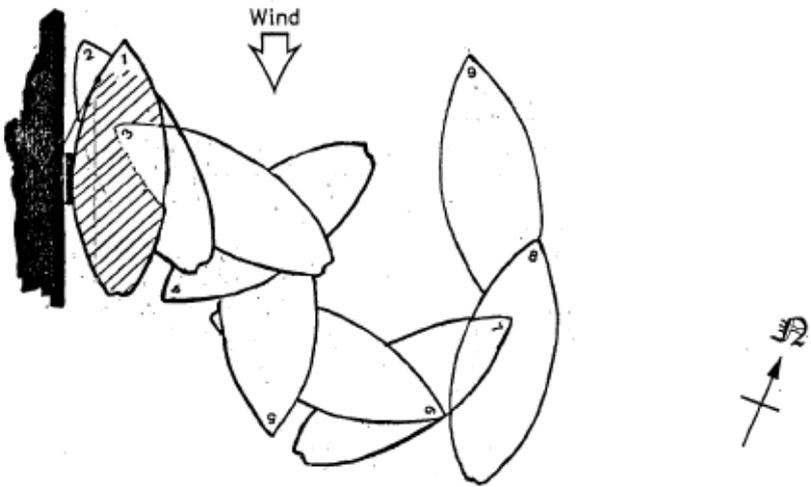
1956 Arctic Voyage

---ooOoo---



18 June
at Halifax

After 62 days alongside we get under way and high time. Away with the dockyard mateys and their dirt. We slip at 0900 and back off and the ship does a 'Mayport', viz., swings (to port) and continues to do so despite the power of the port screw going ahead and the starboard astern. Clouds of dense white smoke, witness to the length of time we've been idle, blowing down the harbour in the strong northerly wind and blinding us from everything to the south. As the ship wouldn't co-operate, I encouraged the turn and we spun, finally, through 360 degrees and made for Bedford Basin. The drift down harbour while endeavouring to turn was much more than this (accompanying) sketch would indicate:⁶



A boring session of degaussing, back and forth over the range, twelve times before 'they' were satisfied. Then anchor trials and capstan trials. The former allright [*sic*] but the brake linings burned themselves out to ruin the latter. At

⁶ Pullen's note: Manoeuvring *Labrador* under any circumstances, could produce skittish behaviour. Our southward drift while this act of defiance was going on was more than this sketch indicates despite vigorous use of engines (port ahead, starboard astern). She continued stubbornly to defy us eventually coming to rest bows north when the desired heading was south. A twin-screw, centreline rudder, arrangement in a football-shaped ship will do this and one best be ready for it. It was really a 'not-under-control situation.'

1600, down harbour and to sea. Bill Kidd in *Lanark* at Jetty 0, with his two wingers, *Fort Erie* and *Lauzon*, failed to pipe me as I passed, in fact were so slack I couldn't raise any of them by light to give them a blast.

At 1930, after crossing the 100 fathom line, deep-sea anchor trials were attempted. A fancy great winch, 300 fathoms of three inch wire and a deep-sea anchor of the Danforth type constituted the equipment. It was quickly established that the anchor (1,000 pounds) could not have been stowed in a more inappropriate spot, out of reach of any crane, derrick or davit. After a great effort it was veered to the bottom with a final total of 225 fathoms of wire. *Labrador* lay beam to sea, blowing down-wind at one knot, the anchor skipped along the bottom and after drifting and dragging for a mile the gear was recovered. It is too light for a 7,000 ton ship and is of the wrong design. In mud it may be fine but (on) any other type of bottom it is of little value. In this case the bottom was gravelly and the flukes did not bite at all. For a heavy ship I consider the Admiralty Pattern anchor would be more effective.⁷

19 June

at St Margaret's Bay

Entered the Bay at 0730 anchoring dead in the center at 0800 to calibrate our UHF and VHF D/F, swing our magnetic compass and use our boats.⁸ A

⁷ Pullen's note: The term 'heavy ship' calls for some explanation. My shiphandling experience was based on destroyers, River and Tribal Class, with displacements of 2,000 tons or so. Compared with those slim, lightly built, ships the egg-shaped 'armoured' icebreaker was certainly much heavier and at times with a mind of her own.

In retrospect I am not at all sure that an Admiralty Pattern anchor (with the arms and stock at right angles to each other) was the right answer. A plough type (CQR) might have been better. Thereafter we never attempted, or needed, to anchor in deep water during my time.

⁸ Pullen's note: Boats. The two motor cutters, fitted with cabins, were 32 feet overall and sheathed to protect their wooden hulls from ice damage. Intended primarily for hydrography, they were also equipped with echo-sounders.

Two 36 foot 'Landing Craft (Vehicle/Personnel)' (LCVP) were built of aluminum, fitted with bow doors and powered by 235 hp diesel engines. Fast, reasonably seaworthy, they were excellent for our purpose. The 36 foot soundboat, named *Pogo* by our predecessors, was a bit of an ugly duckling. Fitted out with a large cabin, she boasted bunks, a galley, echo-sounder, gyro compass (most useful), radar and radio. Under Lieutenant Norton's command, and taking one or more other boats under her wing, she could be sent on detached service releasing me to get on with other work. An inflatable liferaft was kept instantly ready for if ice punctured her aluminum skin, *Pogo* would have foundered

clear, good day, ideal for our purposes and much has been accomplished. Two ice-protected motor cutters, two LCVP's, *Pogo*, the 36 foot Sound Boat, all afloat. Much breaking down of engines but now is the time rather than when on operations.

21 June

to sea

After two peaceful days of settling in, we weighed and proceeded to sea arriving in Halifax (on) Thursday at 0800 to fuel, 1,000 tons (of) diesel at Imperoyal securing once again in our berth in HMC Dockyard at 0930, Friday, 22nd.

22 June

Halifax, N.S.

While we were away a battle raged over us as to whether or not we should retain our Duty Free privileges. Apparently the Department of Transport ships to operate in the Canadian Arctic asked for, and were refused, similar privileges. They said 'What about *Labrador*? Why should she be privileged? And so HM Customs decreed that all bonded stores were to be landed. Men and trucks were all ready to be sent to take our stuff. Luckily we were at sea giving time for those fighting on our behalf (and on the Navy's behalf also) to appeal such a ridiculous situation, and they succeeded thanks to Captain Hurcomb in Ottawa, Ian Morrow here, Chief of Staff etc.

A near thing.⁹ We need more emphasis on us being a Navy ship and to play down the scientific role a trifle.

immediately, there being no watertight sub-division. She more than justified her original cost.

⁹ Pullen's note: This was a storm in a teacup but it could have got out of hand. The civilian-manned Department of Transport ships were trying to make the point that we were different than other navy ships and this had to be, and was, resisted. Captain Philip Hurcomb, Judge-Advocate of the Fleet, in Ottawa, and others, were able to square off this attempt to rock the boat.

It was years before a so-called Canadian Coast Guard was established as a creature of the Department of Transport but those ships were given the privilege of having liquor on board and public rooms in which it could be consumed. Before this there was a disgraceful amount of heavy drinking in cabins, smuggling of Duty Free liquor bought by individuals during ships visits to Thule, Greenland, for their own use.



3 July, 1956
at Halifax and to sea

After parting from family and friends, and in warm sunshine, I took *Labrador* from her berth to sea at 1330. Admiral Bidwell had had lunch with me and then went ashore to see us off on the jetty. After passing outside George's Island I closed the Royal Nova Scotia Yacht Squadron breakwater where I espied three figures there to wave farewell. Betty, Sue and Timmy. A sad sight to see them grow smaller and smaller as we slipped out of harbour.

After months of activity and preparation the great adventure, for me at any rate, has started. I wonder what the coming weeks and months will bring? It is at any rate a relief to be at sea, to be rid of the Dockyard and all its works, mostly dirty and I suppose necessary. We number all told 240. 21 officers, nine civilians (oceanographers, hydrographers) and 210 men.¹⁰ Our course is for Cape Race at 13 knots in perfect conditions.

4 July

at sea

In a deep sleep the Officer of the Watch (Benny Ackerman) calls me during the middle watch to tell me [there] is a ship ahead 13 1/2 miles distant. Because it is so far away I roll over and go to sleep. A long time later I woke up with a start wondering 'What of that ship?' Ackerman, in response to my question, says 'What ship?' etc. 'Oh, that ship, It passed down our port side two miles off a longwhile back.' The bloody fool. He forgot to tell me anything more after the first report. What a watchkeeper he is. I do not like

¹⁰ Pullen's note: The Coast Guard operates *Labrador* with about 65 officers and men. It seems incredible that we manage to stuff 240 souls into that ship and it says a lot for the people involved and their acceptance of crowded living conditions. It was my object to determine whether all these people were really needed and the Commander and I managed to reduce the number by 40 after that first year. The explanation as to why there should be such a difference between what the Navy required and what the Coast Guard use now can be answered by pointing out that many more tasks were carried out under the white ensign than the simple role now given that ship. For instance *Labrador* operated, and maintained, three helicopters, had a full scale operations room set-up, carried out a wide variety of scientific tasks, engaged in communications intelligence work (ELINT), had sophisticated worldwide communications capabilities including cyphering and coding. The ship was equipped with 40 mm Bofors guns which had to be maintained and manned. But most important, she functioned as a headquarters ship accommodating a senior officer and staff for the conduct of a number of inter-service, international operations such as 'Operation Bellot'.

having him on during the silent hours, he knows nothing and has no experience. I gather he is a good messmate, he's not good at much else.¹¹

This afternoon I flew for nearly an hour in one of our two Bell helicopters with Lieutenant (P) McNeil our new, and senior, pilot. No other ships in view but fun to watch *Labrador* ploughing along, very wide and squat, drawing 29 feet for'ard and very nearly 31 feet aft. All (three) aircraft were aloft and approximately five hours flying put in. Calm sea, warm and sunny. I wanted to fire the Bofors guns but after much huffing and puffing Ackerman is obliged to tell me they've got the guns crews all mixed up and the wrong grease in the gun barrels, so our shoot has to be postponed.

5 July

at sea and at St. John's, Newfoundland

Entered harbour on the dot of 1300. We slipped in without incident but it was a tight fit. Drawing 30 feet, Merlin Rock being 28 feet below the surface, we had a clearance at the most critical point of 15 feet either side. Once inside I saw that a ship was lying where we thought our berth was, and had to maneuver towards the other, and shallower, end. Going alongside was

¹¹ Pullen's note: While this is an entry in my personal diary I regret having made it for if there was fault to be found I should have directed it at myself. The Officer-of-the-Watch simply obeyed my standing orders by telling me of a ship ahead. It was my responsibility to get up or ask for further calls. I did not and therefore had only myself to blame for not being kept informed though if matters had deteriorated I feel sure Ackerman would have roused me. If I did not like him keeping a routine night watch then it was up to me, no one else, to change it. Again, I did not.

Ben Ackerman was, and remains, a quiet, delightful person. We have collaborated over the years since on a number of projects and are good friends. At least I hope he feels that way for he had a rough time in Labrador at my hands although in reading my entries concerning him I think they come through rather worse than was actually the case. So I like to think.

He was borne for diving duties at which work he was first class. His problem as a watchkeeper was a product of inexperience and possibly an over-estimation of his abilities as a watchkeeper. Also, many officers hesitate to call their captains if it may prove to be unnecessary. This is out of consideration for them and one had always to emphasize that one would rather be called unnecessarily than too late and be confronted with an irretrievable situation.

Ackerman was also the ship's gunnery officer and being one myself this made things difficult for both of us. He seemed to be dogged by bad luck and a staff that to be charitable appeared to let him down.

a most satisfactory maneuver. In cramped quarters I turned and slewed her in sideways, just missing the ship already berthed. My chaps indicated their pleasure which is a most pleasing thing to a shiphandler when he has done well.

A flood of people poured aboard including Captain A.F. Pickard, Canadian Naval Commander, Newfoundland, a number of Americans (including) Colonel Rinker, U.S. Army and Commander Smith, USN, and, of course, the press. A hectic two days. Called on the Mayor (Mews) who talks a blue streak and who never once evinced interest in the ship, [on] the local Canadian Army Commander, Lieutenant Colonel Berwick who was a pleasure to meet, on General Barcus, USAF who, with his Deputy, General Root, appeared to me to be very narrow and parochial in outlook. General Barcus still flies a jet which to his sycophants means a great deal but to me would seem to indicate misemployment of a general. A call on Sir Leonard Outerbridge, the Lieutenant-Governor, was a refreshing and pleasant experience. A reception at HMCS *Cabot* on Thursday evening and at Government House the following evening. A luncheon by me for HE, or rather HH (His Honour) Mayor Mews, who still showed no interest even out of courtesy, General Root, who I kept on calling 'Colonel' which maddened him and amused me. [Also] Tony Pickard, Dr Campbell, our Senior Scientist, and of course the commander. This on Friday after which Sir Leonard had a pretty thorough look around. To Peggy and Fabian O'Dea's for the evening and back to the ship at midnight so weary.

7 July

to sea

Saturday, A.M. A steady stream of visitors etc. Roll on sailing time so that we can be alone. Americans are the world's most eager hand shakers. A tiresome business. Colonel Rinker and I shook hands at least ten times. I would be happier if they shook hands less, wrote fewer orders and expressed them in plain English, and did not emphasize the first syllable of words such as RO-tate. At 1400 we shook hands again all round, pushed them ashore and said goodbye with thankfulness. Slipped and proceeded to sea without incident. Course was shaped to the north at 15 knots, the visibility poor with fog patches, a following wind and sea and not very many icebergs.

8 July

Northbound

A quiet day. Good attendance of men at voluntary church, and of course all the officers for whom nothing is voluntary! Improving visibility. My voicepipe to the bridge has been fixed now so that I do not have to shout which wakes one up. It is a fine art being able to receive a report from the Officer of the Watch, evaluate it, give a decision or an acknowledgement, and roll over dropping back into a deep sleep again without ever really having awakened.¹² Today, at my suggestion after church, we had our pictures taken and the results were not too distressing.

10 July

Tuesday another shoot was attempted. I gave Mr Ackerman explicit instructions not to open fire before the beam because of an aircraft on that bearing. So what happens? He trains the port Bofors on Red 45 degrees and, without asking my permission, opens fire. I was so startled I bit my tongue and, despite my rage could not overcome the noise to make him stop. And, finally, to cap matters, the mats to catch the empties were cleverly placed so that they (the empties) hit the deck. The starboard gun would not even fire so the whole episode could be classed as a shambles.

Threats by me that the starboard Bofors had better be ready to fire the following day, or else he'll walk the plank. And despite this we make our way up through the Labrador Sea in fog.

11 July

Hudson Strait

'Ready to open fire, sir' and so we climb up to the bridge and what happens? No power, no electrics, no nothing. Much huffing and puffing and then 'We'll fire it in hand'. That too turns out to be out of the question, and so again there is frustration. Fog and we close toward Resolution Island encountering scattered ice at 1900 et seq. and also a few bergs.

¹² Pullen's note: Another example of trying to have one's cake and eat it too. I did endeavour to be explicit about being given additional reports so that I could judge when my presence on the bridge was necessary. When one is exhausted it is hard to surrender sleep and get up.

Because of fog being forecast for the next few days in the Brevoort Island vicinity which will prevent flying and survey work, I decided to head Into Hudson Strait and get on with oceanographic stations instead. Plenty of ice, enough to satisfy everybody. The ship bumping and crashing her way through it, occupying stations in lines running across the Strait from north to south, each line 50 miles apart. At least we are busy and accomplishing something useful but I will not feel easy until the Brevoort Survey is complete.

In the last dog we stopped for a 'cast' and I asked Mr A. If a large bergy bit would clear us, or we it. I was assured we would be allright and so the engines were put to ten minutes notice and matters proceeded. It then became apparent that we and the bergy bit, about 10,000 tons of it, were in fact closing on a steady bearing and rapidly so. A taut situation. Urgent call for two engines and an agony of waiting while we get closer and closer. The berg was sitting solid and unquivery in the water while we bounced about in the wind and swell. Finally, when no more than 40 feet from colliding I got two engines and astern we went and just in time. I got her bow clear by feet and then we were on the other side and being set back on it. A shot of power ahead and again we just cleared it. A near thing and I had to have a chat with Mr Ackerman after that. After it was all over I suppose one shouldn't get too fussed but damage could have been done particularly to our props. and hull. The temptation is strong to bellow at the unfortunate officer at the time but that cannot be. I like A. but wish he would not keep on crossing my bows.

12 July

In all we took 17 stations and in the morning watch headed east again toward Resolution in hopes of improving weather. Ice in patches.

13 July

Flying weather. HUP and Bell up. To keep Dr Little, our physicist In sea ice physics, happy I put the ship, nose to, to a very dirty bergy bit and the Bos'n leapt onto it clutching a saw to use to cut a chunk for study. This evolution brought out the 'goofer clickers' by the dozen.

14 July

Standing north, passed Loks Land about 0800 and then came the good news that Lady Franklin and Monumental Islands are 300 feet or so high, this means we can fix their positions relative to Loks Land and they can be radar beacons to ships sailing to Brevoort. Fortune continues to smile as we head north mile after mile in ice-free waters. The edge of the pack is on our port beam, pushed there and consolidated by the east wind prevailing for the past week. At 1145 we alter in towards Brevoort and by 12 we are into the pack. Ten tenths and the going getting heavier. 33 miles to go.

I took the ship into the ice with the Second Officer of the Watch on the other bridge wing to watch for heavy ice getting into the propeller on his side. A beautiful clear, cloudless afternoon, extreme visibility, and a slugging match. Real icebreaking, ice sometimes loose, then tight, soft and slushy and then great floes frozen tight, hard ice, blue and 12 to 15 feet thick. Every size, shape and variety. At 2100 we arrived off the entrance. Nine hours to go 33 miles and I was sun and wind burnt. Tired but thoroughly happy in the knowledge that I can handle the ship in her element. Parked in the ice and fell into my bunk.

15 July

off Brevoort Island

Up at 0400, it being daylight most of the twenty-four hours now, and started operations. Flying off the hydrographic and diving people etc, then under way at 0600 to nose our way into the harbour, quite possibly the first ship to do so, feeling our way but the water was deep. Once inside, lowered an LCVP, churned up some of the Inner

Ice, and then headed out to continue the distant survey. Another slugging match in ten tenths pack and an all day 'do'. The Officers of the Watch handled the ship, Kelly and Manzer, being old hands, are competent but Douglas (RN) is new. He got stuck and I took over, more because I wanted to drive than for want of skill on his part. On one occasion he drove our bows up on a floe and there they stayed. After twisting and turning, grunting and groaning, not a move. So, ring-off, ten minutes notice for the engines and below for a peaceful dinner. Afterwards we got the old girl to slide astern and on we went arriving back off Brevoort at 2100, parking there again for the night.

16 July

Up at 0630, off at 0700. Its so easy, one just pushes the throttles and away we go. One of the advantages of an icebreaker. Park in the ice and pipe down, no anchors, cables, wires, buoys etc. This time we ran another line of soundings into the harbour and I took the ship right up to the cliff face until we were 500 feet from visible rock ahead and 18 feet (of) invisible rock under our keel which I judged to be far enough. At lunch Melvin, my steward, flattered me by saying 'what a marvellous job of shiphandling' and that 'my predecessor would have had a dozen cat-fits if he had seen it! [It's] odd, what strikes the lower deck as good shiphandling is far different than the wardroom's (opinion). Melvin had nothing to comment on about the 'alongside' in St John's, for example, which was, I felt, worthy of some note.

To sea and another battle with the ice to get a line of soundings. When clear of the harbour I took off in the Bell flown by McNeil and went in to 'inspect' the chaps ashore. Scrambled about having a happy time joshing the (fellows). B. Ackerman in his element at last jumping happily off ice floes into the water (temp 29° F) with his fins and other frogman's paraphernalia. He and his team have done a good job and I'm pleased he has been given a chance to shine at a [task] he knows.

We flew up to the U.S. site and around the countryside. Rocky, pre-Cambrian, harsh and very impressive. Sheer cliffs 500 feet high. Back to the ship at 1245 to find Chief with a frown and a leaking tank. Not serious according to him.

Returning for the night the Padre sighted a polar bear on the port beam, distant about one mile. The news was piped and soon the port side was black with people. The bear, very curious, sniffing and peering, approached quite close with every appearance of coming right inboard, finally took alarm at about 400 yards and galumphed away at high speed.

17 July

Brevoort Island

Operations started at 0700. Another beautiful day. Surveyors away in boats doing the harbour. Parties ashore erecting leading marks. Divers blowing a rocky pinnacle while *Labrador* continues to break up the harbour ice on the western side, going right into the beach so that one could almost touch it, which I dare not do lest we lose our Foreign Allowance by touching

Canada!¹³ In the p.m. landed 70 men for exercise, in the LCVP. Lieutenant Commander Hunt, driving the Motor Cutter, provided the day's laugh when acknowledging my shouted instructions to follow the landing craft into harbour, saluted very smartly and said 'Aye aye, sir' in a keen and anxious to please voice when his boat hit a piece of ice, and down he went (at the salute).

A good day's work which has seen the completion of the work except for last-minute clean up details. After parking for the night off the land, and having just got to sleep, I am called that *Pogo*, the Sound Boat, is trapped in the ice and requires rescuing. This was accomplished by midnight with him hoisted in and the ship again put to her night station.

18 July

Brevoort Island

Recovering gear [and] planting a four foot by eight foot sign on the little Islet we have named 'Asiaq' which says 'HMCS *Labrador* 1956'. It is secured to steel pipe driven three feet into solid rock. I wonder, will it be there next year? I suggested the name Asiaq because she is the Eskimo goddess of the weather and lives somewhere out in the ice pack. When the ice fails to crack in the springtime the Sorcerer must go to her and pacify her, so that she may unloose the warm mountain winds and rain, break up the ice and send it out to sea. Because of the extremely fine and timely weather which has made our survey possible I think it proper to acknowledge Asiaq's good works on our behalf.

We have named the very prominent headland on the western arm of the harbour 'Pullen Point' after Captain T .C. Pullen, RN, who, as Master of HMS *North Star* in Sir Edward Belcher's expedition in search of Franklin, wintered in Erebus Bay, Beechey Island, 1852 - 1854. I feel that, as his namesake, I have a right to submit this to the Canadian Board on Geographical Names for their consideration although it will have to be done

¹³ Pullen's note 8: Foreign Allowance was a little extra pay for those serving in ships abroad or away from Canada for periods in excess of 30 days. This was a contributory reason we avoided anchoring during our northern operation thus ensuring the crew would get that \$1.00 a day addition to their pay.

There are some charted depths in Brevoort Harbour close to the rocky beach on the Pullen Point side which we obtained by taking Labrador right up to the shore-line, close enough almost for one to jump onto the land. Admittedly under tranquil conditions. Because of her sloping forefoot it was possible to do this without touching.

through the Dominion Hydrographer. The other prominent headland we are calling 'Labrador' for obvious reasons.

The Commander and I flew in the HUP, bearing a gift of cigarettes and a picture of the ship, to say goodbye to Mr Smith, Site Superintendent. His camp is a cluster of Atwell huts, in a hollow square, facing inwards and there, in the center, a sight to gladden the eyes of any Britisher, flying in the breeze, a Union Flag. I discovered that this remarkable man, reputed to be 73, stands no nonsense and makes quite sure that every U.S. visitor is under no delusion as to sovereignty. He told us that one Yankee from New York enquired as to the reason for the flag (an odd question coming from a citizen of a very flag-waving-conscious country) and he was told, obvious with relish by the teller, that it was a gentle reminder that the country was still Canadian and would continue to be.¹⁴ He told us also about the time he spotted a polar bear stalking a seal hole. Crawling cautiously up to it and lying crouched by the edge. After a long cold wait up popped the seal, swish went the bear's paw, and the seal was a goner. After the bear had had his fill and wandered off, wolves took over, then the ravens and finally the fox. In this fashion does Nature provide.

Went up to the very top of the highest rock, 1,200 feet above Sea Level, to view the site. He has achieved a great deal in a short while and under appalling conditions. Quite a man. His Foreman is Arsenault who was in the Gunnery School with me in 1942-43 although I do not remember him.

Stood out to sea for the last time and as we did so fog, like a blanket, came round Cape Murchison and over the tops of the hills. How very fortunate we have been in our weather. Parked in the pack ice for the night so that the draughtsmen can work undisturbed.

19 July

at sea

Underway at 0600 back to the approaches to Brevoort to run a line of soundings the boats missed and then, at 0800, under way for open water. Another struggle, heavy pack, ten tenths, with six engines on the line it took us nearly five hours to batter our way five miles when the ice eased and better

¹⁴ Pullen's note 9: How times have changed! Now (1982) one rarely, if ever, sees the Union, let alone a Canadian red ensign, in Canada. Mr Smith was a fine fellow and he certainly ran a tight ship. Beards were not permitted because he reckoned it was a sign of laziness and the first step on the road to sloveliness.

headway was maintained. Open water was reached at 1630 and course shaped for Resolution Island.

Chief has trouble. A coil in a hot water boiler burst and leaked. After a prodigious effort a repair was effected last night. Now the starboard stabilizer fin, when extended on reaching open water, is making a peculiar noise and it is suspected that ice penetrated the housing opening and damaged it. We discovered it will house allright so that is a relief but a diver will have to have a look. But that is not all. At 2030 Chief reports quite serious damage to the steering gear. The rudder has been hit so hard that the two big coil buffers were forced metal to metal and the huge casing holding the idling pinion, which governs the quadrant, has been shifted bodily fracturing two of the heavy holding down bolts and all the others bent. Our rudder cannot be used so steering by main engines is necessary which, however, is easy in this type of ship. The damage must have occurred when going astern in ice with the rudder over, but Officers of the Watch all deny doing this. A diver will have to have a look at this also. One of our two echo-sounder transducers is also unserviceable and that will have to be investigated by divers. So things are not too rosy at this stage.

Pilot and the Hydrographers very busy preparing the charts, pictures, radar photos etc, ready for landing to-morrow. At 2315 McNeil comes to me, full of talk about the dangers of flying by pilots if they are fatigued, etc etc. A story that sounds as though he is still an Air Force officer. He makes a good pilot but he is not a Naval Officer. After the good flying effort at Brevoort he is spoiling it by nattering about the need for long rest periods after flying before taking up watchkeeping again. I do not agree and at that hour to come and see me was injudicious.¹⁵

20 July

at sea and off Lake Harbour, Baffin Island

The 'mapmakers' finished at 0600 and a very good job they have done. Arrived off Resolution Island at 0800 when Fitzgerald, the flying Sub., took the charts, etc., plus a gift of food and magazines, into the lighthouse at

¹⁵ Pullen's note 10: I felt at the time, because of the lateness of the hour, that he might have had one too many and would otherwise have thought better of it. If I had to make a choice, I would rather a 'good pilot' than a 'naval officer' though preferably both. The business of not wanting to keep watches was a recurring theme with some, not all, of our helicopter pilots. Watchkeeping, with a large list of people, was not particularly onerous.

Acadia Cove. The USS *Edisto* will pick them up from here on her way north. Having safely recovered the HUP we stand to the west for Big Island, High Bluff Island, and Lake Harbour. Scattered ice, bergs and bits, encountered which were easily sidestepped. At 2200 we came to a stop and flew off two Bells for Lake Harbour with the Doctor as one passenger and Petty Officer Galley, the photographer, the other. The Doc to see if his services are needed and the P.O. to make a record of the visit. Its a long flight, 30 miles or so, and a worry when they go where I cannot follow If trouble should arise.

While lying-to Ackerman goes down in his frogman's outfit to look at the props, rudder and transducer. He reports no visible damage to the rudder which is odd, and that the props. are as we thought; port OK, starboard, two bent tips. Transducer is allright too.

21 July

Hudson Strait

A long wait. We were out of radio contact (but) at 0100 word came they were airborne and returning to the ship. I spotted them first a good ten miles away. Once landed on we proceeded at twelve knots to carry out oceanographic stations further to the west of Big Island. Doc brought back quite a nice assortment from which I took a rather fine walrus, also a seal, \$3.50 each. More profit for the Hudson's Bay Company.

23 July

[Ivugivik] and at sea

Arrived off Ivugivik at 1000 on 23rd sending in a boat with the Commander while divers went down to look at our echo-sounders and fins of the stabilizers. They reported no visible damage. At 1400 recovered Tony and his party, all very disgusted. The priest away, 50 Esquimaux with no English, no carvings and the whole place dirty and smelly. The Doctor's nostrils reported to have quivered and curled in disgust. To sea at 1430 shaping course for Coral Harbour.

24 July

Coral Harbour and at sea

No ice and a peaceful run to Coral, arriving there at 0900. Blowing and cold. Away went the LCVP and (then) an impatient wait, manoeuvring clear of shallows, for our mail. It came, eleven bags, and much satisfaction at that. Stood out to sea at 1400 and shaped course for Foxe Peninsula, Baffin Island, where we will recover gear left at Cape Enaoulik last year. A helicopter 'do' with us stopped ten miles off in a glassy calm sea and scattered ice - one tenth.

25 July

at sea

Started at 1530 and finished at 2230. 16 sorties flown. Sub-lieutenant Fitzgerald force-landed due to abnormal cylinder head temperature caused by failure of cooling fan belts. Luckily he was a mile from the ship and I drove her to him otherwise it could have been more tricky in shallow and uncharted waters inshore. A good show by 'Arctic Airways' - well done.

Under way and proceeding towards Cape Fisher on Southampton to recover some of the gear at the second EPI (Electronic Position Indicator) station.

26 July

at sea

Into heavy ice at 0200. With the ship grinding and crashing her way about I cannot sleep, partly because I still start with fright when the ship shudders to a halt in ice like a ship taking the ground - every 'Captain's nightmare - and partly because I feel the Officer of the Watch is driving her too hard and will do serious damage. It is only 100 miles but it took us all day to get there through eight to nine tenths ice. At 1600 completed the last oceanographic station and headed south for Coral. It is thick fog, so much so that it is Impossible to take advantage of openings and leads, resulting in more crashes and bangs. By midnight, having got south and west of Seahorse Point, we reached open water and I enjoyed a quiet and undisturbed night. Flat calm but visibility less than a cable.¹⁶

27 July

at Coral Harbour and at sea

¹⁶ Pullen's note 11: Cable. Nautical unit of distance having a standard value of 1/10th of a nautical mile (608 ft.). For practical purposes a value of 200 yards is commonly used.

I went messdeck rounds and was most pleased to see the improvement. Tony has a cake for the cleanest berthing space and its winning excites much competition. I awarded the prize to the Seamen; they have raised their space to a high standard.

By 1130 the ship was lying-to off Coral - no Commander Savage - he is at Fox so we land the Ops. Officer to fly to Fox to prepare for our arrival. I spotted a polar bear, which unbeknownst to me had been seen by one of our boats, swimming alone miles from land. Took the ship quite close for a good look. A fine beast, quite unconcerned. All the cameras out in force, of course. After a thorough peek, stood away to leave the animal in peace.

Exercised the crashboat for the first time. From the pipe 'Away seaboard's crew etc', to the moment it was in the water, took eight minutes. Too slow by five. By 1900 we were standing out of the harbour making for Cape Fisher and In hopes of improving weather conditions.

28 July

at Cape Fisher and at sea

At 1800 approached Cape Fisher. Not much ice, about three tenths but visibility down to one mile or less. Pilot and I took the ship right into the beach, within a mile, when the hut was sighted. Boats were lowered and threading their way through the floes reached the shore. Quite a strong current carrying ice, and the ship, [at] about one or two knots. By 2000 the gear was recovered. Tony reported that bears had broken into the huts and eaten all the food; quite a shambles. Tins crushed by paws to get at the contents. 2100- stood seven miles off the land and nosed into a large floe for the benefit of Dr Little and his ice studies.

Visibility too poor for flying so Commander Savage and four bags of mail remain at Coral, the other side of fog enshrouded rock 1,000 feet high. Mr Markham forecasts fine weather for the morrow.

29 July

And he was wrong - no improvement. After waiting for conditions to improve I took the ship south to the Ascension Islands and there, where the hills lose some of their height, it was good and so, [at] 1550, McNeil took off in the HUP and disappeared over the hills. After a longish wait, and with fog

swirling south spoiling the visibility, he finally was sighted to my intense relief, landing on at 1830 complete with Commander Savage and the mail. Very shortly after that we were in thick fog -- how fortunate we were. At last we will [be] able to head north but progress will be slow in heavy ice.

30 July

Slow progress through heavy dirty Foxe Basin floes. Aerial recce flights help but the ship is not making much northing. The weather, however, is ideal.

31 July

Another day with little real progress. Worked the ship to the east to get off the coast where the ice is heaviest. A tiring business. Commander Savage much interested in everything. Six engines for two hours.

1 August

Foxe Basin

It has to be experienced to be appreciated. Another day of struggling. At 0205 crossed the Arctic Circle. At 0400 open water was reached and I fell into a deep sleep without knowing that was the reason. A good day's run and a lot of idle talk about reaching Hall by midnight. Then at 1600 we were back in heavy pack, giant floes that took everything the ship had to offer. Six engines on the line from 1700 on the 1st to 0300 on the 2nd at which time open water was reached distant from Site 30 about 32 miles. A great relief. We have certainly bucked our way through some very heavy ice. The captain of the *C.D. Howe*, sitting comfortably off Coral Harbour, is reputed to have said that because ice conditions were so bad this year the sealift ships would never get through and that *Labrador* would not make it either. Well, here we are! Silly old man.

Mr Robertson, Mr Winter, Marty Mullen and Mr Crowell off for lunch. They seem pleased and relieved to see us. We land the divers, the E.P.I. parties¹⁷ and Commander Savage. I get a letter from B. and have a good sleep.

¹⁷ Pullen's note: Representatives of Federal Electric, prime contractor for construction of the Distant-Early-Warning Line.

E.P.I. = Electronic Position Indicator, a fixing device for hydrographic surveys.

2 August

Chief, Tony and I ashore in the HUP at 1030 for a tour of the establishment.

Most Interesting. Lunch and back again. We departed Fox and shaped up for Rowley Island and Site 31 where we arrived at 0900 the following morning.

4 August

A serious accident; Leading Seaman Guertin was hit by the bow door of one of the LCVP's which fell on him when one of the wires gave-way, shattering his pelvis. My priority signal asking for his removal by air unleashed a torrent of signals from RCAF Search & Rescue. Returned to Fox and landed him with Petty Officer Applejohn to fly by Mercury to Mont Joli. They left at 0230. My night is shattered again; never seem to get a satisfactory amount of sleep.

5 August

Sunday and church. The hymns are better but I object to extemporaneous prayers and wonder why we cannot have the Church of England general confession.¹⁸ Will have to beard the Padre. No mail which is always a disappointment. The Sunday movie was a sad one. I left at the half-way mark, very depressed and gloomy. The low point of the voyage I hope.

6 August

Through uncharted waters to erect a beacon on Manning Island. Took four hours. Then west to South Ooglit where the Engine Room Department

¹⁸ Pullen's note: Being older and, I hope, wiser this strikes me now as an unreasonable view. The Church of England form of worship was likely as unfamiliar to some as was the United Church version was to me. The Chaplain had to put up with my views but I like to think it was a friendly sparring match. I would still be ill at ease over extemporaneous prayers because my naval training and background, RN and RCN, was Anglican which served all Protestants. For the remainder it was 'Fall out the Roman Catholics'. That's the way it was.

erected Number Three. Chief, Pilot, Douglas, Hunt and I went ashore in the Motor Cutter (and) had an interesting walk, seeing such a lot of living things on a barren island. We were attacked by Terns swooping as if to peck us. The reason for this became obvious when I spotted a wee ball of fluff proceeding at full speed ahead of us. I caught and held him, a baby Arctic Tern, then let him go. The attacks ceased and then recommenced. This time another ball of fluff was spotted pretending to be a rock. Even with us all standing around him he didn't flinch. A duck fluttered away from us as we advanced down the beach, pretending to be winged in Nature's trick to lure an intruder from the nest. There it was with four large green eggs in it. Pilot and I came upon a sandy beach and saying how odd to see such a thing in these latitudes, I stepped onto it and sank at once to my knees in quicksand. I wasted no time in removing myself from the treacherous stuff. Pilot discovered a skull, no other bones, with a bullet hole through the forehead and a larger hole at the back of the head where the slug came out. Murder or suicide? Numbers of duck and geese. Eskimo ruins. Flowers of all colours or so it seemed. We returned to the ship at midnight, tired after a good walk and some boating.

7 August

This day we erected beacon Number 4 on Tangle Island using a VP and an Engine Room Department team. The ship went on to airlift beacon Number 5 into Tern Island at the entrance to Fury & Hecla. In the evening we couldn't find Chief's team because thick fog closed in and blotted out everything. By using our radar and radio we talked him off the beach and through the murk toward us. I took the ship in through virgin waters to within a few miles (2) of the beach. With 20 feet under my keel it was a tricky business. Once inboard we felt our way out to more frequently travelled waters.¹⁹

8 August

¹⁹ Pullen's note: This refers to the hoisting in of the boat and beacon party. 20 feet of water was, by arctic standards, quite a lot. There were numerous instances when we had considerably less. I used to brood on the possibility of grounding and how it would be regarded by the Navy. One could hardly prove a charge of 'hazarding HMC ship' in waters which were uncharted and which we were striving to survey. And where would arctic-qualified experts be found to form a court? Happily, we never took the ground.

Four beacons this day. Two by airlift to Koch Island and two by VP to Atka and Pursuit on Rowley. The Wardroom team did Atka, the tide dried out their LCVP, no one could read flashing, and their radio broke down. Then to top it all, thick fog made its appearance. We recovered the HUP and Number 1 VP safely, then I turned to go after Number 2, trying to take the ship in as close as possible. The Echo-sounder operator chanted "70 feet, sir, 60 - 55 - 40 feet sir. Shoaling fast. 36 - 31 - 29 - 20 - 15 sir, its merged sir, no echoes". This can be hard on the nerves. By this time we were stopped, using one prop, as I did not want to risk damage to both by whirling them about. I stood off into deep water and waited. Pilot then spotted the radar echo of the VP putting off from the beach and we closed on him, duly picking him up visually at 1,800 yards. A busy day. Put the ship into the close pack for the night between Bray and Rowley. Fog still thick.

9 August

The pack has been moving at a rate of four knots which meant bucking it. So at 0900 I got four engines on the line and headed out. Once in open water the fog lifted and we found beautiful weather. Making for Hall for mail. This day we piped down and gave the people a rest. Hunt mucked up the mails, they ended up at Rowley, blast it. A few short words.

10 August

Erected beacon Number 10 on Bartlett Point by air and had the HUP collect the mail from Rowley just before it was returned to Hall which would have caused an uproar. By perseverance I, and Pilot, found a short-cut to Rowley that reduces the distance from 82 to 45 miles. A very satisfactory day for that reason. Pilot nearly convinced me to give up as he felt there wasn't one. More groping in shoal waters but a way was found. Peaceful night in the box²⁰ off Rowley. McNeil off in the Bell with a fine mess of fish.

²⁰ Pullen's note: During nights when we were not en route to some other scene of activity, a box would be drawn on the chart in which the ship was ordered to remain under way at all times. I did this to maintain a high level of alertness on the bridge. In my view it was noticeable that when an anchor was dropped, there was also a drop in efficiency and also a built-in delay in responding to an emergency requiring the ship to be on the move. Being at anchor during the day meant usually no work was being done and that was anathema to me. At night we simply remained under way while Pilot and I could get the rest we needed to keep going.

11 August

A bad day. Pilot infuriates me by claiming no one told him that *Pogo* was to be lowered; this because he and Dr Campbell disagree. After being abrupt as I've been with him, and in public too unfortunately, *Pogo* is sent away to do oceanography and current measurements, and the bloody fool of a cox'n (P2 Richey) crosses right under my bows. Then Lieutenant Webster prangs the HUP taking off with some tailwheel gadget still attached. When gestured to by the flightdeck crew to come back, and not knowing for what reason (it being a minor one), he slaps the HUP down and misses the deck, buckling the fuselage on the edge. That puts that aircraft unserviceable for the rest of the summer. Damn it and blast it.

I recalled a Bell from ashore to fly a recce for me to see if boats could get through the ice. Off went the Wardroom team under the Commander to struggle through the ice to Koch Island and they had a tough time. Meanwhile I nosed over to Sadleq Point on Rowley to find open water to get off the Chief & Petty Officer's team in the other VP. During this a minor flap when the Bell was reported down with transmission trouble which was diagnosed finally as a faulty gauge.

After a worrisome creep through ice and shoaling water to an ice-free space where it would be possible to lower the boat, hoping we could get there before running aground, which we did, 18 feet under us [8&] weeds in sight! Off went the boat without, we discovered later, an antenna. I think we have more people out of the ship than in. A long wait and then Lieutenant Commander Kelly, ashore with the Chiefs & P.O.'s, flashed a request to stay the night. So we recovered his boat and then headed north and west to recover the Commander and his party which was done by midnight. After that we lay to off Rowley in Labrador Channel.

12 August

Back through the ice and fog to recover Kelly and his band which was done by 1300. They were in good heart. We now have twelve beacons erected. Back to our 'box' off Site 31 at Rowley to rest and to recover *Pogo*. Another busy week. I think we have accomplished a lot but we must keep at it.

13 August

Today, with *Pogo* on our beam, we ran lines of soundings to determine if there is enough water for ships to go direct from Frustration Bay to Labrador Channel and there is. What a pair we made - like an elephant and a flea.

14 August

Arrived Hall midday and then, again with *Pogo*, back out to the center and in again to expand the soundings arriving back at 1800. *Pogo* into the beach to do various things though I suggested to Cavanagh that a V.P. would be preferable and safer. 'Oh no, she [*Pogo*] can put bow to the beach and there you are etc etc' says he, Mr Know-all. What happens? 'Please sir, *Pogo* is aground and the tide has gone out.' What idiots. In goes the V.P. and breaks down and then the bloody fool gaily pipes 'Away second V.P.'s crew, man your boat' at 2315, long after pipe down. It is hard to remain in the cuddy and leave it to the Commander; but he'll fix it but much too quietly for me. Turned in and ignored the shambles which went on until 0200 when all boats were back at the ship. Turned in but didn't sleep.

15 August

A drizzly foggy day, low visibility and a sea running. Weather that matched my mood. Tried a radar calibration using a repaired *Pogo* with a new cox'n, the other having been 'dismissed his ship'²¹ summarily, but it had to be cancelled. *Pogo* nearly wrecked when being hoisted with the ship rolling in a beam sea. Nothing else attempted this day, lying-to off Hall resting. Tomorrow is another day, I hope.

16 August

At 0830 off to Rowley (Site 31) to run a line of soundings. Embarked one Bell and returned to Hall arriving at 1800. The wind has stirred up the ice and blown it to the west, the first time this year I have seen so much off Fox.

Coming over from 31 saw one hundred-plus walrus on floes. Blew the whistle, fired Very's pistols and rockets to get the fat old things into the water [but] they just lay there too far away to be bothered.

²¹ A naval courts-martial sentence.

Admiral Rayner is delayed at Mont Joli as usual. Now we will fuss about, wasting valuable time. Sent a party ashore in the LCVP and then could not recover them because the ice became too heavy. Still no Admiral and I spent an uncomfortable night in the bunk in the spare cabin unnecessarily.

17 August

Good weather at last. Recovered our chaps via the Bell. No mail. No word of the Admiral. This day we carried out a range calibration of the radars to try and 34 bowl out a suspected range error in the ANSPS 10 which we think is 'over' by one to two miles. Did Rounds in lieu of CNP and once again the Seamen won the cake, and handily too, which pleases me. The Stokers started this but are now in a bad slump.

18 August

A night of uncertainty waiting for word on CNP²² and such a night means little sleep. He finally arrived at 0545 and was aboard shortly after thanks to having the Bell in there ahead of time. At 0900 we proceeded through nine tenths Ice to Navy Channel between Rowley Island and the Spicers to erect beacons and run soundings. Ice blocked our efforts to get in to Morrissey Point and shallow water (20 feet under the keel and shoaling) to get in to the Spicers, so we went through Navy Channel, the first ship to do so, and established a new route for deep draft ships.

The Wardroom dined the Admiral and a first class 'do' it was but by midnight I was dead on my feet.

19 August

²² Pullen's note 16: CNP = Chief of Naval Personnel. Rear Admiral Raynor had been responsible for my appointment to *Labrador* and I was anxious he should see that his confidence in me was justified. He was the only senior officer who made the effort to get himself into the arctic to see what we were doing. Most senior officer, indeed most officers, had no idea what our work was and, I fear, many did not even care. Indeed, some were fearful lest they be appointed to the ship.

His visit, therefore, was much appreciated by the ship's company and meant a great deal to us. He was a man who understood that loyalty went both up and down, a man in whom one could have complete trust. I remain to this day grateful to him for giving me *Labrador* as a junior captain and my first appointment in that rank. I suspect that Robbie was just a little miffed that such a junior captain had been selected to be his relief.

Foggy and bumping our way through ten tenths ice. Church at 1030. CNP read the lesson. Adam Bursa jumped up and down at the harmonium! The Chiefs and Petty Officers had an 'at home' at 1700 and at 2100 the Ship's Company put on a jolly good concert which impressed CNP considerably. And then to turn in, in that uncomfortable bunk in the spare cabin.

20 August

Foxe Basin

Back to Hall arriving at 1100 there to collect 12 bags of very welcome mail. CNP departs by Bell to catch a southbound flight from Fox to Mont Joli. He spoke to the Ship's Company and afterwards told me he would say the same glowing things to Naval Board. He seems to have been quite impressed with everything he saw, and mentioned in particular the cheerful spirit he observed and also the very high standard of cleanliness. Am sorry to see him go, he is such a thoroughly nice person, but I am glad to be back in my own quarters. As soon as he went we stood out to sea and for Labrador Channel, passing over a shoal area with a least depth of 19 feet under us.

21 August

At 0430 flew off the hydrographers in the two Bells to complete their triangulation work on Koch Island which was done before noon. An LCVP sent inshore under the charge of Lieutenant Commander Douglas, an odd fellow, to establish a cache of diesel fuel for *Pogo* and one cutter to draw on when they are sent away for the actual sounding of Labrador Channel. On completion I headed for Frustration Bay off Site 31 (Rowley) and embarked all the people, stores etc that had been established ashore while the Bells were there. For the night the ship lay-to off Site 31. The mail we received at Hall included the long missing change to the Operation Order which I now discover requires us to rendezvous with the ships on the 28th August so we must head south almost at once.

22 August

Pogo and *Labrador* carry out a thorough Investigation of that shoal area, between Hall and Rowley, which was finished by 1400. To Hall to conduct last minute business and embark seven bags of mail which arrived by air at the strip just in the nick of time, then, at 2000 off we go, southbound for oceanography and the convoy. I received a signal to-day telling me that Hugh had had a minor heart attack, was in RCNH, Esquimalt, and in excellent condition. A shock to get such a message, especially as we shall be out of touch with the mail at a time when an amplifying letter would be welcome. We make good progress in almost open water, where last time we were in these parts it was a slugging match to force our way through.

23 August

southbound in Foxe Basin

We had a good night's run. The ice continues to be scarce which is a relief. A fine day and we start 'occupying' oceanographic stations at 1500. During dinner we came upon a magnificent big polar bear with two cubs on an ice floe beside which we stopped and watched the antics of the trio. We were within a cable's length and the bears showed us as much curiosity as we did [them], then, after a while, mother lumbered off followed by her two cubs.

24 August

Messdeck Rounds again and the matter of determining which is the cleanest berthing space. I find the inside of the ship steadily improving. Tony says, and he is right, that it is due to the fact that the Captain does Rounds himself, which was not the case under the old regime. Again the Seamen were best, for the fourth week in a row.

Ran into progressively heavier going through ice as we closed the western side of Foxe, by Frozen Strait. A bumpy, uncomfortable night. All told 13 stations of the new series have been completed. A bear with two cubs sighted [but] not the same trio we saw before.

25 August

During the night while battering our way back to the eastward and to open water, Kelly reported seeing five more bears, and in the morning we lowered the motor cutter to go and photograph another bear with two cubs. I hope they got good pictures because the bear was getting pretty annoyed and the cubs having a hard time keeping up with mother.

Have just been told that we have completed our 100th oceanographic station and more flying hours over a 30 day period than ever before in the ship's history. Upperdeck Rounds. The ship looks quite shipshape, better than she has for a long time, but now the rust is beginning to show through.

26 August

Foxe Channel

Sunday. Church at 1030. I've got the Parson using the familiar (to me) confession but I still can't stomach his extemporaneous prayers and his sermons.

Reading in the '*Polar Record*' about the highest latitude ever reached by a ship under its own power. The record is 83 degrees 11 minutes North in longitude 49 degrees 03 minutes East. A Russian ship, the *Fedor Litke*, on 12-13 September, 1955. She was launched at Barrow in 1909 as the *Earl Grey* so she must be pretty long in the tooth. The previous record was 83 degrees 06 minutes North, also Russian. In North American waters the *Eastwind* reached latitude 82 degrees 38 minutes North 61 degrees 51 minutes West in August, 1952, after taking supplies to Alert. It would be

something if we could have a crack at these records, maybe next year when we head up to Chandler Fjord and Hall Basin.

At 0200 we completed the present series of oceanographic stations, 31 in all, bringing the total so far this voyage to 114. Proceeded to a 'box' seven miles west of Nottingham Island to be in position to look for an alleged reef, 'Trainor Reef' (PD),²³ in the daytime.

Pogo sent away for the day but after a diligent search found nothing and was rehoisted at 1600 after which course was shaped to the north for the rendezvous with the sealift ships. CJTG 6.3 in *Donner* called me on R/T [&] it was difficult to understand what he was saying as some other station blasted through drowning him out. I dislike conferences with strangers by radio so suggested that I call on him in the morning, a suggestion he at once agreed to. A quiet night with ships lying-to, all stopped, waiting for the morning.

This day marks the completion of 20 years service. If I was on the old pension scheme, Parts I to IV, I'd be in, but I changed to Part V.

28 August

Foxe Channel

A good morning and Fitzgerald flew me over to *Edisto* at 0830. Commander Plummer met me on the flightdeck and escorted me to the cuddy where Captain Ward, CJTG 6.3, greeted me. We discussed ice conditions, the route to be followed and communications. I gave them the ozalid prints of the charts we've improved. Cdr. P. said it was too risky transferring them by helicopter to the other ships so I offered to take back the ones for my convoy and send them around myself, which was subsequently done, and by helicopter too!

After half an hour I departed and returned to my magnificent-looking white ship which was flying, for this occasion, the largest white ensign aboard. *Edisto* is painted a dreary grey and I was not impressed with the appearance of it compared to the white we use which is copied from the U.S. Coast Guard. A strange ship that struck me as gloomy and dark and not at all similar to *Labrador*.

By 0930 under way to take over my convoy which had already formed up - surprise - the *Edward Cornwallis* has appeared and joined my team. A total of six ships including myself. The *Boyce*, an AK or cargo ship, the *San Marcos* and *Fort Mandan*, Landing Ships Dock (LSD's), the *Peconic*, a

²³ Pullen's note 17: (PD) = Position Doubtful.

tanker and the *E. Cornwallis*, which is a Dept. of Transport tender. I steamed over, swept up the line, and took station ahead, signalling that they should follow me and indicating the speed - and so away we went. *Edisto* led his column consisting of four ships excluding himself. I have been saddled with the slowest ship of the lot - this is proper of course! The tanker - ten knots.

Not long before the party was in good order and northbound, my lot astern of *Edisto*'s. Chief flew over to look over the American ship, see her steering gear etc. Came back very disappointed in all he saw - a dirty ship - a slovenly crew.

Fog closed down in the afternoon and I wondered how we would fare. Before long the *Boyce* was climbing up my stern. When I asked him what he was doing he replied 'Ten knots' (and) obviously having no intention of stationkeeping. He was very quickly told who was guide. After another argument, when he failed to follow me around a turn, things settled down and he co-operated very well.

Encountered scattered ice, never more than one to two tenths, but CTG slowed us down from ten through eight, six, to three knots, which made stationkeeping difficult. A long night with little progress made; annoying because there is only enough ice to bother the timid.

29 August

Good progress after a slow beginning. The faster convoy left us behind but we steamed on making a good ten knots. The *Peconic* had difficulty in keeping up, particularly in ice, so I put him at the end of the line and moved the *Cornwallis* up. The *Boyce* did well today, no backchat, always in station.

30 August

Foxe Basin

At midnight arrived off Hall where *Fort Mandan*, *Peconic* and the *Cornwallis* detached and the rest carried on to Rowley via our 'direct' route. Arrived at 0430 in fog. After ordering the two ships to lie-to I investigated their anchor berths to see if they were clear of ice - which they were - and the ships proceeded in and anchored. After a sleepless night I rested for an hour and a half.

Beach plans were delivered by boat at 0730 and by 0830 offloading was started.

Labrador to 'her' channel to see if ice conditions would permit the boat survey, and found they would. A Bell became overdue and I went to look for it. The Officer of the Watch, Lieutenant Webster, spotted a red flare on the beach near Atka Head and there they were. The other Bell, Two Fan its call-sign, provided spares. Apparently all the oil had drained out of 'One Fan'. Sub-lieutenant Fitzgerald in my report for twice disobeying orders during this event. Back to Rowley for the night.

31 August

Foxe Basin

Pogo and No. 1 Motor Cutter lowered and sent away for 2/3 weeks sounding Labrador Channel, and No. 1 LCVP away to shift the fuel cache for *Pogo* to a better spot according to Cavanagh. I left the three boats at it and went back to Rowley and at once the visibility shut down and a snowstorm, our first this year, swept across the bay. The VP had orders to follow us on - it had better wait for improving conditions. Again a worry about boats but they certainly get experience. *Edisto* escorting *Peconic* arrived at 1600. I went over for dinner with CTG and a movie. Odd ship the *Edisto*, an unhappy air. Her captain, Plummer, was Exec. of the *Thuban* last year up here, the ship that made everybody's life miserable, that had a murder aboard, and he was alleged to have prodded his captain into all sorts of situations. Robbie's 'old man of the sea'. Plummer keeps four engines on the line and two at five minutes notice! The despair of his E.O. and I'm not surprised. He will have trouble. Back through the snow in a VP to my happy ship - what a difference.

1 September

Back to our channel there to recover the Motor Cutter, too rough for it to operate, then on to run a line of soundings through Navy Channel, parking for the night in a 'box' west and south of Rowley Island. Have an Infected tear duct in my left eye which causes discomfort and makes me look pretty ugly - more than usual that is.

Reverting to the *Edisto* I was much amused when I intercepted a signal concerning the transfer of CTG's staff from *Donner* to *Edisto* - nine staff officers, 23 enlisted men and ten tons of gear!

When McNeil was away with Dr Swithinbank on ice recce they sighted two whales between Koch and Rowley. They dropped from 800 feet to

investigate but before they could get close both whales disappeared under an ice floe. From what they saw they were identified as belugas. It is a sighting of some considerable significance as whales haven't been reported in Foxe Basin for 40 or 50 years according to Dr Campbell.

2 September

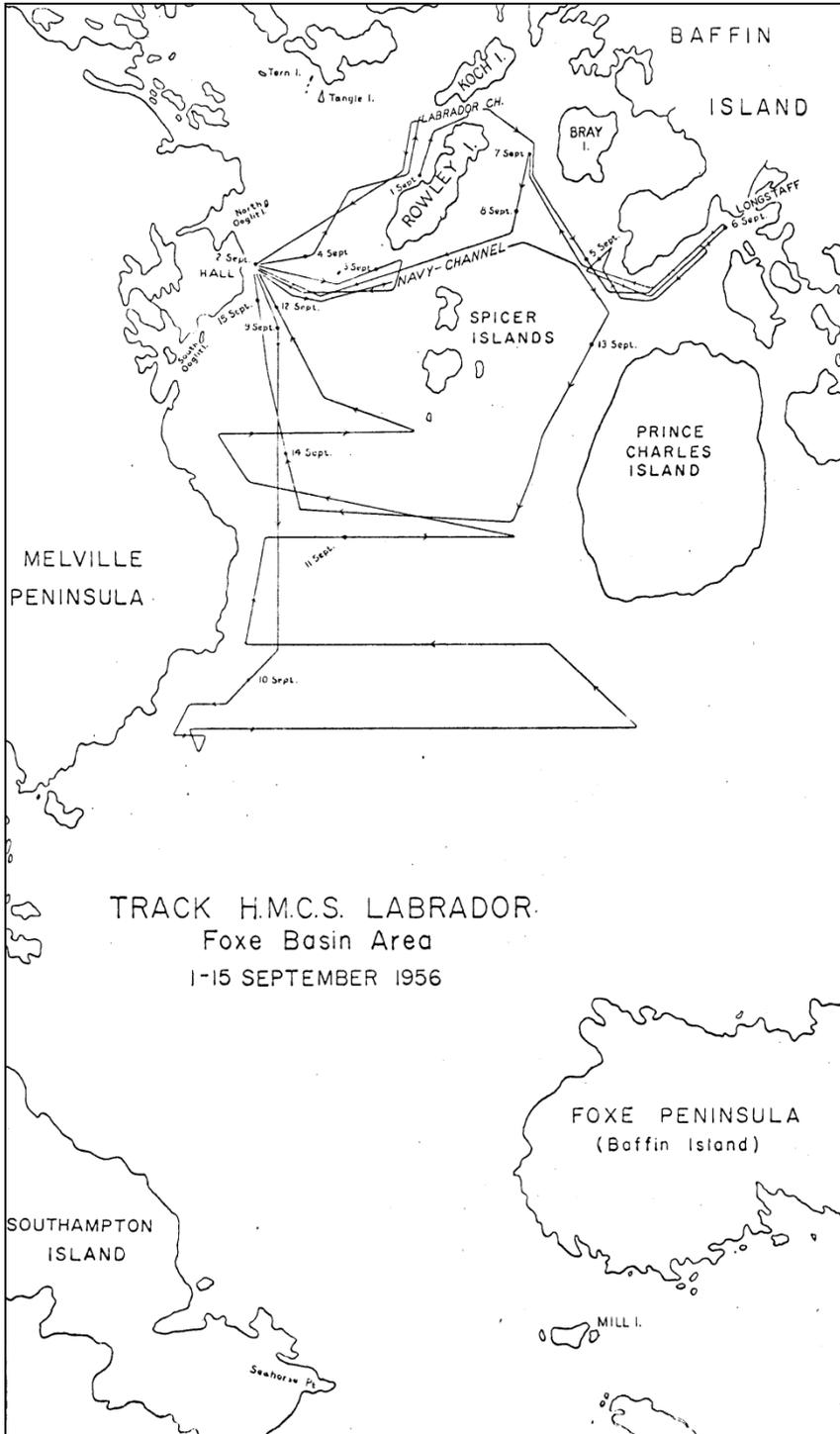
Back again to run our third line through N. Channel. At one stage we had 13 feet under the keel. A record I believe. Got through. Up to Lab. Channel at 1600 where *Pogo* was refreshed with fuel and water and sent away again. We completed the circuit round Rowley getting back to the 'box' of the previous night. *Edisto* under way with *San Marcos*, *Peconic* and *Boyce* en route to Longstaff Bluff and Site 33.

Lieutenant Commander Douglas, RN, making himself unpopular. He handles our men the way RN officers handle their men. This is a bad thing for our men and for Douglas. He has McNeil all worked up by piping 'Flying Stations' without warning at meal hours and other inconsiderate things. There always seems to be someone who has to be slapped down. Yesterday it was Sub. for acting independently or, in plain words, disobedience. Next few days it will be AS Springer for drunkenness aboard. This I will not gloss over either. Abuse of the beer privilege.

3 September

A fresh gale. Short, steep sea and that finished any thought of erecting beacons. An 'Operational Immediate' from CTG 6.3 saying that *Edisto* had one of her main motors U/S and for me to proceed and take over the convoy. I thought something like that was bound to happen. With glee I headed for the position then 35 minutes later came word that he was OK. People who panic and make appeals for help and then backtrack are a blasted nuisance, quite apart from the disappointment in not being able to leap into the breach.

In unpleasant weather ran more soundings in Navy Channel and established a record. The ship slid into shoal water, seven feet under the keel. This is too close by far. Wind Force 5, waves 6 feet.



4 September

Foxe Basin

To Hall to await the arrival of Louis Audette (Tony's uncle), Mr Drury and two RCMP Commissioners. We had hoped to entertain them but when they appeared they did so in a float-fitted Norseman which reported conditions unsuitable for landing and that they were away for Coral Harbour. So that was that. Landed and embarked mail and stood over towards Baird Peninsula through Navy Channel doing more soundings and also oceanography (which is such a long word to write).

The efficient hydrographic section produced an ozalid print of Navy Channel showing the latest track and soundings. We were fortunate to find a good deep trench, so an arrangement was made to rendezvous with Edisto to let her use this latest shortcut.

5 September

This was done and we met at 0130 off Burpee Point on the Baird Peninsula sending the First Motor Cutter over with the charts. As usual the boat was slipped from too great a height but no damage was done. Lay-to for the rest of the night. At 0930 the Seamen Daymen went off with Number 13 beacon and the Wardroom team at 1015 with Number 14. The ship then ran lines of soundings up to Longstaff and back.

6 September

After recovering the Seamen I lay-to off the Baird Peninsula until dawn at which time a very cold, wet, officer's party got back. Both beacons up and considering the conditions they did well. Returned to Longstaff arriving at noon. Commander Steen, C.O. of *San Marcos* (LSD), came aboard. Having had his lunch sharp at 1200 he effectively upset mine until 1400. Gave him our latest charts which he accepted offhandedly as though they were roadmaps. After accepting an invitation to dinner (6 pm!), earlier if I had encouraged him, I sent him off in the Bell. Flew around the anchorage and site having a good look-see and then Lieutenant Webster put me down on top of Longstaff Bluff amid the pre-Cambrian rock and left me [there] with my thoughts -- peaceful and quiet. [Later] Tony and I flew over to have dinner which was a sticky-do. He and his fellow officers did not have much to offer

In the way of small talk. *Boyce*, *Peconic* and *San Marcos* got under way at dusk and with me carrying out soundings we proceeded to Bray Island and Site 32 arriving there at 0730.

7 September

Foxe Basin

At 1415 my two Bells started flying out the VIP's. Vice Admiral Will, COMSTS; Rear Admiral Mason, CTF 6; Captain Ward, CJTG 6.3; Captain Robertson (RCN); Mr Kyle and *Edisto*. The Vice Admiral was impatient to be away almost as soon as he was onboard. It might have been less rude if he had stayed ashore. Radm. Mason was more friendly but also pre-occupied with rushing on. At a meeting, chaired by Captain Robbie, and after the Admirals had been flown ashore, I had sprung on me two surprises -- one, to take *Edisto* with me and go on a recce, through Fury & Hecla, to [the] Gulf of Boothia [and] Bellot Strait to be ready to assist two U.S. civilian-operated tugs and four barges that may be caught in the Central Arctic, [and] to do hydro[graphy] and oceanographic work. The second and uglier one was oceanography to be done by us in Baffin Bay [and] Davis Strait in October in lieu of *Westwind* who has been withdrawn for another job. This would delay our return to Halifax almost into November. There have been hints and rumours about this emanating from U.S. officers but this is the first I've heard and as it effects us within a week, and has been known to U.S. staffs for four weeks, I consider it a poor show not telling me earlier.

Robbie, when he arrived aboard, greeted Kelly on the flightdeck and, in [the] hearing of the men, announced that "we had more work to do and would be late getting back to Halifax". This, of course, flashed through the ship in a wink and put the ship's people 'on their ears'.

8 September

Kept the ships free from ice and then, after being relieved by *Edisto* who arrived at 1600, and after embarking CTG 6.3 and some of his staff, sailed for Hall escorting *Boyce* going via Navy Channel.

9 September

A tiring night. There was more ice than I expected which slowed us down but *Boyce* did very well. Landed our U.S. friends and stored ship -- a lot of our stuff spoiled or pilfered. Finished at 1115 and sailed for Croal Shoal and oceanography.

10 September

Reports reached me that the ship's company [was] seething with rumours and uncertainty as to our future -- thanks to our thoughtless visitors. I have been put in a difficult position too as I have not got the answers. Spoke to the people over the Intercom or S.R.E. and assured them that we would not be mucked about and would return as advertised.

11 September

Foxe Basin

The next 10 hours kept me occupied drafting a signal to FOAC explaining the situation -- sent it off "Exclusive - Secret" to him and am sure all will be well. At 0600 sent away both motor cutters to survey Croat Shoal while we lay off and exercised control. Finished at 1600 rehoisting the boats and pressing on with our oceanography -- by midnight completing a total of 126 stations.

12 September

[The] next day was more of the same and on Wednesday, 12th, I landed Pilot, Markham, Dr Swithinbank and Petty Officer Pilger at Hall for the ice recce flight of Fury & Hecla, Committee Bay and Ballot Strait. That night proceeded via Navy Channel to the Baird Peninsula.

13 September

The following day probed south between Prince Charles Island and the Spicers trying to find a deep water route. At one stage the water shoaled to eight fathoms and less. I stopped and turned west -- it stayed shallow -- no point in going east to[wards] land as it being low-lying, was bound to be

shallow. Finally, after reversing course and then retracing our steps, I got back into deep water.

Before all this we had made ourselves a floating radar reflector which was put in the water just before we lost touch with our beacon on Burpee Point on the Baird Peninsula. It was this floating aid -- called the "Labrador Lightship" -- because it looked like one being made up around a dory, that enabled me to get back onto my track and into deep water, and so therefore paid for itself. Radar ranges of 13 1/2 miles were obtained. By 1600 we were through and heading for Cape Penryn. As a consequence of much signal traffic about our future operations, and wanting to talk to CTG 6.3 about things, I shaped up for Hall arriving there at 0800 on the 14th.

14 September

Foxe Basin

Flew to *Donner* for talks with Commander Ward and of course I found *Edisto* in the corner, and two staff officers. I find talks with these people a trial. They will not, or cannot, relax. Anyway we resolved our problem and I sail on [the] 15th with *Edisto* under my orders. Went in to the beach and talked to the divers who will be flown back to Halifax when their job is finished. Two damaged aircraft on the edge of the runway, one a York and the other a C 46.

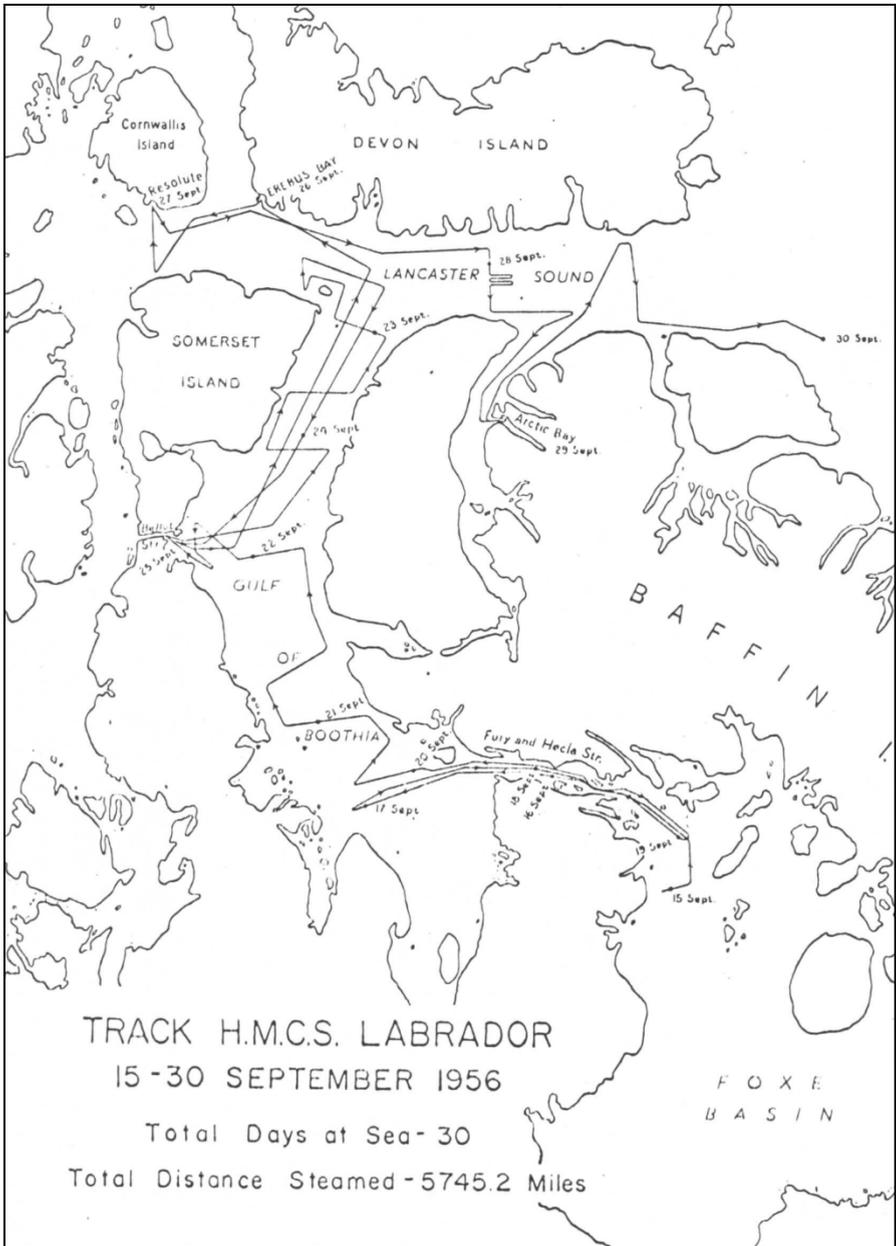
15 September

Hall Beach, Foxe Basin

Busy day embarking gear [&] giving the people a last (for a while) chance to get ashore. *Edisto* and the Commodore for lunch. At 2300, with *Edisto* 10 cables on my port beam, we departed from Hall for the last time and headed north towards Fury & Hecla Strait.

16 September

Early in the morning we started occupying our [first] oceanographic station off Tern Island, finishing the third around 1400 and then, because *Edisto* reported delays in erecting his first beacon, I decided not to wait for him and pressed on into the narrows at the eastern entrance. A most interesting afternoon working our way through past Liddon Island. At last a



break from the flat monotony of Foxe Basin, rocky and interesting, deep water though very 'pinnacly'. Both Bells airborne photographing the first transit of the Strait from east to west. Plaintive signals from *Edisto* having trouble erecting beacons. Cannot meet the 'sked', wail, wail, what will we do now? etc. She drops farther and farther behind. Told her I would erect Number 3 beacon for her and she Number 2 as previously instructed.

17 September

Fury & Hecla Strait

A sunny day off Crown Prince Frederick Island and in less than four hours our beacon was up, flying two Bells and the ship at the farthest point being nine miles off. Through quite heavy ice, the hardest, thickest yet though quite a lot of water. Young ice joining the heavy blocks and floes giving ten tenths coverage.

We chased a polar bear, rather a stupid bear, [which] kept on fleeing from us along our MLA, scrambling over floes, slipping and sliding along the young ice which was like black glass. At one point he fell flat on his tummy, four legs spread-eagled, and whooshed across a wide piece of ice. Then he fell through ... and swam under it, coming up, poking his head through for air, and then down and on. He got mad and stopped, challenging us, then changed his mind and loped off like a great wobbly white pear on legs.

In the 'dogs' we broke out into open water and made all speed across to the Boothia Peninsula doing 'stations' en route. Signal from *Edisto* saying they were using a boat and hoped to be finished by 2030, to which I replied: "Well done, try and force the pace as we are falling behind". I knew this would happen as he has no experience, not that I'm an expert. Glad I got through as otherwise he would try and convince me it was too heavy.

Then shortly after 2100 it happened. An 'Operational Immediate' that he had lost his starboard screw, was hove-to and please come, so at once I was on my way. What bad luck for him and this will throw a monkey wrench into the works. Bashing and bumping taking extra care of our props!

18 September

Gulf of Boothia

At 0500 he was 18 miles away and we struggled on to his position. At 0900 we stopped to run in two diesels so that six engines will be available.

Edisto flew over and we discussed this and that. A marked change in his manner -- very friendly and sincere. Filled him with two hookers of whisky and sent him back after agreeing to a plan. At 1300 we finally got to him after some hefty icebreaking, heaviest stuff yet, 15 to 20 feet thick, huge floes, green, blue and hard. Actually, where he was situated the conditions were good -- quite a lot of open water. I came up astern and then close aboard up his port side, then away we went. A few heavy floes but we got through, then into the Strait, a lovely clear night with a full moon. Through the eastern narrows at 0200 -- a long day.

19 September

Foxe Basin/Fury & Hecla Strait

I sent *Edisto* on alone when in the vicinity of Tangle Island. Exchanged the usual polite signals and then I stood back to the north. Mr Van Dyke, who spent a few days in her, said they all were sure we would not go back again and try it alone. In the area of Tangle we ran into very shoal water-- the echo-sounder was off the paper and even the cathode display merged with the groundwave. It was about 30- 35 feet deep altogether. After an anxious period I worked the ship to the east and into deep water. This done, away to Fury & Hecla for the third time. A fine day and we made good progress.

On passing North East Point on the south shore we flew in a tin containing a document stating what we have done and put it in the cairn that was spotted on the top of the highest rock. Then, at 2100, we left the western entrance and, as the ice was heavy to the westward, I hove-to in a floe for the night ten miles east of Crown Prince Frederick Island and near where lies *Edisto's* propeller.

Today I got a shock when a signal arrived from CTG 6.0 asking for my recommendations for the feasibility of continuing the proposed work in the Gulf of Boothia, Bellot Strait and Prince Regent Inlet, "In view of non-availability of support from any other icebreaker." I had never considered not going on, and still intend to, but this, together with the opinions heard in *Edisto* that we too would not turn back, puzzle me. In my signal to 6.0 I said that *Edisto* lost his prop. in 'heavy ice' -- this was to be charitable to *Edisto*, but in fact I consider where he was lying the ice was loose with plenty of water. He had not reached the heavy stuff through which I had been twice, and would have to go again. Now the words 'heavy ice' have given 6.0 pause

to consider whether I should go on alone. Will delay replying and hope to get through in the meantime.

20 September

Up to the bridge at 0800, dressed warmly for a long session, and started to drive the ship. It was heavy ice, the heaviest icebreaking I've had. Six tenths polar and winter [ice], bound [together] by four tenths [of] young [ice] up to eight inches, so that the heavy stuff would not move away from the ship but was held. Slow going -- one knot, and ever present the specter of losing a propeller. The further I got the more difficult to get back. Certainly the ice conditions had worsened in the last day or so.

At noon I got stuck, my bow into a heavy floe and somehow my stern got around so that a large floe was on either side and right astern. Every time I went ahead she would slide up on the floe and hang there (the ship being so light). My wash, even with six engines, would not move the two pieces, [or] the floe astern of me, clear. I could not turn either to port or to starboard because of the ice on each side, and every time the propellers were put astern (with my heart in my mouth) the bells would ring, lights flash, and they were tripped and stopped by the Motor Room watchkeepers because ice was jamming them. And so there we were with 30 miles or more of the same, cold, with the young ice growing. At noon this day I was really concerned. If not very careful, off would come one or both screws. Visions of wintering-in etc etc.

After lunch, during which time I let Pilot have a go but he achieved nothing, I took him aft on the flightdeck and we had the engines worked indicating what we wanted done by signal.²⁴ In this fashion we could turn the

²⁴ Pullen's note 18: This calls for explanation. In the normal course, with the engines being controlled on the bridge, the motor-room watchkeepers had the option of tripping one or both main motors if the propellers became jammed by ice and there was risk of damage or even loss of one or both screws. They were in a better position to be aware of a dangerous situation than we on the bridge though all of us kept a close eye on floes moving towards the area of the propellers. This system worked well. In *Edisto*, for example, the engine room had no such discretion which is why, in my view the arctic has exacted such a toll of propellers from USN icebreakers.

In the situation in which we found ourselves, the ice was so heavy and so close to the props. that every time power was applied there followed a jam and the motors were tripped and rightly so. I recalled at other times lying on the safety nets which border the flightdeck to examine our blades for ice damage. Because of the clear water they were

screws longer as we could tell better when the props. were going to be endangered. Success attended our efforts and it was a relief to me to feel the ship drive on ahead into, and then through, the floe. Then shortly after that I got trapped again but this time it was not so dangerous. Then into an area of young ice and Pilot took off in a Bell to scout leads for me. This worked very well and we made good time. By 1900 we were through and into open water to my great satisfaction. Eleven hours to go 38 miles and shiphandling all the way.

She is very light and quite high out of the water which reduces her effectiveness. Some of the lee was more than 20 feet thick -- nearer to 30 -- great chunks of blue and green lee boiling up from under the ship, spewing water in all directions. A wearying day but what a feeling of achievement. Sent off my reply to CTF 6 and said I thought conditions were OK and operations feasible. Gave him my position, course and speed and told him what we'd come through but that at the rate the young ice is growing return via that route was by now probably impossible. Repeated to *Edisto* too. Then to bed to have a good night's sleep in ice-free waters.

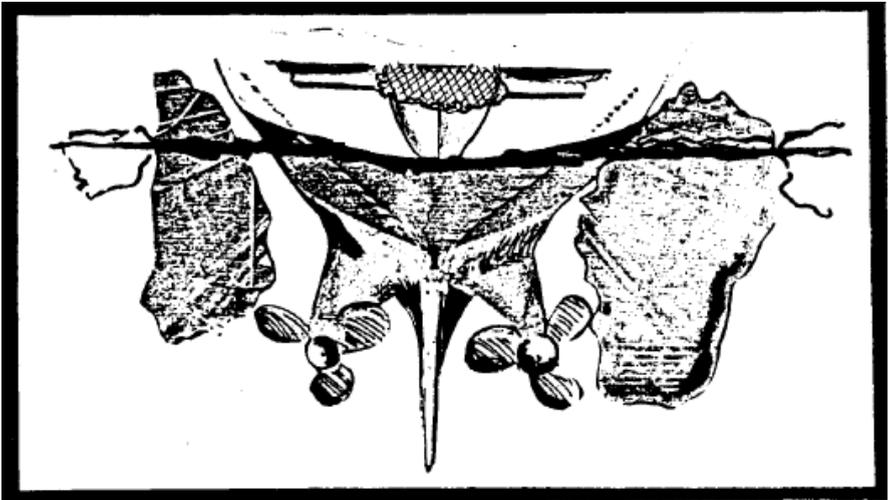
21 September

Gulf of Boothia

Oceanography in southern Gulf of Boothia. Anxious to make northing. To get into Committee Bay is out of the question now without running a risk of remaining there.

Anyway I didn't lose a prop. even tho' they are bent. Oddly enough the port one, which has had a marked "thwump" to it, now has no "thwump" at all. It would seem that we've straightened it out again on this latest sally.

plainly visible. So, taking Pilot with me, we went aft, lay on the nets, each side, having left instructions with the bridge to move the throttles as we indicated, and with the motor room not to trip the motors. In this way we left full power on longer than would otherwise have been possible or even wise, but the thrust maintained over a longer period made the difference. The floe blocking our advance sundered and we extricated ourselves.



A rather poor sketch of what it feels like to be surrounded by heavy ice, and probably what it does look like too.

22 September
Gulf of Boothia

A reply from CTG 6.0: "Your 210320Z Psalm 119 verse 103 Radm Mason" which is "How sweet are thy words unto my taste, yea sweeter than honey to my mouth." What a pleasant surprise, and relief too, to know that our efforts do not go unnoticed.

Approached Ballot Strait at midday -- sent away Lieutenant Commander Hunt in charge of the LCVP to Inspect Fort Ross, the abandoned Hudson[s] Bay Company's Post -- then on into the Strait. Hills covered in snow and low cloud making it look like a tunnel. Lowered *Pogo* and sent her on ahead while I followed. Am glad I did as she reported shoaling water. Twice we moved to the right, and still it shoaled, then left, and ditto. By this time the current was behind me and it was difficult to hold the ship back. After the water shoaled to within 20 feet of the bottom of the ship I felt it unwise to press my luck and withdrew to the east to await *Pogo* who went on trying to find a deep channel. And he did but there is no time to try it. Must get up to Port Leopold and see what ice conditions are like in Lancaster Sound. Recovered both boats and stood away to the north for oceanography. I hope to return when the weather improves and have another go at Bellot.

23 September

Prince Regent Inlet

Early off Fury Beach but the weather was bad, a blizzard was blowing attracting few volunteers for a shore party, and so we stood on and continued taking stations to the north in poor weather. A ship's concert, the third, and me in the front row being blasted at a range of a foot with waves of sound. The microphone broke down and this emergency found the boys wanting for some leadership and some powerful lungs. It finished as a bit of a flop as a consequence.

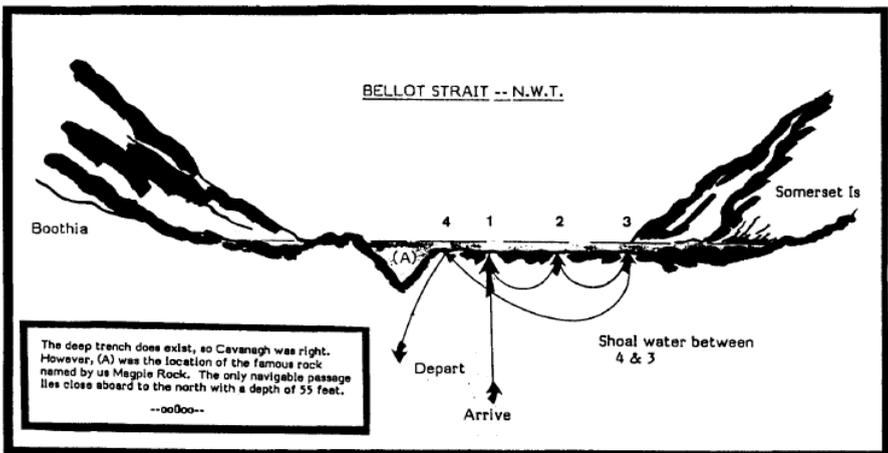
24 September

As we approached Lancaster Sound the sea began to kick up. By morning it was a good gale and the ship leaping and wallowing as only she can. More broken crockery and uneasy tummies including mine. Lay down and slept and felt better. An RCAF Lancaster appeared out of the snow and murk to buzz us after providing information on ice conditions in the Sound, and departed after telling us he would be in Ottawa the same night at nine p.m. Under the lee of Baffin Island and the sea dropped to a calm. Southbound for another crack at Bellot Strait.

25 September

Bellot Strait

Arrived good and early off Bellot and sent away *Pogo* to do another survey. The last time we were here the picture of the channel bottom was thought to like this:



Four attempts to get through frustrated by shoal water.

After *Pogo* returned he said, Cavanagh did, that he felt sure there would be a trench at (A) and on our return would confirm. We would buoy it and we would be through. Well, when we did get back we found the picture [to be] just the opposite. At (A) was shallow and there is a rock over which the water was boiling and frothing at six to eight knots, maybe ten.

The other day, on our fourth attempt, we must have been with feet of this rock and with the current behind us too. I flew over it and it was a sight to make one's blood congeal. We have named it 'Magpie Rock' -- a near miss.²⁵

The LCVP went aground trying to erect beacons. I flew over and visited them. They were happy and eating as usual. Also Fort Ross. At 1600 hoisted boats and departed for the north in the teeth of a moderate gale.

26 September

Erebus Bay

An uneventful run up Prince Regent Inlet and at 1400 HMC Ship steamed slowly in[to] Erebus Bay, and what a day it was. Brilliant sunshine, cloudless sky and the first snow of the new winter on the hills. Cold. To arrive at this place was for me quite an experience as 104 years ago William John Samuel Pullen and Thomas Charles Pullen in *North Star* passed two years. Read through T.C.'s Journal and it makes interesting but grim reading. Once inside McNeil took me off in one of the Bells, first to Cape Riley (632 ft), top and bottom, to look for caches. Nothing. Then eastward along the cliffs, air very bumpy giving me a surprise, then to Caswell Tower ten miles to the east, and back via the valley. Spotted two muskox, circled and landed.

Muskox, when frightened or repelling an attack, form a circle facing outwards. It was quite a spectacle watching those two creatures trying to form a circle with both of them backing into each other. We got out of the aircraft and walked towards them with me hastily loading my .45 as we did so (ten thumbs). McNeil got his picture but from a goodly distance and we retired. Curiosity overcame instinct and the 'outboard' animal abandoned his efforts at being a 'semi-circle' and faced us. They both stared but nothing more. What they can find to eat in that white, frozen, desolate country is a puzzler.

²⁵ Pullen's note 19: A target shooting term --Bullseye, Inner, Magpie, etc. We missed scoring a bullseye by that amount. The suggestion came from Pilot (Harris MacLean) and it was apt.

Off we went to the west to look for Ross's cairn on top of the hill beyond the river Mary. Nothing seen. Then back to Franklin's upper cairn – ditto -- then over to Beechey Island to the main cairn, inside of which McNeil found a brass pipe with a screw cap on both ends. Stamped on the pipe was "RCMP St Roch 21 Aug. 1944" and the names of his crew. It was too cold to study the papers I found inside so we returned to the ship with it to study them in comfort. They were mostly copies, the earliest was 1906 -- Bernier in the CGS *Arctic*. That, and Larsen's papers, were the most interesting. I left a document, a copy of which is in this Record, and we returned and stowed it safely back in its original place.

Then off again to the beach to inspect Northumberland House, the yacht Mary's mast, and the memorial to Franklin, Crozier and Fitzjames, and [also] to Lieutenant Bellot. Scores of old staves and iron hoops lying about. Then back to visit the graves, over to a floe where an old sick walrus was resting and so back to the ship. A fascinating afternoon for me. At 1900 as the sun began to set we stood out of the bay and shaped course for Resolute Bay via some oceanographic stations en route.

27 September

Resolute Bay

By 1030 we were lying-to off Resolute and the two Bells inshore. Local officialdom declined en masse our invitation to lunch but more important we got five bags of mail and I 13 letters. Waited in vain for Lieutenant Commander Ackerman who was not aboard an aircraft that flew in at 1700. At 1735 sailed and headed east by way of Beechey Island where McNeil flew to exchange my deposits with new ones, there having been a spelling mistake of Beechey (Beachey) which I could not abide. My fault, too, I have no doubt. Very unpleasant flying conditions and it got quite dark -not too happy but he did well. By 2120 he was back and off to the east we went.

28 September

Quite a number of icebergs about. To satisfy the photographers I stopped the ship within spitting distance of one while they clicked and clacked to their heart's content. Occupied oceanographic stations Nos. 182 to 185 and investigated unsuccessfully a 'PD' shoal. Then to the south for Admiralty

Inlet and Arctic Bay off which place we arrived at 0900, unannounced, to the considerable surprise of the inhabitants.

29 September

Arctic Bay

Mr Hughes, Dept. of Transport, and his German wife, both received on board We fixed their radio ashore, had the Doctor examine two patients, supplied ice cream for all hands and did a favour by giving passage to a very dissatisfied employee who seized the chance to get out aboard us. Hope he doesn't cause trouble. Departed at 1545, hoisting *Pogo* outside where she had been running lines of soundings, and proceeding north out of Admiralty Inlet and across the Sound to seek shelter from a 40 knot wind from the north.

30 September

Lancaster Sound

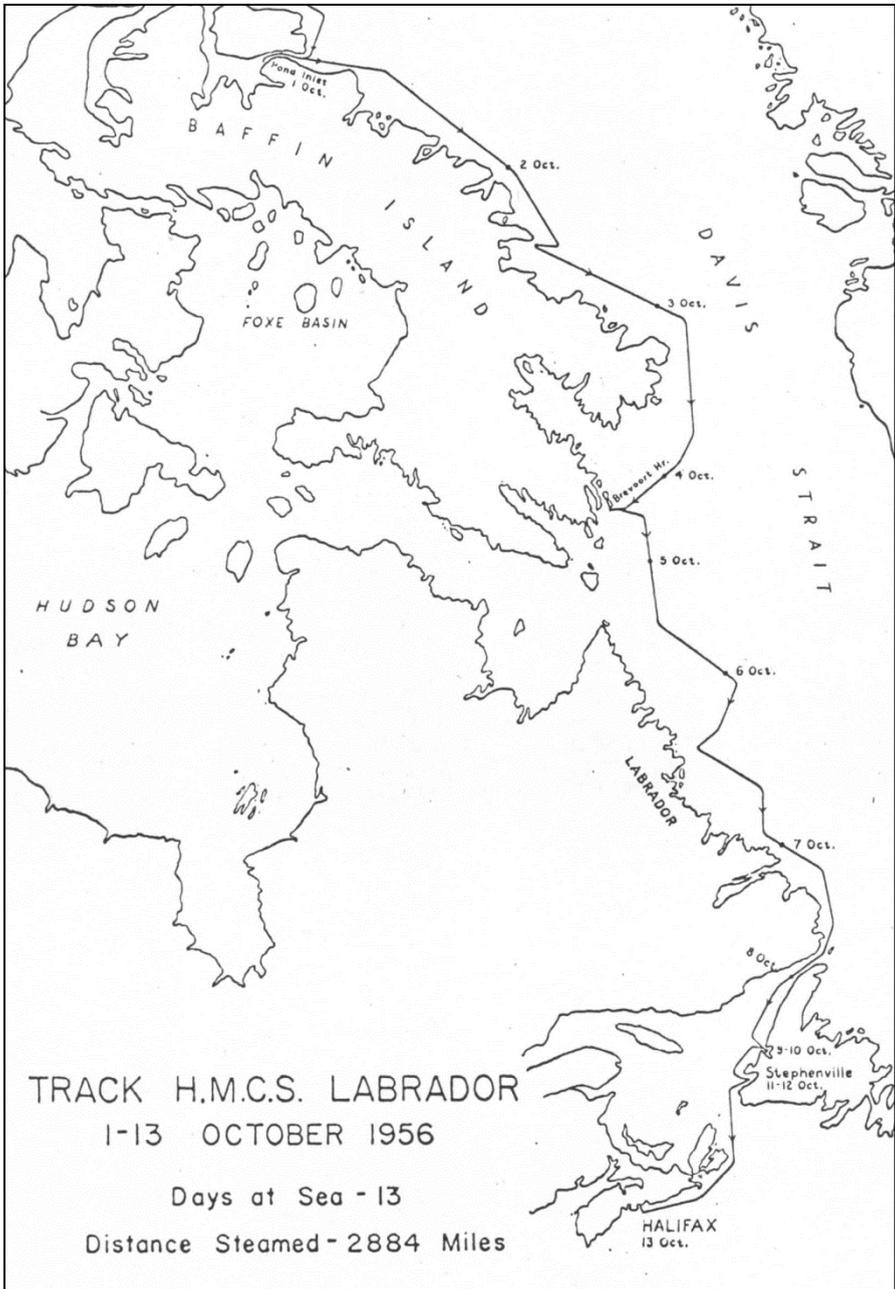
Ran a line of four [oceanographic] stations, north to south, in Lancaster Sound finishing at 1940 and then, because the Met. forecast appeared promising, I shaped course around Bylot Island to do the first of U.S. Hydro's stations but the weather worsened although the Officer of the Watch (Douglas) didn't tell me.

1 October

Rolling heavily with a beam swell and sea. Very uncomfortable. Went to the bridge and altered course in steps to the northeast to try and reduce the rolling. Finally, and sensibly, altered back to the south and ran before the swell and sea and she was steady. Forgot the station and decided to run for Pond Inlet and shelter. Arrived at the shelter at 1400 and stayed until 1800.

One of the projects was Santa Claus (Dan Fairney) being thoroughly photographed by three cameras in a film project which has been the subject of several conferences. By 2100, after landing the R.C.²⁶ priest (who had taken services and who looked like a grey golliwog), and the RCMP constable, we left. By 2100 getting clear of the land and steering a southeasterly course.

²⁶ Roman Catholic.



2 October

Baffin Bay

Southbound and homeward bound, down the long coast of Baffin Island making good time in calming seas. A quantity of icebergs about, they are easily detected by radar, it is the small chunks too low for radar that are a menace. A small chunk can still be hundreds of tons in weight. Enough to bring us up all standing. Good weather in which to write reports and clear up paperwork before arrival, if only the weather will hold.

3 October

Baffin Bay

Another good day. Four engines on the line but the distance made good isn't what it should be due to the damage to our propellers, particularly the port one. This may delay our arrival in Halifax until Sunday a.m.

4 October

at sea and at Brevoort

A low approaching. Increasing wind and sea. Running before it and then altered to the west to make 'our' harbour at Brevoort for shelter. Conditions worsened quickly and at 1600 stood into Brevoort Harbour. Could barely make out the land close by. Anchored with a 60 knot wind shrieking down out of the hills and whipping the harbour water into quite a frenzy. A most uncomfortable set-up but it must have been worse outside.

Put seven shackles on the starboard anchor and put the port anchor underfoot, depth 15 fathoms. Closed up an anchor watch and kept the sea watch ditto. Two engines at immediate notice. That is about all one can do except be in instant readiness to rush to the bridge, or simpler still, remain there. A satisfaction to have a haven to go to for shelter from the storm, particularly one we had surveyed ourselves. A grim night but the worry made lighter thanks to radar, the only real aid that would have made it possible to maneuver with a good chance of not being blown on the rocks.

5 October

Brevoort and at sea

The storm blew itself out during the middle. The winds, gusting over the top of the high hills, and then down the slope into the harbour and out to sea, probably had a boost in velocity due to the funnelling effect, but averaged 55 to 60 knots, gusting to 70. Our anchor held.²⁷ The first time we haven't been under way since leaving St John's on 7 July. When day came it was a shock to see how close the beach was on either side and, most extraordinary thing, our *Labrador* sign which we put up on 'Asiaq Rock' on 18 July and which we have been wondering about ever since, whether it was still there or whether the Yanks might have removed it (most unlikely), or, as one report had it that we got in Foxe Basin, that the heavy swell had removed it. During the morning watch when it came light, Lieutenant Webster, looking through his glasses to see if it was still there, spotted it just as a heavy swell swept up, over, and removed it. A really odd thing we should be on hand at the precise moment it was smashed down.

At least two of our five leading marks have, understandably, been blown down, and possibly a third. We will come back in 1957 and put all this to rights. At 0815 weighed and proceeded to sea passing our sign floating face up. I wonder where it will end up?

On passage. A heavy swell but no sea. We missed the worst of the weather during the night. A case of being 'comfortably worried' instead of 'uncomfortably so' had we remained at sea. Southbound doing oceanography for U.S. Hydro. Making good time.

6 October

Making good time. Pumped out the six heeling tanks and two trim tanks to get the ship up and get her to move a little faster. Captains's Rounds and for the first time prowled into the Wardroom and Ante-room. My findings --

²⁷ Pullen's note: 70 knots = 80 mph. Looking back I wonder whether I did the right thing. If we had remained at sea we would have had an uncomfortable time but there would have been no risk. Once inside that harbour we had to stay and hanging on while the wind shrieked about our ears, and the rocky shore so close though visible only on the radar, was a tiring and worrying business. In fact, the winds were likely less violent out in the open. My concern was that with a ship that behaved so unpredictably at slow speeds, there was no room for us to risk an irremediable sheer in such close quarters.

a shambles and a pigsty. A good shake-up is necessary. Also the Wardroom wine store was in poor shape. The stewards, especially Petty Officer Glazier, all expect 'above average' assessments for promotion -- bitch if they don't get them, and then work in a dirty set-up. Clean up on the outside, hide stuff in the corners.

Sighted two ships astern of us after dark [and] overtaking but they would not answer our call by light. Probably grain ships out of Churchill or sealift ships en route to 'Conus'. Magnificent display of northern lights. Tony Law showed me his 'Cruise Diary', a host of watercolours and some oils. All good, some very so and one in particular of Devon Island which 'clicked' with me and I asked for, and got, first refusal to purchase, if one can do such a thing when dealing in pictures.

7 October

Labrador Sea

A signal from *Eastwind* to tell me they had done the last two stations which I was to have done. A pleasant surprise. So off we go steering direct for the Strait of Belle Isle with no more oceanography. We have done 200 and that is quite enough.

8 October

Belle Isle Strait

Weather worsens. Fortunately I had increased speed to take advantage of the good weather. Up all night driving through steep seas hoping to make the lee of Belle Isle before it got too bad. Succeeded but then the wind shifted and we had it in our teeth all the way up the Strait. Pitching and rolling, diving and shovelling sheets of spray all over the ship. An uncomfortable day. I am weary of it all. Decided to go into York Bay, Bay of Islands, Newfoundland, to anchor where we will get a lee from the westerly winds, get work done and get respite from the leaping and heaving.

9 October

York Bay, Newfoundland

Pilot came nattering, before breakfast, about not wanting to go in (to York Bay) -- Sailing Directions say the anchorage is not good in a southerly wind and the Doctor says he heard the St John's radio say the wind would be southerly etc etc. We went in-- and a good thing too. A beautiful day, warm, sunny, calm and the smell of trees. Anchored in 15 fathoms, 5th shackle at the waterline, starboard anchor. The wind blew hard later in the day gusting 40 to 50 but we were sheltered. Not so had we gone on to Stephenville.

10 October

York Bay and to sea

Quiet and peaceful. Had best sleep for a long time. Woke up not knowing where we were, what we were doing and why so quiet. Much progress in painting and cleaning. In the evening signals in about the USS *Fort Mandan* towing a disabled vessel, the *Lady Cecil*, and would *Labrador* take over as she had been on extended Arctic ops. etc etc. She sailed five weeks after we did -- how extended can one become? As we were in the Bay of Islands, and had time to spare, I said we would take over the tow and proceeded to sea at 2200 to do so.

11 October

at sea and to [Corner Brook], Newfoundland

Overtook *Fort Mandan* (LSD) towing the *Lady Cecil* at 0500 and took it over. From the first, and only, Coston gun until we were under way took 18 minutes. Troubles with our \$100,000 towing winch. Lack of use and therefore knowledge of its peculiarities. Towed with a 6 inch manilla and she followed nicely at five knots. Once inside the Bay of Islands I increased to seven knots made good, and off we went up to [Corner Brook] where we arrived at 1400. My tow had no anchors, and no propulsion and no tug met us. I could not leave him drifting so asked Bowaters if I could park her alongside the *Baybranch*, a hulk. On receiving the OK I stopped and we hauled the *Lady C* close into the notch. In this fashion I got under way and made a wide sweep across the harbour, up alongside the hulk, and stopped. Got very angry as no one thought of getting the flightdeck safety nets up, of

providing fenders, of having an anchor ready, etc etc. We are all to blame -- too long away from needing such things but that still doesn't excuse it. Got nicely alongside and lay-to while lines were passed to *Lady C* at which time I cast off, got my stern out (after a deal of cursing because of 'no fenders'), my bow in and then drove hard astern. The ship really moved. Got a fright as a little harbour craft unseen by me slid under my stern and we narrowly missed ploughing her under.

Swept away at high speed leaving the locals agape and thundered out to sea at 15 knots. Around to Stephenville arriving there at 0130, coming to the starboard anchor, 6 shackles of cable, and then without delay to my bunk.

12 October

at Stephenville. Newfoundland and to sea

Weighed and proceeded at 1030 while the two helicopters waited inshore for the Admiral and his Flag Lieutenant. The cox's'n up as a defaulter for being adrift from Special Sea Dutymen when we went into Brevoort. Pleaded 'not guilty' and made a fool of himself -- Ordinary Seaman-type excuses etc. Got so angry had to stand the case over. He has been a great disappointment - - a garrulous character.

Rear Admiral Bidwell arrived on time and was aboard by 1130 or so and off we went, six engines on the line, homeward bound and getting close.

13 October

at sea and at Halifax, Nova Scotia

Despite our inefficient propellers we made good time and glided up harbour at 1430. A beautiful day, not a breath of wind, clear, warm and sunny. Our largest ensign flapping at our ensign staff, the ship gleaming white and everyone in good heart -- naturally. A large crowd on the jetty and a band. My approach was too fine, damn it, and my bow paid off to starboard spoiling what I had hoped to be a good 'Alongside'.

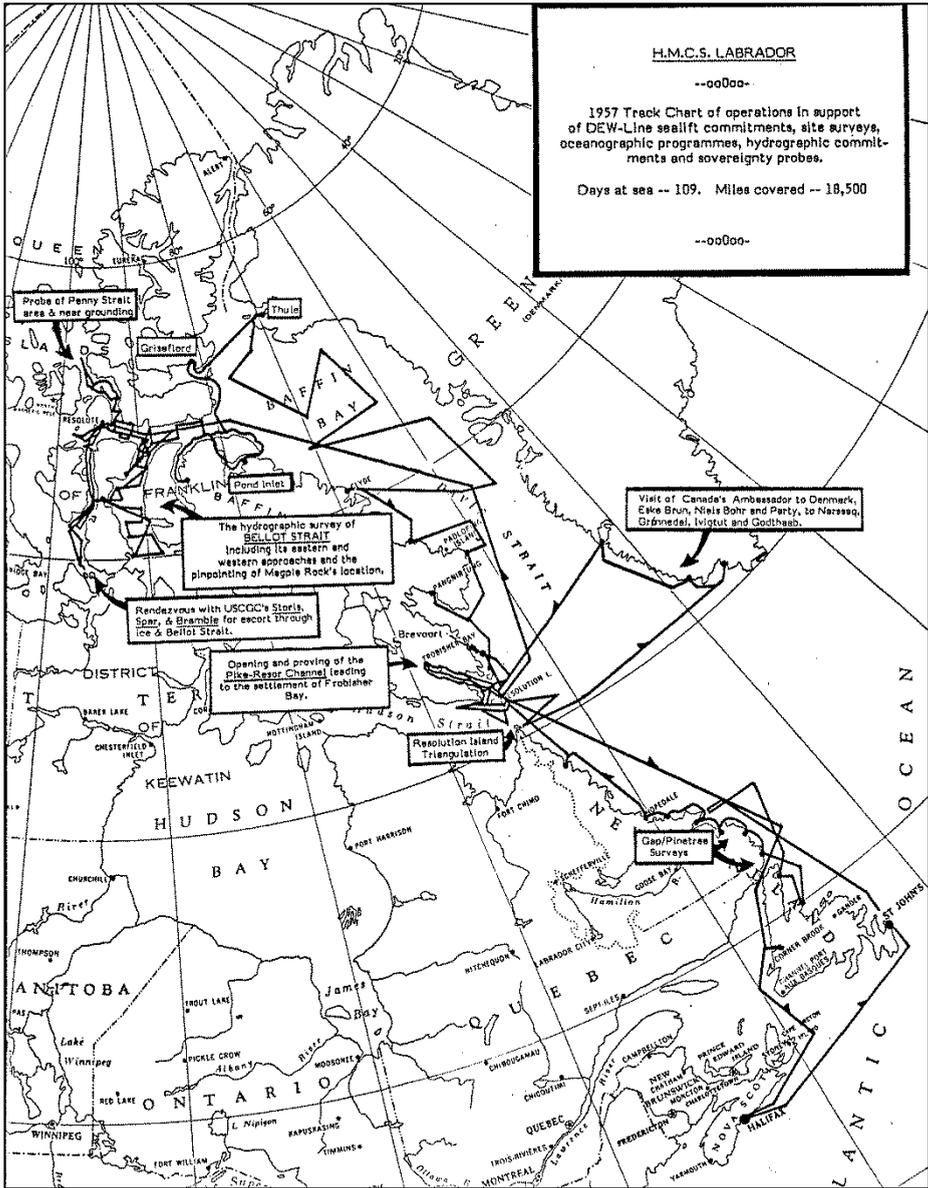
The usual uproar and stampede. The Flag Lieutenant, after being under the Admiral's feet all day, disappeared at the crucial moment. I carried the Admiral's bag to the brow and he carried it ashore. My family were first aboard, and rightly so, but I had to ignore them while I got the 'old man' ashore who was by then in a terrible temper. These situations always seem to arise.

Once clear of the Admiral I was able to greet my family and my mother who surprised me by flying down to see us come in.

And so ends our 1956 operation. 103 days away, 100 days at sea, two days at St John's, Newfoundland, and one night at anchor at Brevoort. Steamed 18,606 miles, approximately 12,000 of which were in uncharted waters. Had several close calls --- the worst occurring in Foxe Basin when we were within seven feet of taking the ground off the southwest corner of Rowley Island, and in Bellot Strait when prudence kept us from attempting a passage which would have seen us on Magpie Rock (named by us). The ice passage off the western entrance to the Fury & Hecla Strait was the worst we encountered. The rescue of USS *Edisto* was another highlight and a satisfaction too. We now remain in Halifax until the New Year, granting leave and losing our identity as a ship.

---ooOoo---

1957 Arctic Voyage



Pullen - Proceedings for June 1957

HBC Archives E346/8/1 vol.2

To Office of Flag Officer Atlantic Coast, H.M.C. Dockyard, Halifax, Nova Scotia

ILR 1926 AW 50

HMCS Labrador

at sea

6 July, 1957

Sir:

I have the honour to submit the proceedings of Her Majesty's Canadian Ship under my command for the month of June, 1957.

During the period 1 June to 24 June Labrador was alongside in Halifax preparing for 1957 Arctic operations. One thousand hour routines on the main Diesels were completed and the three heating boilers, the subject of so much worry and trouble, were worked over once more by the Dockyard.

On the 19th we were moved by tugs to Irving Oil where the ship topped up with 8,000 barrels of fuel. Her fuel capacity is quite astonishing. My engineers have calculated that she carries sufficient fuel which, if put in 45 gallon drums, would require 12,102 of them and if they were piled one atop the other would make a column seven miles high.

On the 21st the ship moved under her own power into Bedford Basin, there to carry out calibrations and to turn over main machinery. All went well and the ship secured alongside again at 1630.

At 1100 on the 25th, after a farewell visit from our Admiral, I took Labrador to sea to start our 1957 arctic voyaging. Aboard were 20 officers, seven civilians headed by Mr M. Bolton of the Canadian Hydrographic Service acting as Chief Scientist, and 196 men; a total of 223.

Once clear of the land course was shaped for St John's, Newfoundland, where we were to embark a U.S. Army representative to accompany us on our preliminary survey of the GAP/PINE sites in Newfoundland and on the Labrador coast. We were also to embark a U.S. Navy officer with a team of photographers and writers. This was a last minute change of plans brought about by the damage to the icebreaker Eastwind, who had burned out one of her two main motors and who had returned to Boston for a major repair job. I doubt we will see her again this season. Her loss reduces the number of

available icebreakers for the eastern arctic to three, ourselves, Edisto and Westwind. This, together with the fact that ice conditions are bad this year, will mean a busy time for all.

At 0900 on the 27th Labrador entered St John's harbour and lay to. I was pleased to note that the leading marks about which I had occasion to complain last year (ILR 1926-408/1 of 8 August, 1956) have been painted and were very much easier to spot.

Commander Focht USN and his band of reporters and photographers came aboard, as did Captain Little, U.S. Army, and 300 gallons of fresh milk. CANCOMNEW (Commander J.H.G. Bovey) also came aboard. After discussions with CTG 6.1 (Commander C.W. Smith USN) Labrador departed St John's and headed north for Hamilton Inlet to take over where the Eastwind had left off.

At 2300 on the 28th radar, then visual, contact was made with two U.S. tankers, the Kankakee and Memphis. The former manned by the U.S. Navy and the latter by civilians under contract to the Military Sea Transport Service. Both ships were waiting at the rendezvous established off Hamilton Inlet by the USS Edisto for vessels awaiting ice escort to Goose Bay.

At 0430 on the 29th with Kankakee in station two cables astern and the Memphis, after prolonged delays and much prodding, two miles astern we moved into the ice. All went well but Memphis would not close up no matter how slowly we proceeded. Inevitably a message I had been fearing came in to the effect that she had ruptured one of her forward tanks containing 800 barrels of bunkers. She had nobody to thank but herself.

The ice edge lying NNW-SSE was entered at 0600 and concentrations very quickly rose to 6-7 tenths block and small floe. After penetrating eight miles a lead was found by helicopter trending southwestward and excellent progress was made for ten miles with concentrations under one-tenth. The lead then curved to the NNW and was abandoned, the ship entering 5 tenths ice, mostly block size. After another eight miles the concentration increased to 8 to 9 tenths, again block and small floe. This coverage was general to the south but was somewhat lower to the north. After six to seven miles, concentration dropped to 5-6 tenths and, in the final ten miles, to 3-4 tenths.

At 1100 USS Edisto came to assist. The last time we had been together was in northern Foxe Basin in September last year when she was minus one propeller after Labrador had extricated her from the heavy ice west of the Fury & Hecla Strait. She assured me that she had two brand new ones and that she

had every intention of hanging onto them this year. With some relish I invited her to take over the escort of Memphis who was, as usual, stumbling along several miles astern of Kankakee and Labrador.

In contrast with Memphis, the Kankakee was very well handled. She is a tanker of 22,000 tons deep displacement and her captain handled her as though she was a destroyer. Always close up and following accurately in my wake -- not easy for a large unwieldy ship as icebreakers spin on their heels making follow the leader difficult. I was most impressed. It was because she was so ably handled that she suffered no damage.

Kankakee was detached at 1700, in less than 1 tenth block, 27 miles west of George Island. Moderate ridging was found in the floes and in the outer 30 miles the proportion of polar ice was quite high. Thickness of winter ice ranged from 4-6 feet and of polar ice from 8 to 10 feet. Only a few puddles were seen but the ice near the inner boundary was much softer than the rest of the pack.

Having seen Kankakee safely off into open water I retraced my steps to rendezvous with Edisto to whom I transferred Commander Focht, USN, and his press team. I also sent over [my] Operations and Diving Officers to probe for information on forthcoming operations. This [work] was done by helicopter and when it was finished at 1900 I got under way shaping course to the south for Newfoundland to commence the survey on the Pine Tree and Gap Filler sites.

It is too soon yet to comment on the morale and spirit of the ship's people. Nearly 60% of the men are new.

Attached as Enclosures are a Diary of Events, a Track Chart, and a Report of Proceedings for Helicopter Utility Squadron Twenty One, Detachment Two, embarked in Labrador.

I have the honour to be,

Sir,

Your obedient servant

[T.C. Pullen]

Captain

Royal Canadian Navy

Commanding Officer

--oo0oo--

Pullen Diary, 25 June-30 July 1957

Copy (incomplete) provided by W.A.B. Douglas

25 June

at Halifax and to sea

Last minute flap and scurry. At 1050 the Admiral aboard to say goodbye. He had a cup of coffee and after some very flattering remarks to me as to my future in the service went ashore and watched us sail at 1100. Turned the ship around and stood down harbour leaving a forlorn group of 'family' on the jetty. The Admiral will, of course, have retired by the time we see these shores again. As the R.N.S. Yacht Squadron hove into view there was my family to blink the car's headlights at me. I know how they must be feeling. Me too. A grim business this. On down harbour and out to sea for our 1957 Arctic operation. 20 officers, seven civilians and 196 men, a total of 223. 17 fewer than last year.

At 0800 I was called at home to be told of a change in plan. The USCG icebreaker *Eastwind* has burned out one of her main motors, involving her return to Boston. A big repair job -- I doubt we will see her again this year. That cuts the number of 'breakers to three and with ice conditions as bad as they are we're in for a busy and challenging time. Ice extends 80 miles off Hamilton Inlet, 40 miles of it ten tenths. Two ships damaged and general disruption to the planned sealift.

We are on our way to St John's, Nfld., direct, to embark the necessary people and then to go up to Hamilton Inlet to help out in place of *Eastwind*. *Edisto*, of last year's memory, is there too. I wonder what shape she is in. The sea is calm and a quiet day passed settling down, washing down, and generally getting used to a sea routine. A silly signal from Canflaglant asking me why I'm heading for St. John's. The originator obviously has not read the 'formers' which would have saved him from falling on his face. I fear CTF Six is going to be worried -- it would be a disaster to lose another 'breaker. I must be careful.

26 June

Calm sea, sun and some fog. Tony furious at the filth in the ship -- much activity shovelling it over the side. The two Bells flying and everybody settling down. The usual line-up of people to grow beards. Chief, Tony and I are considering it. Old T .c. had a beard. It might be a bit of a skylark to try it on. May never have another opportunity and still be 'persona grata' with my wife!

27 June

at sea, at St. John's, Nfld., and back to sea

After rounding Cape Race and making up towards St. John's began to encounter fog and icebergs. A spotty night's sleep, many calls during the middle from Benjamin Ackerman who has no watchkeeping certificate and certainly no confidence in himself. At 0900 entered harbour after an uneventful passage of the narrows. Noted that the two range marks have been painted after I complained about them last year. They were very much easier to see and to identify. Lay-to inside while CanComNew (John Bovey) came off for a brief visit in his fire tug -- and various American officers came off too. A press information team of one Commander USN and two enlisted men for passage to Edisto and a visit from Commander Smith USN, CTG 6 1, to give Labrador some 'gen' on the situation. After landing visitors, embarking 300 gallons of milk and six newspapers, I got under way, had a breakdown and drifted with the N.U.C. balls hoisted for a few minutes, and then tried again, this time leaving harbour without incident and shaping course to the north and Hamilton Inlet.

Edisto reports having got the two damaged ships, Marine Carp and Lindenwald. out of the ice -- also that she is having evaporator trouble, an ominous state of affairs this early in the season. The rest of the day ploughing north at 12 knots on two engines. Gave the officers a few thoughts on shiphandling in ice and the Met Officer (gave) an interesting talk on ice. Worked late preparing for a meeting to-morrow on Operation Bellot.



28 June

A quiet night with no interruptions. Gave a historical review of Bellot Strait to the Wardroom officers followed by the proposed plan and a general discussion. Rounds at 1040 and to my surprise the interior was not as bad as I expected it to be, but still not up to standard. In the afternoon encountered our first ice, a belt of a few miles or so but quite scattered and about five tenths. Douglas is my Ops. Officer and no longer Mate of the Upper Deck. This removes him from direct contact with the men which is a good thing for all concerned. I do not want any clashes to recur. At 2300 made contact with the US tankers Kankakee and Memphis, waiting at the rendezvous established by Edisto off Hamilton Inlet, to be escorted through the ice.

29 June

I cruised about until 0430 (daylight) and then, after a delay because of the slowness of Memphis to get in line and the difficulty in establishing communication with her, I led the way into the ice followed closely by Kankakee (hereafter just 'K'!).

[Missing pages from 29 June to 3 July]

3 July

The survey of Fox was accomplished by boat, motor cutter and LCVP while the helicopters flew about with the hydrographers. A misty, rainy day. Also sent Pogo off for a check run. Everybody busy. Completed at 1700 and under way for Spotted Island, distant 120 miles. More fog and some ice, the former makes it difficult to avoid the latter. As a result, I suppose, of our chat yesterday things went very well.

4 July

Started at 0600 sending the VP into Spotted Is. and sending the helicopters off as usual to help Mr Bolton. Visibility not good, a worry when helicopters are up. Finished at 0945. Proceeded towards Cartwright in improving weather. Arrived 1530 and did the survey this time by air. Lay-to in the warm sun until 1830 sailing then for Cut Throat. Wardroom dined

Captain Little and Mr Perry (sp?), our two Americans. Presented them with a cake complete with 'Old Glory' in the middle. The captain is a pleasant person but a little out of his depth socially and not much sense of humour. More fog but not much ice.

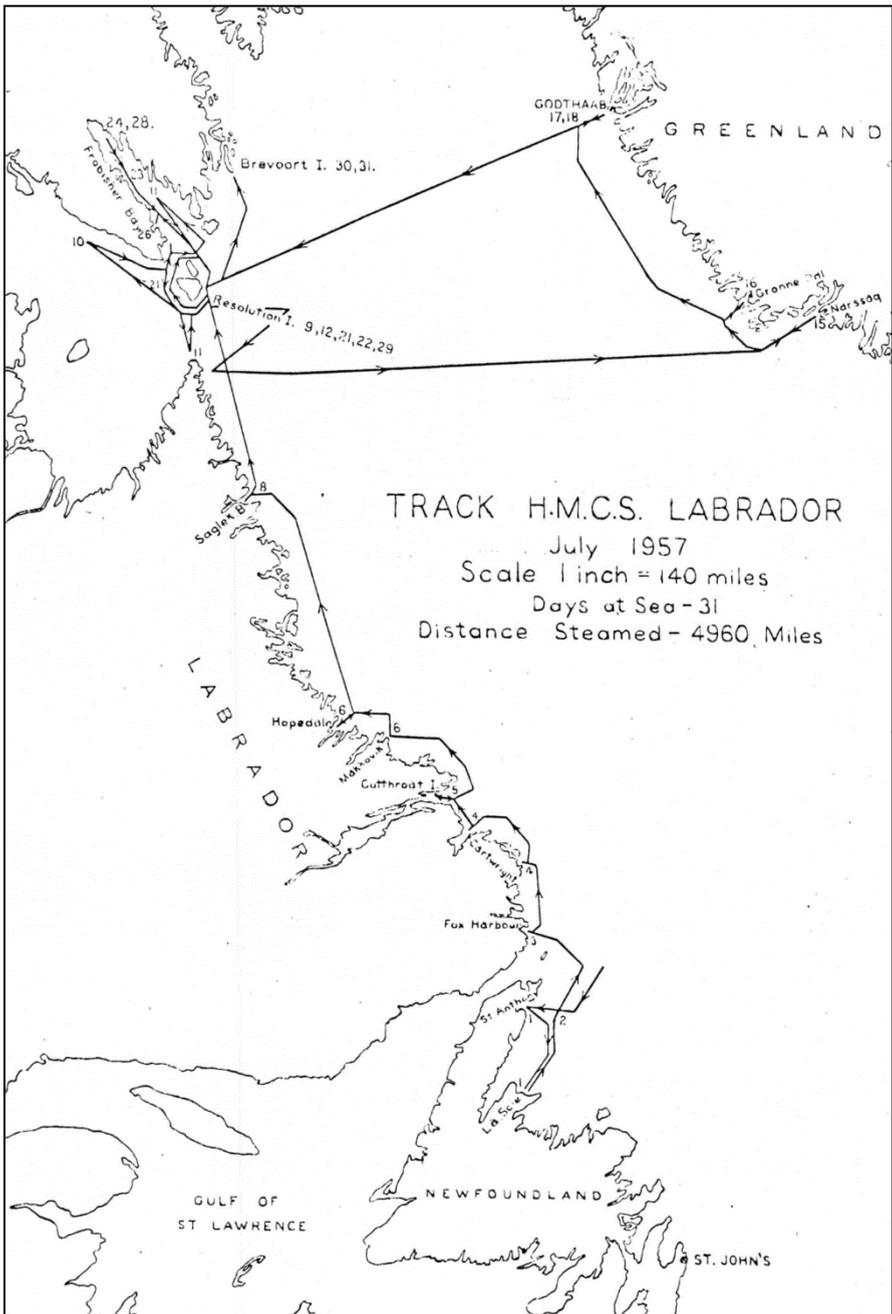
5 July

This day surveyed Cut Throat Island just north of Hamilton Inlet. Because of fog unable to land a mail on Edisto. Disciplinary troubles In the Engine Room Department. Two stokers (EM's) refused to obey an order -- too tired so I gather they want to sleep in during the forenoons after their night watches and etc etc all the other ships do etc etc. This is an 'upper deck' ship they say. There is a suspicion a certain Chief Petty Officer is being incredibly disloyal and putting these two up to it. Certainly someone has been pushing them. In the Arctic its difficult to deal with serious cases.

News in that the Baffin, the new surveying vessel, has gone aground on Black Rock off Le Have, N.S. What bad luck. In dense fog, no more details.² On completion set course for Cape Makkovik, the seventh site on our list. More fog. On the radar Pilot spotted what at first he thought was a lerad in the heavy ice through which we were struggling, then realized that it was a large iceberg and the 'lane' or 'lead' was instead shadow effect. We closed and finally sighted it. A monster and an uneasy feeling to be so close to such an enormous thing. I believe it was aground. I estimated it to be 1,000 feet along one face and almost as much the other side but the vis. was not good enough. Markham calculated that it was about 13,000,000 tons of ice-- too little by far.

To-day Chief and his chaps worked out our fuel storage and came up with a ...

[Missing pages from 5-30 July]



Pullen - Proceedings for July 1957

HBC Archives E346/8/1 vol.2

ILR: 1926 - AW 50
HMCS LABRADOR
at sea
3 August, 1957

Sir:

I have the honour to submit the proceedings of Her Majesty's Canadian Ship under my command for the month of July, 1957.

On the 1st July Labrador was southbound from Hamilton Inlet where she had assisted in the ice escort of shipping destined for Goose Bay. We were bound for Newfoundland and the southernmost of the Gap/Pine sites there to start preliminary beach surveys. (See Track Chart --Enclosure B).

Having been delayed on passage by fog and ice I attempted to reach St Anthony and survey that port first. But there the ice was close pack and the visibility only yards. During our approach, having just put two additional engines on the line, the lookout in the eyes of the ship became markedly agitated and pointing in an urgent manner. Then out of the murk came a vast mass of white, towering above the ship - an iceberg undetected by radar - and we came to a shuddering stop with our stem just short of touching. In fact, in the course of maneuvering clear it was actually touched. Even an icebreaker must treat these monsters with respect. A toppling berg can engulf a ship.

St Anthony being plugged with ice we withdrew to seaward and open water arriving off LaScie (The Saw) the same day at 2000. By noon on the 2nd the work had been completed and Labrador was retracing her steps northward again to St Anthony.

In this fashion the ship surveyed in all ten sites. The aim was to prepare the approaches and beaches for the forthcoming sealift due to follow in a few weeks and also to contact local officials to determine what, if any, problems they had. The following were the sites visited and worked over:

LaScie, Nfld.
St Anthony, Nfld
Fox Harbour, Labrador
Spotted Island, Labrador

Cartwright, Labrador
Cut Throat Island, Labrador
Cape Makkovik, Labrador
Hopedale, Labrador
Saglek, Labrador
Resolution Island, N.W.T.

There was nothing of particular interest involved in this work which took in all nine days. The weather was foul. Rain, fog and not a glimpse of the sun. Navigating off the Labrador coast can be a chancy business at times as the photographs attached as Enclosure C show. At one point in close pack ice the radar showed what appeared to be a lead which is always a welcome prospect to a ship struggling through ice. It turned out, however, that it was not a lead but the shadow effect of a large berg. In fog a ship might steer for what is thought to be open water only to find, possibly with disastrous consequences, that instead she was confronted with a solid wall of glacial ice.

Having arrived off Resolution Island on the 9th at 1400 the clearance divers and other personnel were landed by helicopter. Misty conditions existed and in addition the helicopters reported turbulence and difficulties in landing on the beach at the foot of the 1,200 foot mountain. As flying had therefore to be suspended, and the swell being too heavy to permit handling boats by crane, it was necessary to send a motor cutter away with the balance of the gear for the divers. This operation was finally completed but only after a series of near disasters in lowering and hoisting the cutter. Leaving the divers ashore to do their work the ship left the area at 1700 to proceed up Hudson Strait.

Heavy ice on the 10th having prevented the ship reaching Lake Harbour in the time available, course was reversed and surveying undertaken in the Gabriel Strait area off Baffin Island. To do this the hydrographers were flown to prominent headlands by Bell helicopters taking them with their Tellurometers.

The Tellurometer is an apparatus enabling distance to be measured to geodetic standards provided a line of sight is assured. Radar of 10 cm wavelength is used and hence the method is not affected by bad visibility or darkness. It is easily portable weighing only 32 pounds. System error is in the order of eight inches in 40 miles. This development will revolutionize survey

techniques and many operations which took weeks can now be completed in a matter of hours.

At 1600 while this work was in train, dense fog was seen from the ship to be stealing down over the area and both Bells were recalled. The advancing fog was too quick however and very soon the whole area was blotted out. On East Bluff, which rises sheer from the sea to a height of 850 feet, one hydrographer was stranded and further up the coast were the two Bells. One put down on a rocky islet while the second was caught airborne above the murk. There followed a trying interlude while the airborne Bell was talked down through the fog and homed to the ship before it ran out of gas. When this was accomplished the second Bell took off and was likewise safely homed and brought onto the deck. This left only the civilian atop the bluff.

The ship was taken in under the cliff and during a brief spell of clearing weather Lieutenant (P) D.A. Oliphant flew up in a Bell and plucked the lost hydrographer from his perch. As a result of this experience certain additional precautionary measures were instituted for future flying operations.

On the 11th I probed Frobisher Bay as far as possible without becoming committed to heavy icebreaking. Onboard was a ton of supplies and a canoe which I had agreed to deliver to Ney Harbour where a Dr and Mrs Maclaren are spending the summer doing work on behalf of the Fisheries Research Board. But having got within 40 miles of Ney and 100 miles of Frobisher itself the ice slowed the ship to the point where there was no time to press on.

Retracing our steps the ship arrived off Yellow Beach, near Sorry Harbour, Resolution Island, during the forenoon of the 12th to send in the hydrographers and two Bell helicopters to carry out surveying work during our absence in Greenland. Having landed the party and recovered our divers Labrador proceeded. Resolution Island was still enveloped in fog.

The passage across Davis Strait was also made in fog. Oceanography was conducted en route and during the morning watch on the 15th we made our landfall. Proceeding up Brede Fjord Labrador arrived off Narssaq anchoring in a small bay to the west of the settlement.

The purpose of my visit to this place was to embark the head of the Greenland Department in the Danish Government, the famous Mr Eske Brun, and Mr Feaver, our Ambassador to Denmark. This had been planned during the ship's visit to Copenhagen last April. But since then, and unknown to me, the party had expanded considerably. Mr Feaver, in a personal letter

received just before sailing, had also requested that I embark 'the party' at Narssaq. Available charts gave me a choice of at least three Narssaqs one of which was tucked away on the east coast. It was with a mixture of relief and disappointment that word was received from Pogo in at the beach that I had arrived at the right Narssaq and that 20 people were ready to embark including three ladies.

The expanded party consisted of the following:-

Professor and Mrs Niels Bohr
Ambassador and Mrs Feaver
Ambassador Kaufmann (Danish Ambassador to the U.S.)
Major General Rasmussen (Danish Air Attache to the U.S.)
Mr Eske Brun (Permanent Undersecretary to Greenland)
Commander Rosenvinge U.S. Coastguard (Reserve)(Danish Consul, Boston)
Miss Hirschsprung (Secretary to Mr Brun)
Mr Thomsen (Danish Atomic Commission)

To accommodate this party required considerable veering and hauling in the matter of cabins. Without going into detail it is sufficient to write that our guests were given as comfortable accommodations as possible and Labrador left Narssaq at 1600 the same day.

On the 16th the ship entered Arsuk Fjord securing alongside the jetty at Gronnedal (Green Valley) at 0900. There was a large reception party on the jetty, a guard of honour, and when the Ambassador disembarked a 19 gun salute was fired. I was invited to accompany the party on the tour of the town and to lunch at Ivigtut a mining establishment three miles away. The two communities are joined by road and they have the distinction of being the only two so connected in the whole of Greenland.

During the afternoon we were given a thorough tour of the workings of the Cryolite (Ice Stone) mine which is the only one in the world where the ore is found in so pure a form. Without Cryolite there would be no aluminum and there are only three other spots in the world where this mineral is known to exist at all.

While this was going on my attention wandered somewhat as I watched with alarm while an iceberg, the only one in the fjord, drifted with the current in a bee-line for my ship. It would have gone right onto her had it not gone aground 250 feet abreast the funnel. On my approach to the jetty that forenoon it had been necessary to do so at a broad angle because of shoal water at both ends of the jetty. With the berg sitting beside the ship and blocking our only exit, or so it appeared, we could have been visitors to Gronnedal for a long time.

Leave having been given to the ship's company two men promptly went mountain climbing. One got stuck and could neither get up nor down and 'froze' to the face of the mountain. His companion, luckily managed to get away and rush for help. Thanks to the promptness and skill of the Danes the first man was rescued. He had been hanging by his hands to a steep slope, where a foothold was not possible, for four hours. During this time he had slid 30 feet down the face. When roped up to the top he was on the verge of utter exhaustion and would have had to let go and plummeted over the edge to his death in a matter of minutes.

This matter has been reported on in my 1LR: 36821H of 31 July, wherein I requested that the Danish authorities be thanked for their efforts in rescuing the man concerned.

A large dinner party was held in the evening of the 16th at Ivigtut to which I and some of my officers were invited. It had been my hope to sail at midnight as I could not delay longer if my passengers were to reach Gothaab¹ before having to spend a third night in the ship. Heavy pressure was put on me by the locals to let the celebration go on to two, three, or even four in the morning. Fortunately Mr Kaufmann came to my assistance having appreciated the situation and all my passengers were safely aboard at midnight.

Dense fog had by this time closed in and the only thing visible from Labrador's bridge was the iceberg looming through the mist on the starboard side and the frustrated hosts standing on the jetty on the port side. Having broken up the party it became a point of honour to sail willy-nilly. After some twisting and turning the ship was successfully extricated from her trap and course shaped for Gothaab the capital.

¹ Gothaab was renamed Nuuk by the Greenland Home Rule government in 1979. It remains the capital and largest city in Greenland today.

During our passage to Gothaab we passed a small Danish coaster who dipped her ensign twice. Studying her through my binoculars I asked out loud why the double salute? A voice beside me answered that the second was a salute to the ship. "What," I roared, "was the first?" The voice replied, "A salute to me". The voice belonged to Mr Brun who enjoyed this exchange hugely. Obviously he is not called the 'King of Greenland' for nothing.

We arrived at Gothaab at 2030 on the 17th anchoring off the town. My passengers went ashore immediately after to be accommodated in more suitable quarters. I remained off Gothaab until the 19th giving leave to the men.

Weighed and proceeded at 1000 on the 19th and made across Davis Strait for Resolution Island arriving there at 1300 on the 21st after an uncomfortable crossing.

On arrival off the island, blanketed in fog as usual, a boat went in to bring off people and gear but fog made it impossible to recover the aircraft. The hydrographers had completed their work thanks to good weather during our absence and the availability of the Bells. I also learned that the aircraft had been helpful to the Site Commander in a search and rescue role.

One of the USAF men had left the site, which is atop a 1,200 foot prominence, and gone alone to mountain climb (forbidden) and had not returned. After search parties failed to locate him our aircraft were laid on and Lieutenant (P) D.A. Oliphant located the body. The man had apparently slipped and hung on as long as he was able until finally, through exhaustion, having to let go whereupon he plunged 900 feet onto the rocks below. His broken body was found 200 feet above sea-level. It was the helicopter which found it and dragged it so that a boat might grapple it. The flying skill displayed by Lieutenant D.A. Oliphant working in against the face of the cliff was remarkable.

The next day, the 22nd, I took the ship close to Yellow Beach and with her thus in sight through the murk both Bells flew on. The HUP, which had been trapped in fog at the top, also took advantage of a momentary rift to drop down to the ship and get on deck.

While recovering aircraft Pogo was away sounding the channel between Edgell and Resolution Islands determining that there is a deep water channel through which this ship could navigate.

On the 23rd Labrador made for Ney Harbour in Frobisher Bay. It is a long narrow bay being 800 yards wide at the entrance and four miles to its head. There is no chart but off the entrance we were in 2,000 feet of water and inside the depths varied between 400 and 600 feet. The whole is surrounded by rocky mountains 2,000 feet high.

Our three helicopters airlifted the stores ashore for the couple who are camping alone for the summer. Three volunteers paddled in the canoe portaging it up into the lake which is the scene of Dr Maclaren's work. The couple was brought off to the ship where they showered, dined, and stocked up on various necessaries and luxuries before being returned to their lonely camp. The nearest habitation is Frobisher airstrip 75 air miles away.

After departing Ney the ship parked in the ice for the night proceeding in the morning, the 24th, to Frobisher. After a long slug through the ice we arrived south of Frobisher's Furthest. There is a choice between two passages through the islands. Accordingly an ice recce flight was made which established that Deep Passage and its approaches, which is the usual route, was jammed with ice. So we went through Bartlett's Narrows which is navigationally the trickier, made more so by floes whirling and gyrating in the strong tidal currents, but in the circumstances the only way to go.

Once clear of the constricting effect of the islands no ice was found in the upper bay and we hove to off the airstrip at Frobisher at 2000. At 2130 acting Commodore H.L. Quinn DSC RCN (and mail) was embarked. He had flown up from Montreal to spend a few days to watch icebreaking.

After remaining off the beach for the night Labrador proceeded at 1400 25 July towards the lower reaches of the bay.

On the 25th, intending to progress survey work, the two Bells were flown off with the Tellurometer and the hydrographers. At 1215 a faint voice on R/T was heard by the Operations Room Staff saying that "1 Fan had crashed but both occupants were alright". The second Bell was at once directed to the scene and at 1223 it reported the crash had been sighted, the aircraft was upside down, and that he was landing. Then nothing was heard for more than an hour.

At 1340 a distorted message came in on distress frequency saying that "the only possible approach for a search party was from the beach at the northwest end of York Sound". This was rather ominous.

As soon as it was realized there was trouble the ship was headed in through the ice towards the last known position of the lost Bell. Pressing on into York Sound it was possible to work around to the north and west of the accident and moving the ship in that close ensured that R/T between ship and downed aircraft was strong and clear. Then at 1350 they were sighted at the top of Peter Point mountain which is 2,400 feet high.

The HUP, which had been unserviceable for some time, suddenly became serviceable and was able to take off with instructions to have a look at the scene of the accident but to remain in sight of the ship, not to attempt a landing, and generally to act in a manner calculated to preserve my sole remaining aircraft.

As sailors are not much in the way of mountain climbers, as I had learned at Grønnedal,² Greenland, I was reluctant to commit my people to a climb that, from the ship and from the air recce flown for the purpose, was going to be 'fly on the wall' business. Instead, I banked on the wind dying down during the night permitting rescue by the HUP at dawn the following morning. This was not to be. In fact the wind increased and an attempt at 0500 the morning of the 27th was a failure.

Lieutenant Oliphant however made successful air drops of water, food, rope and other urgently needed items. The turbulence was such the drops had to be made 500 feet above the crest. To get water and hot drinks to the anxious party from that height undamaged presented a challenge. Someone suggested ice cubes which could be melted. Someone else suggested a steel flask from a CO2 fire extinguisher for hot soup. Both suggestions were adopted and were successful. I heard later the soup was so salty the increased thirst thus engendered consumed all the extra water sent.

When the air rescue attempt at 0500 failed I ordered the climbers to land. They left the ship at 0630 and hit the beach at 0700. The Commander went in charge as I did not want their enthusiasm to outstrip their climbing ability.

Then, at 0715, the stranded party reported conditions of calm and that the HUP could safely make an approach. The machine was hastily ranged and at 0730 was airborne. On reaching the summit it hovered and in scrambled Mr Dumbrack and Lieutenant Zbitnew whereupon the EUP wheeled away returning to the ship.

² Kangilínnguit or Kangilínnguit, formerly Grønnedal, is a settlement and the location of a former naval base located at the mouth of Arsuk Fjord in southwestern Greenland.

Refuelling was necessary and patience whilst this was done became trying for dense fog could be seen rolling off the icecap to the west blotting out everything in its path. At 0750 the HUP was off again and ten minutes later was hovering at the top. In scrambled Mr Van Dyck and Lieutenant Commander B.F. Vibert. No sooner had the last-named climbed into the aircraft than it was engulfed by fog. The pilot did not tarry until his last passenger was completely in before moving off. The owner of the dangling legs quickly realized he was not four feet from the rocks but 1,200 feet. He wasted no time in reaching the interior of the HUP.

Having thus plucked the lucky four off the mountain the climbers were recalled and the ship returned to Frobisher there to land the Commodore which was done at 1000, 28th July.

Labrador arrived off Resolution Island on the 28th to embark 500 pounds of mail then shaped course for Brevoort Island with Edisto (Commander J.E. Plummer USN) in company.

At 0700 on the 30th we entered the pack east of the island leaving Edisto to await CJTG 6.3 (Captain R.R. Sampson USN) coming up from the south in the USS San Marcos (Cdr. E.T. Steen USN) and with another LSD, the USS Rushmore (Cdr B.J. Germershausen USN) and the USNS Robinson, a civilian manned ship.

Remembering last year how heavy the ice was off Brevoort I was relieved to find this year it was loose, rotten, and with many areas of open water. Accordingly a quick run was made and the harbour reached at noon. By 1300 work to examine and survey the beach was under way while other parties re-erected leading marks blown down in last winter's gales and made other preparations. At 1800 the ships arrived and unloading operations immediately begun.

I entertained CJTG 6.3, Captain Sampson, his staff, and Edisto, to dinner in my ship on the 31st. This was a successful evening as by 2300 I had received from CTG assurances that a message would be sent to CTG 6.0 recommending that a Bell helicopter be transferred from one of the ships of the task group to Labrador to enable her to carry out the Bellot operation. I was grateful for this evidence of international co-operation. HUPs cannot land on uneven ground and my civilian hydrographers have indicated that they refuse to be winched in and out of aircraft for which I cannot blame them.

The health of all aboard has been good. Morale too has been good but the weather has had a depressing effect on us all. We have had 20 days of fog, ten days which were cloudy and dull and one day of sunshine which might explain why people have been jumping on their sun glasses.

The good work of Lieutenant Oliphant in taking up an aircraft (which had been unserviceable) to carry out recce flights of the 2,400 foot mountain, dropping supplies under turbulent conditions, and finally rescuing the entire party is certainly worthy of notice. This, when taken into account with the good work performed by this officer referred to in earlier paragraphs, indicates he has done a remarkable job. Certainly if it had not been for his gameness and ability the men on that mountain could have been stranded for a long time and might, for want of food and water, been in serious difficulty.

Attached as Enclosure A is the report of the Officer-in-charge of Helicopter Utility Squadron Twenty One, Detachment Two. Enclosure B is a Track Chart of the ship's movements and Enclosure C contains some photographs.³

During the month of July Her Majesty's Canadian Ship Labrador was in harbour one day and at sea for 30 during which time she steamed 4,961 miles. Our aircraft flew 95.8 hours.

I have the honour to be,
Sir,
Your obedient servant

[T.C. Pullen]
Captain
Royal Canadian Navy
Commanding Officer

³ Please see original for these appendices, which we have not chosen to reproduce in this volume.

Pullen Diary, 1 August – 30 August 1957

Copy (incomplete) provided by W.A.B. Douglas

[Missing pages from 1-11 August]

11 August

...the T. as though alighting from a taxi. The tanker people goggle-eyed too and congratulations for my successful diplomacy, crowned by good shiphandling, made by the Commander and other officers which meant much to me after such a rough time. Backed off at speed and swept away to lie off for the night.

12 August

Set off in fog with my two charges and made for the approaches to Deep Passage and Bartlett Narrows. The fog very thick and it stayed that way all day. Ta's radar was U/S so laid alongside and transferred P.O. Dickinson and one other to fix it. All day with the two ships backing and filling, then at 1800 it cleared and I sent off the HUP with Cavanagh and Markham on an ice recce at 1900. Had intended to start through at 2015 or a little later but fog began to roll in from the south. If we were going it was then or wait 'til the next day. So at 2000 gave the word and off we went.

Ten knots, ships well closed up, we swept up towards Frobisher's Farthest. A splendid start (&) I was impressed. Made a graceful sweeping turn and altered to the west in Deep Passage. Once into the ice we (be)came disorganized. The strong eddies undid any good I did in breaking Ice as by the time Ta passed over the spot where Labrador had broken ice, the bits had been swept away and new unbroken ones were there instead. The three ships had a trying time but we pressed on. The visibility was poor and my navigator had a time making out the leading marks. Once to the west of Pink Lady Island, ice and eddies were easier.

The final leg up to Frobisher completed at midnight and by 0100 I was lying-to off Monumental Is. while Tamalpais and Tonti eased into their anchor berths. Tired but relieved to have got the ships in with no grounding or serious lee damage.

13 August

Pogo had found a promising channel between Pike and Resor Islands so at 1000, with Pilot Osborne and Captain Mitchell of Redbud aboard, left Frobisher and ran down towards the entrance to the channel where we lowered Pogo and together we got moving. It went very well and it was not long before we were through. We have found, therefore, a channel which is deeper, wider, straighter and safer than any other of the routes through the upper reaches of the island-studded upper bay. The recommended route for 15 years has been through Algerine and Deep channels which have abrupt course changes, shoals nearby and cross-tidal currents of five to six knots carrying lee which can be a menace to thin-skinned ships. Our new channel has no course changes greater than five degrees, is relatively ice-free, no cross currents and a minimum depth of 23 fathoms and minimum width of 700 yards. The bottom is smooth and the sides give a good radar picture. The channel is 15 miles long and will make future shipping to F. an easy and safe matter.

My two 'friends' were beside themselves with delight and relief at this, but I wondered whether it was all genuine, after all a pilot doesn't like to see his job disappear or even become too easy. At 1700 turned about and returned back up the channel hoisting Pogo at the upper end and then returning to F. where I took the ship alongside Tamalpais's starboard side to take on 2,400 barrels of diesel fuel.

Commander (E) and I went ashore in VP and ice skiff to a little 'do' in the local officers club. Lieutenant Commander Webb, USNR, who I had met in 1953 at the recruit training establishment at Bainbridge, Maryland, met me on the beach to drive us up. Pleasant evening. Returned early and delivered some of the chaps back to their ships. Captain Pedersen of Magga Dan and the Chief Officer of Tamalpais etc. The ship had cast off at 2200 and was lying outside but no difficulty with Leading Seaman Sunderland, the very able cox'n. Chief, the Commander and I had a nightcap and sat about for too long discussing various problems.

14 August

Frobisher Bay

The day passed embarking stores, food and bringing off people from shore. I entertained the Station Commander to lunch. At lunch, Wing Commander

Burnett, RCAF, a pleasant friendly fellow (one would have to be to solve all the problems at F.), also Lieutenant Commander Webb, USNR, the MSTs rep., and a Major Dodd USAF. After embarking the Board of Enquiry from Shearwater, Lieutenant Commander Lyon, Lieutenant Webster, and Lieutenant (E)(AE) Chandler, RN, and Vibert's relief, Lieutenant Murray, also 30 USAF men and 2,000 lbs of stores (including whisky) for Resolution Is., I was too late to make the transit of the narrows by dark so lay-to until 0200 sailing then for the last time from F.

15 August

to sea

Alatna and Redbud did not wait for me but pressed on and transited 'our' channel unescorted, which indicates their confidence in it. By 0530 the channel was behind us and off down the bay we went. Passed Redbud returning to F. with the pilot and exchanged complimentary messages with my two piratical friends (M. & O!).

Arrived in York Sound at 0945 sounding a blast on the whistles to let our three climbers know of our approach. Fog and rain as usual. Recovered all the gear and the campers. They had reached the summit once but it was a risky business. The guns, binoculars, and other odds and ends salvaged, the better Bell reported to be in [very] Good condition.

At 1430 departed (to arrive) off Yellow Beach, Res. Is., at 2145. Dark and unpleasant, icebergs, rain, wind and a bit of a sea running. Sent the VP off to the beach to land the USAF people and stores, thankful for having such a competent cox'n -- Sunderland took two trips to do it. Got a little short with Douglas who hadn't thought of getting the 20 inch light arranged for and who was too slow for my liking in expediting its being got ready and then properly used.

Hoisting the VP was a shambles. The Chief Bosun's Mate trained it clear of the ship's side and then 'Up purchase'. The boat took charge and crashed to and fro, bashing the crane until I thought both it and the boat would be lost. Quite the wrong way to do it. With the boat held against the ship's side the purchase should have been raised and the topping lift lowered until the bow of the boat came against the boom so there could be no chance for it to take charge -- was furious and told the Commander what I thought. Didn't know it then but he was nearly crushed during the performance trying to get

it into her chocks. Once chocked got under way with four engines and head(ed) north at last.

In the dark with ice about, stabilizers out (risky) and doing 15 knots the OOW, Lieutenant Bird, spent an interminable time peering at rpm dials when he ought to have been peering for ice. Told him so and got backchat, so used blunter terms to indicate my wishes. Later I ordered a floodlight on the port crane switched off as we were blinded by it -- more back talk. I then warned him that it had better never happen again; by gadfrey, if it does he's unemployed in this ship. Weary and in a filthy temper. Turned in.

16 August

Northbound in Davis Strait

Northbound and all of us thankful to be away from Frobisher Bay, Resolution Island, and the depressing weather. Messdeck rounds, the ship is certainly cleaner and even the Chiefs and Petty Officers came near to winning the prize of beer for the cleanest berthing space for the first time since I've been in command.

A meeting in the p.m. to plan for Operation Bellot. Details this time and I believe we've thought of everything. By sunset, which was visible, the sky clear and the sea glassy smooth.

17 August

Having crossed the Arctic Circle last night there was a ceremony during the forenoon. King Neptune (C.P.O. Lockett) and his two Ice Worms (Padre & Doc) burst out of the Sickbay at 1030. I welcomed them and turned over command of the ship (handed over the steering wheel) and then they took off and held court. Chief and the Commander very cleverly costumed as was most of the Ship's Company. I did not take part being a stuffed shirt. A quiet sunny day. Wrote up S206's and puttered about.

Thick fog and a glassy calm sea with clearing spells of blue sky and some ice. Slowed down by both. Flew one ice recce but the threat of fog forced it to turn back.⁴

⁴ *Editors' note:* The original diary transcript had this sentence under the entry for 18 August with the note: "A little mixed up -- the previous sentence describes events on the 17th."

18 August

... A good *day* but slowed by a little ice and fog. A good turnout at church. Voluntary church for the last two Sundays produced a sprinkling, mostly Officers and C. & P.O.'s. So passed the word that I expected a full house willy nilly.

19 August

Lancaster Sound

Westward in Lancaster Sound. We all feel that we are in the Arctic proper now. Clear days, no dark hours at this time of year in this latitude. Extreme visibility and magnificent scenery. Arrived off Resolute at 2300 and flew in Lieutenant Commander Vibert for return to Shearwater which is best for all concerned, and Lieutenant Commander Lyons, Lieutenant Webster and Lieutenant (E) Chandler. No mail or stores waiting for us, damn it, and no aircraft to take the chaps out until the 29th. It looks as though mail is going to be infrequent now, both in and out. The C.D. Howe and N.B. Maclean lying in the bay. Why the latter has to loaf around I have no idea. The DOT ships certainly drift about not adding much to our knowledge of Arctic waters.

20 August

Resolute Bay and to sea

A new Bell helicopter landed on for a brief visit -- HUL or Bell Ranger. Three passengers and the pilot. A fine machine, two of those would be the answer for this ...

[Missing page for 20-21 August]

22 August

I got little sleep for thinking of the forthcoming operation and my hopes for good weather. At 0400 buzzed the bridge and got no answer. Visions of no OOW at all and the ship dragging. Crawled up to find Brown, the Senior Engineer, worried that the buzz was not mine and afraid to check for fear of waking me up in case I hadn't called. Poor guy. Clear sky visible to the NE

which was a hopeful sight. Up at 7, weighed at 0730 and headed towards Fort Ross.

Long before this Mr Bolton (and) Lieutenant Commander Markham had taken off in one HUP to recce the Strait while the 2nd machine took the Governor of Fort Ross (Lieutenant Commander Manning) and the Doc. into that place. At 0800 arrived off the peninsula and Long Island where the boats were lowered. The second motor cutter to erect a tide gauge at Fort R., then to accompany Pogo running through the Strait to get four lines of soundings and to establish the western tide gauge party of three. Both VP's away to transport stores and to lay three boat moorings off the Fort.

The Strait and approaches entirely clear of ice and a sunny day to assist us in our first burst of activity. After the air recce both HUPs employed flying the hydrographers from point to point to progress the triangulation work.

At 1600 Pogo and her consort were sighted coming back through the Strait. Lieutenant Norton reported on his return a successful day, no rocks or shoals encountered except for Magpie Rock. This was good news as I had been given to understand there was a rock at the halfway point and there was a strong suspicion that off the western entrance, between Pemmican Rock and the Arcedeckne Islands, that shoal water might spoil our attempt to locate a deep water channel. So once Magpie is charted and a channel past it developed we're 'in'.

A truly remarkable day in that the plans made weeks ago, Phase I and its five parts, went off exactly as planned and without a hitch. A gathering of the chaps at 2100 in my cabin to review the day's doings and to prepare for the next stage or phase. Turned in at midnight and then had a rough time from Douglas as OOW who, every time I dropped off to sleep, called me -- to do with Pogo, and ice, and breakdowns. Finally she was hoisted and that character left me in peace. He riles me, just the tone of his voice makes me squirm. The tide and ice gave him a busy time but he did not call for my presence on the bridge.

23 August

HUP's off at 0800 to complete triangulation work. The approaches plugged with ice and there was also a block in the Strait. This a blow as it put paid to most boatwork and infuriated me, especially as a message came in that Storts, Spar and Bramble, the three U.S. Coast Guard ships, had reached the

eastern end of Simpson Strait and might be heading for Bellot within 48 hours.

The Navigator away at 1000 in a VP to erect [two] temporary leading marks to lead the ship past Magpie Rock. The boat returned after successfully depositing Cavanagh and his yeoman (St John). By noon all the triangulation work had been completed and the hydrographers then applied themselves to the preparation of the boat boards, or field sheets, on which will be plotted the soundings yet to be collected, ice permitting.

In the evening, 1900, the ice cleared from Magpie and so I determined to check the position of Pilot's' transit using Pogo, but she broke down; in fact she has been very tiresome of late. Put the boots to the technical people who got cracking, but not taking any chances of losing a good opportunity had a motor cutter prepared. In the meantime, closed the rock. Quite a sight, the water boiling, frothing (and) swirling as it roared east. Ice spinning and moving very fast, the ship even behaving very skittishly and sheering this way and that.

Pogo was finally reported ready and was lowered. There she sat while the ship was carried by the strong current. Ice came charging in, big chunks, big enough to ruin Pogo, so a panic while the crane was readied. She left the water just in time. I took the ship into calmer waters to the east and we tried again, this time with success, and off went Labrador II with Norton and Bolton to try Pilot's transit before ice made boating unsafe.

I told Pilot I'd give him a bottle of whisky if the marks didn't have to be moved. An involved process because of communications. The HUP landed and remained with Pilot, with its engine running to act as a radio set for him to the ship. Pogo took off and ran to and fro on the transit and to both sides, chitchat being processed in my Ops Room. After two and a half hours it was finished and successfully. I was delighted as now the ship can be taken through. Recovered Pogo, the LCVP which had been placing sounding marks and cutting in their positions, and the HUP. Mr Bolton had completed the field sheets so the day finished on a high note after a shaky start. A late conference to discuss 'The Transit' and to bed well satisfied with progress.

24 August

Bellot Strait

A clear, sunny day, perfect for our purpose. A little lee seen in the Strait. At 0830 Pogo away to lead me past the shoal and the HUP's airborne for

pictoretaking purposes. With four engines on the line, special sea-dutymen closed up, both anchors ready for letting go and the cable party closed up, we started through at 0900 with the sun behind us and a great torrent of foaming water tumbling over and around Magpie Rock. Making good about three knots over the ground -- six and a half plus against us. We forged on. When abeam Magpie out of the east flew a great four-engined USN aircraft stuffed with press people representing NY Times, Newsweek, Time, etc. It

flew in at the most crucial moment. I had luckily insisted that my largest white ensign fly from the ensign staff on the flightdeck, to the annoyance I'm sure of the fliers, so that press photos would not mistake the identity of the ship. As the USN 'craft buzzed the ship my ensign was there large as life.

The deep water channel past the rock is, we reckon, 1,000 feet wide. Quite a tense business, the upper deck stiff with people, even the bridge was crowded by those who had no business there. We got safely by Magpie, the only obstacle, and headed into the Narrows after stopping to hoist Pogo. While doing so the powerful east-running stream nearly carried the ship into shallow water, and possibly aground.

At 1125 cleared the western end and there was much jubilation, and for me, relief. We are the fourth vessel of note to make it [after] Fort James, Aklavik, both H.B. Coy. schooners, and the St Roch, and the first of consequence, drawing 29 feet mean for this transit. Signalled CTF 6, COMSTS, H.Q. and FOAC "Passage of Bellot Strait accomplished -- southbound in Franklin Strait."

Sent away Chief in an LCVP to erect a 30 foot radar beacon on Pemmican Island and then off to the south in glorious sunshine and blue water -- no ice and lots of 'fathoms'. Ran down almost to Cape Swinburne, sent off an Ice recce flight, and at 1600 turned and headed back to Bellot. The aircraft reported good conditions as far as they could see to the south, so I am now able to evaluate the daily ice reports from the RCAF more accurately. They tend to be pessimistic which could put one off. Arrived at Pemmican to recover the 'beaconers' who had completed their 'assigned task' as they say in the USN. The boat came to meet me when it should have stayed in the lee of the land to make hoisting easier -- excuse "they wanted to see the movie". A quiet night doing oceanography west of Bellot.

25 August

Bellot Strait

Another Sunday. Fog and ice spoiled plans to erect boat marks and carry out surveying with the Tellurometer. Lay-to in the entrance to Bellot during the forenoon. Church was well attended -- the men permitted to go in their working rig. The Padre shook me by enquiring if it was necessary to work on Sunday etc etc. I assured him I had no intention of drifting about a whole day doing nothing. What a silly man. A few hours later he was on the beach erecting a 20 foot leading mark.

After a peaceful lunch took the ship east through the Strait. Uneventful except for an exciting few moments getting onto our transit and driving past Magpie. During our passage an RCAF Lancaster thundered through the Strait on his daily ice recce. During the afternoon landed a two-man tide-watching party beside Magpie, a VP in with officers to erect a permanent transit, Pogo away running boat soundings dodging lee floes in the process. So there was plenty of activity. In the evening recovered the boats, Pogo steering 260 degrees to make good 180 in a seven knot tidal stream. When she turned to come to be hoisted Norton reckoned she did 17 knots! Stood out to occupy three stations for Mr Collin, having to break ice to get there.

26 August

Bellot Strait

Returned to renew the boat soundings, sending Pogo off at 0930. A westerly wind at last which will help to clear the ice away from the eastern approaches and make conditions easier and safer for Pogo who could barely make headway against the seven knot stream.

The western tide-pole party burned out, losing everything but one sleeping bag and a box of food. The records lost too. A lucky thing that the HUP made an unscheduled return or they would have had a thin time of it for a few days. While the ship ran lines of soundings in the outer approaches Lieutenant Oliphant flew Lieutenant Commander Douglas and me in to inspect Fort Ross. Good to be flitting about again in the air. As we approached the 'Fort' Oliphant climbed, I wondered about this, and then he asked if he could do an auto-rotation. At least he asked which is more than Sub-Lieutenant Fitzgerald did to me last year. And so all at once the aircraft

dropped like a stone, my stomach not accompanying it, quite a thrill. At the bottom we recovered and went in to land.

An enjoyable few hours accompanying the 'Governor' around his estate and in the buildings which were in a good state of repair, warm and everybody looking comfortably settled. Examined the cairn nearby and read all the papers, some of little interest, Larsen's record of St Roch's activities being the most interesting.

Took off with Lieutenant Murray for the return, had a look at Magpie Rock, and the tide watchers, who were 'out'! Buzzed Pogo and then explored Kennedy Harbour and found what I was looking for, a cairn on the very top of Mt. Walker (el. 1,200 ft. approx.) but, because of turbulence, a landing could not be attempted. Returned to the ship.

In the evening an unsuccessful try at tying in the Bellot Survey to the Boothia Shoran station.

At midnight replenished Pogo, sent away an LCVP and a motor cutter, and then departed for Resolute. I have quite a few people spread about the place now, but there is nothing much for the ship to do at this stage so I might as well try and circumnavigate Somerset Island, that would be a first, by going back to Bellot by way of Peel Sound.

27 August

A flood of congratulatory signals pouring into the ship or so it seemed. Every so often the Yeoman, Petty Officer Billard, would enter the cabin with a grin a mile wide on his face (where else would it be) and hand me the paper straight off the teletype machine. First from CTF 6 on the charting of the Resor-Pike Channel in Frobisher Bay, then COMSTS on the same subject, then CTF 6 again, this time on Bellot, followed by Canavhed, Canavus and finally Canflaglant and COMSTS. I had best be careful lest I get too puffed up with smugness and fall flat on my face.

To HMCS Labrador from CTF 6

The charting of the channel between Resor and Pike Islands by HMCS Labrador removes a major hazard to ships transiting Frobisher Bay. Your discerning the need and seizing the opportunity while accomplishing assigned duties, and coping with unforeseen operational problems, was a very fine example of initiative, resourcefulness and professional competence reflecting great credit on the Royal Canadian Navy. Please

convey my appreciation and congratulations to your officers and men. Well done. RADM Roy Gano.

To HMCS Labrador from COMSTS

For Captain Pullen. While at Frobisher during my recent operational inspection of MSTs Arctic Operations I was pleased to learn through your letter to Commodore Robertson of your very recent development of a new and significantly better channel in the upper reaches of Frobisher Bay. Use of this deeper, wider, straighter and safer channel will greatly facilitate shipping into this port where previously known approaches have been difficult and hazardous. The Military Sea Transportation Service realizes more than anyone else the great significance of your contribution to safer navigation in this area since we have had two serious and costly groundings in Frobisher Bay by USNS tankers Wacissa and Caney. My congratulations to you and your Officers and Crew for your continued outstanding operations in developing the Arctic sea lanes. Well done. Vice Admiral John M. Will, USN.

From Canflaglant to Labrador

My heartiest congratulations on your splendid work this summer including the transit of Ballot Strait and the charting of the channel between Pike and Resor Islands. I am most grateful for your extremely kind message and hope you will let me come and congratulate and thank you in person on your return to Halifax.

From COMSTS to Labrador

Again I am pleased to send Labrador my congratulations and another 'Well Done'. Your transit of Bellot Strait without incident is one more forward step in the establishment of the existence of a deep draft escape exit, important in Arctic re-supply of Canadian and US defense efforts.

Vice Admiral Will.

From Canavus to Labrador

Congratulations. Labrador again proves the experts to be wrong by traversing so-called unnavigable channels at Frobisher and Ballot.

From CTF 6 to Labrador

The first deep draft passage of Bellot Strait will be marked in history and adds yet another feather to the well decorated cap of HMCS Labrador. Well done. Admiral Roy Gano.

From Canavhed to Labrador

Naval Board notes with pleasure CTF 6 and COMSTS and the early transitting of Bellot Strait. The continued meeting of assigned tasks and undertaking of unassigned projects of such significance as the survey in Frobisher Bay reflect great credit on the Officers and Men of HMCS Labrador and their Civilian collaborators.

--ooOoo--

Repeated a line of oceanographic stations in Prince Regent Inlet and then closed Fury Beach where, while the ship hove-to, Lieutenant Murray flew me in to have a look-see. At first we had no luck. Nothing in sight then we made a final cast to the south and spotted an anchor on the edge of the beach. Landed and had a good prow. Four anchors, two very large Admiralty Pattern, Fury's bowers, some iron cable, rope, two rusting cannons, ice saws, nails, barrel hoops, deadeyes, blocks, spars, coal, punctured cans, broken glass etc etc. This part is fairly well known and there have been frequent visits. Spotted some expended .22 shells which certainly didn't come from Fury. Poking about I lifted a board and a lemming jumped out and fled. I was startled and said 'There's a lemming'. Murray, who had no notion of what a lemming was, reached for his pistol in case we were about to be attacked. Staggered over to the HUP with three cannon balls (25 pdrs), an ice saw etc and returned to the ship. We captured a second lemming and this one we took with us. It was good fun and it is a great satisfaction to have Murray again, full of enthusiasm and good spirits instead of dreary old Vibert, the prophet of doom.

28 August

Douglas roused me up in the Middle announcing that close pack was ahead, that we would become involved in heavy icebreaking etc. He seems to call me more, and to have more problems, than all the other OOW's combined, not that there are very many. After a question and answer

exchange through that smelly voicepipe I agreed to heave-to for the night, but luckily I then stirred my stumps and got up. Good thing too. Close pack indeed, and so off we went trending NE to N to W to make an offing from Prince Leopold Island, the going relatively easy in soft floes. Douglas came to me later saying he never seemed to do the right thing or to be able to please me. He is partly right but part of it is the uncomfortable feeling I have when he is about and also the crabbiness of captains which he cannot understand.

To and fro in Barrow Strait doing oceanography. Passed quite close to Beechey Island -- it was covered in haze. Will make a proper visit later. Tony gave me a watercolour of the ship going through Bellot Strait which was most generous and thoughtful. I could not have a finer memento of one of the high points in this ship's achievements.

Markham in with a dreary met forecast & a big mess bill! My wine expenses 'way up after comparing notes with Chief and Tony. Hovey and I will have to reduce the amount we ladle out to my thirsty guests.

29 August

Embarked 300 pounds (of) mail at Resolute then off to do oceanography to the west during the day while awaiting a second aircraft. The OOW and Pilot got the ship well into ten-tenths heavy ice west of Griffith Island. I blamed Hunt for this piece of stupidity. I finally got so exasperated with him that I took the ship as time was passing and it was also my concern to hang on to the propellers. After a good deal of backing and filling we got clear-- then blow me if a little later he didn't drive straight into a huge floe with a very 'hard centre', and tried to go through when there was open water all around the edges. So I was sharp over that too. Ice frustrated our plans so went back and lay-to off Resolute.

An odd request, 'en clair', to me from the Station Commander, an RCAF Squadron Leader, for a bottle of rum. The answer to that was no for at least three reasons -- a dreary sort of day, after a sunny start; and a Markham low approaching.

30 August

Barrow Strait

After waiting all night the aircraft did not arrive having turned back to Coral Harbour for some reason. By 0700 moving out and by 0800 we were

well on our way across Barrow Strait. Fog and ice, the going fairly hectic. Four engines on the line with two at ten minutes. By noon the ship was ploughing quite easily through ten tenths ice three to four feet thick off the entrance to Peel Sound. Two polar bears sighted to starboard, ambling along on a parallel course. They took fright and increased speed, turning away and galumphed off into the fog.

Just when I expected to come upon the heaviest ice instead we reached open water and the visibility improved too. An uneventful run down Peel Sound in deep water and no ice to impede our progress.

Commander reported a violent discussion in the Wardroom about watchkeeping -- involving Douglas. A poor show in front of our USN Commander. An unpleasant session with D. I tackled him on this and in a twisty flash he was telling me how unreasonable I was on the bridge to him and to all the watchkeepers, that they were all afraid of me, terrified to call me etc. That I had changed ever since the York Sound trouble. This splendid example of a red herring went on and on while I listened in growing amazement. Put the interview back on the rails and made it clear to Douglas that I did not approve and after a few more snarls dismissed him curtly. I loathe those sessions. He has been quite a trial in this ship.

While all this was going on the ship made good progress down Peel Sound, the least depth recorded was over 90 fathoms. As far as we can determine only two vessels have ever been down Peel Sound before. The first was the Pandora, Captain Allen Young, in 1871 (he almost reached the latitude of Bellot but bad weather forced him to withdraw to the north), and Roald Amundsen in 1903 in the Gjoa.

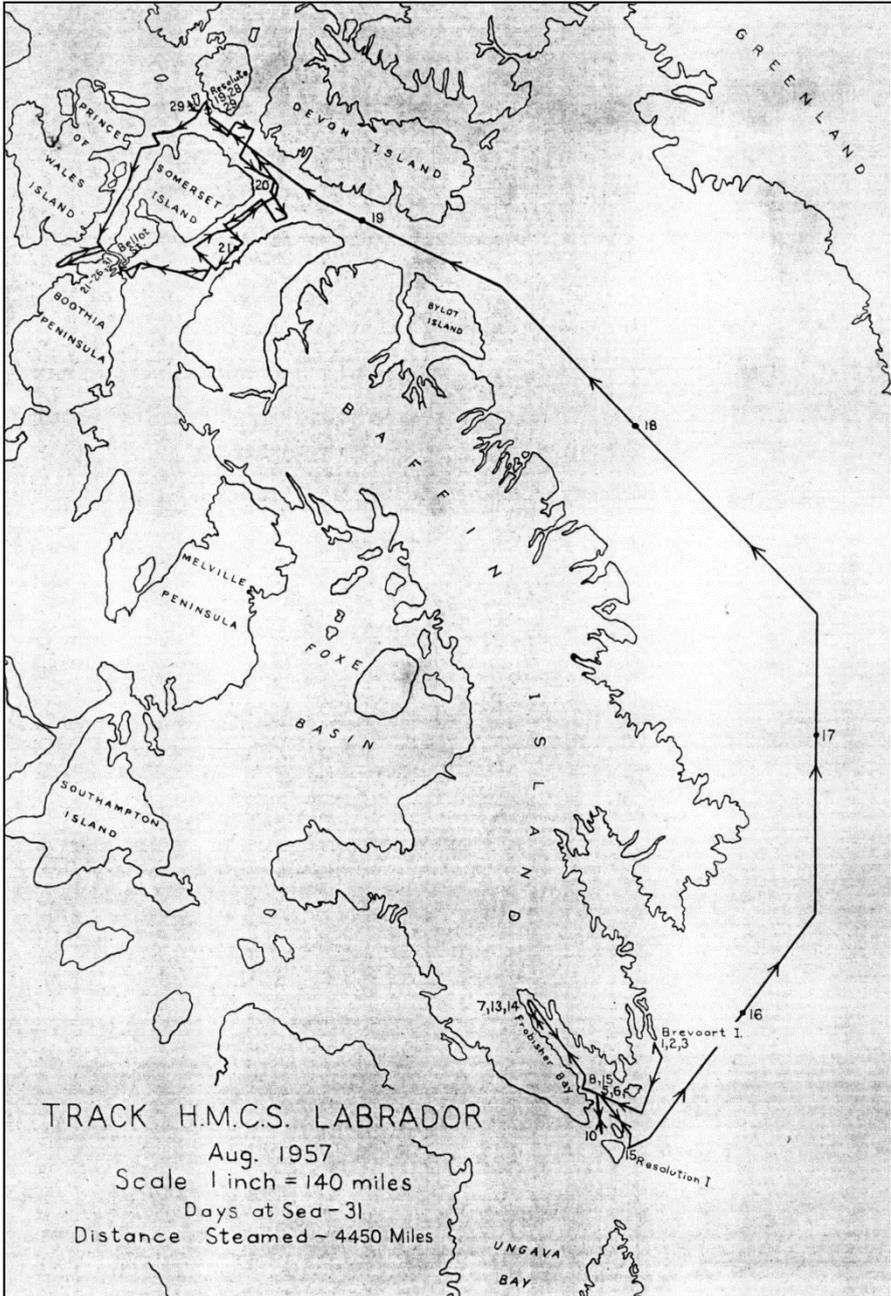
During the early part of the First we came upon a floe measuring 100 yards by 150 yards covered with boulders. We closed and laid alongside to have a good look. It was, we believe, a piece of an ice island, maybe from Ellesmere Is. though how it got so far down Peel Sound is a mystery. It was very old, gray and hard. Its height above water was maybe five to ten feet but it extended 40 feet, possibly more, deep. A great blue/green mass of ice, so low a ship's radar might miss it in fog. Any ship that struck it would suffer terrible damage. An ugly customer indeed. After the crash and clatter of camera shutters ceased we proceeded.

31 August

Bellot Strait

Lying off the western end of Bellot. Sent in a VP with a party to secure the beacon on Pemmican Island permanently, which was done. Fog closed in forcing Murray and Pilot to land in a HUP while attempting to progress survey work. Murray finally attempted to return and used the VP to lead him toward the ship and to act as a horizon. He got on safely. After replacing the western tide pole party and reprovisioning them we stood into the strait at 1315 to make the fourth transit. No ice in the western half but heavy in the eastern half and this time we were going with the full eastgoing flood. We were swept past Magrie Rock at a tremendous speed. Over the rock itself the water was frothing and swirling while great chunks of ice were flung about as they bounced over the shallows.

Norton, my very efficient hydrographer, reported the rock is about 200 feet in extent (&c) much larger than we reckoned. It was exciting but I doubt if I'll try it again, especially using a back transit with the ship twisting about so. Once in relatively calmer waters there was much coming and going in boats. Pogo had done well having run lines of soundings three cables past Bell Island.



Pullen - Proceedings for August 1957

HBC Archives E346/8/1 vol.2

ILR: 1926 - AW 50

HMCS Labrador
at sea

10 September, 1957

Sir:

I have the honour to submit the proceedings of Her Majesty's Canadian Ship under my command for the month of August, 1957.

On the 1st August Labrador was in the Brevoort area of East Baffin carrying out survey work while employing Pogo (the 36 foot Sound Boat) in running lines of soundings in critical areas. At 1000 Edisto (Commander J.E. Plummer USN) departed for Cape Dyer, taking CJTG 6.3 (Captain R.R. Samson USN) and his staff, leaving us to look after the sealift ships.

In the afternoon HMC ship closed the Lady Franklin Islands to send hydrographers ashore in a landing craft (LCVP) with their Tellurometer to obtain an accurate distance measurement of those small islands from Baffin Island. After dodging ice floes and keeping a sharp eye on a polar bear in the vicinity, the information was obtained and by 1900 Labrador was back off Brevoort.

At 0300 on the 2nd the ice escort of the LSD USS San Marcos (Commander E.T. Steen USN) and the USNS Robinson (civilian manned cargo ship) was undertaken. The going was easy and good progress made until we were within three miles of open water when the Robinson, bringing up the rear, dropped back and got into difficulties. After getting San Marcos safely out Robinson was cut loose and led clear of the ice at which time both ships departed for Cape Dyer their next cargo unloading port. The day being fine and sunny Labrador returned to Brevoort to land recreational parties, re-erect and paint leading marks, and to run additional lines of soundings.

In the evening the USNS Nodaway (a civilian manned T-2 tanker) was escorted through the ice to Brevoort arriving there at 2100.

At 1430 on the 3rd cargo operations at Brevoort were finished and the escort through the ice of the USS Rushmore (Commander B.J. Germerhausen USN) and the Nodaway was undertaken. All went well until the Rushmore lost steam bringing the party to a halt. When this happened a second time it appeared likely I would have to tow her out and preparations were made accordingly. This did not become necessary however as Rushmore was able to make repairs and maintain headway. Thick fog closed in but the three ships continued on their way maintaining good station and keeping commendably silent on the R/T. At 2130, open water having been reached though the visibility remained nil, the two ships were detached for Cape Dyer while Labrador set course for Frobisher Bay carrying out oceanography en route.

[York] Sound, the scene of last month's disaster with our helicopters, was reached at 0800 on the 5th and an aircraft salvage party of 14 men under the charge of Commander C.A. Law, DSC, RCN, was landed. The aim of the party was to investigate a suitable route to the top of Peter Point mountain (Elevation 2,400 feet) to salvage as much gear as possible and to determine if the lesser damaged aircraft could be put in a flyable state or possibly both machines prepared for airlifting out by HUP or H21.

We departed [York] Sound at 1100 leaving the party established ashore full of hope that they would achieve great things. The camp and mountain were both invisible in rain and fog. Proceeding to the westward of Edgell Island a rendezvous was effected with the USCGC Eastwind (Captain R.F. Rea). I took Labrador alongside where we remained for one and a half hours.

One thousand pounds of stores, one HUP, and one Bell (HTL 5) were transferred from Eastwind to Labrador. The HUP had been picked up in Halifax when Eastwind was northbound. The Bell was a loan from the Americans to this ship to offset the loss of our two Bells. There was much coming and going between the ships and everybody enjoyed seeing new faces. Having operated with both Edisto and Eastwind there is no doubt in our minds now that the white paint of the latter is far preferable to the drab grey of the former.

At 1530 I maneuvered clear and both ships went about their business; Eastwind to the north to Cape Dyer, Labrador to York Sound to check on our campers.

Arrived York Sound at 0900 on the 6th sending in an LCVP to check on matters. The party was found to be wet and cold. They reported a night of

driving rain and high winds and fog. The glacier tents had leaked and half the party using these were wet, cold and something less than enthusiastic. The ship provided a different type of tent and other necessities. About the only news from shore was some strong talk about Tents, Glacier, (which are not meant to be waterproof in any case) and that the Padre had created a bit of a stir by eating sandwiches made of sardines and honey.

Departing York Sound the same day at 1430 shaping course up Frobisher Bay. At 2100, when off Ney Harbour, I sent an aircraft (the USN Bell) in to check on Dr and Mrs Maclaren (para 12 of ILR: 1926 - AW 50 of 3 August, 1957, refers). Gossip certainly gets around the arctic as the first question asked of Lieutenant Zbitnew when he got out of his machine was, "Where did you get the Bell? We thought you had lost both of them."

After lying-to off Leach Bay for the night Labrador proceeded on up the bay on the 7th having lowered Pogo south of the islands to do more surveying. Arrived at Frobisher by way of Deep Passage at 1300 embarking mail and lying-to for the night. Since our last visit the upper bay had become clogged with ice making unloading and boatwork difficult.

At 0900 on the 8th we left Frobisher and once through Bartlett Narrows (in fog) and into the relatively safer waters to the south, Pogo was hoisted and the naval and civilian hydrographers reported the discovery of what was thought to be a far better channel into the upper bay. Labrador stood down the lower bay arriving once more at York Sound at 1930 on the 8th. The campers reported no let-up from the wet, cold, and rain. The mountain had not been climbed - in fact it had not even been seen.

The next day, the 9th, after a flying visit to see for myself how matters stood onshore, the decision was made to embark all but three men. These hardy types wished to remain a few days longer in the hope weather conditions were bound eventually to improve.

Leaving the sound at 2200 our course was directed towards Resolution Island in low visibility. Off Cape Warwick, Resolution Island, at 0800 on the 10th I met two ships, the USNS tankers Tamalpais and Tonti, awaiting ice escort to Frobisher. In low visibility we formed column and steered up the bay. Good headway was made until ice was encountered when Tamalpais at once slowed down and went so cautiously that I was not of any assistance in clearing a path. At half a knot he inched along while my diesels coked up and the ice propelled by the wind was moving faster than the tankers. After a few

tactful threats the convoy was soon racketing along at all of four knots. At dark the three ships hove to 20 miles south of Cape Vanderbilt for the night.

On the 11th, at 0700 with Cape Vanderbilt abeam, I left the tankers and proceeded to the narrows to get up-to-the-minute ice information. In the afternoon the USNS Redbud came alongside to transfer to me the MSTS Ice Pilot, based in Frobisher, for onward passage to the Tamalpais.

On the morning of the 12th I set off in fog leading my two charges towards the narrows. The fog failed to lift as forecast and all day the three ships milled about in poorly charted waters where conditions were unsuitable for anchoring. Having missed high water slack it was necessary to wait until low water slack at 2030. By 1900 the visibility improved but at 1930, an hour before low water slack, rain and mist were seen rolling in again from the south. It was a case of “now or never” so off we went.

Having briefed the Ice Pilot to use plenty of speed the three ships swept along at ten knots. Our transit of Algerine Pass started out auspiciously and the ships had no difficulty with ice or tidal stream and were in perfect formation. But once committed to Deep Passage things came unstuck. The rapidly lowering visibility made the leading marks hard to see, and more and heavier ice than had been expected had been sucked into the narrows since the last recce flight and it was too late to turn back. The approaching fog had decided me to make the passage before tidal conditions were ideal and hence the ships had some difficulty in avoiding ice and countering the whirlpools and eddies.

When leading ships through ice it is usual for the ship behind the ‘breaker to act as guide. The icebreaker maneuvers about half a cable ahead breaking ice so the ship astern can take advantage of the path thus broken and cleared before the ice can close in. But in this instance, with the whirling and eddying, this did not work and the tankers had to cope with some large floes. Tamalpais, a ship of 22,000 tons deadweight, was loaded deep with Avgas and far too heavy to bring up quickly. To be stopped dead in the water by a heavy floe while this large ship bore down from behind was a situation to nobody’s liking. In every case when collision seemed imminent the mighty power of this ship was enough to sunder the blocking floe enabling Labrador to forge ahead out of the way. We all got through safely and I was impressed by the bold and competent way both tankers were handled. It was dark before the difficult channel was behind us.

The remainder of the passage to Frobisher was, by comparison, uneventful though there was ice to break or clear. At midnight both ships were directed to anchor inside and we lay-to off Monumental Island for the remainder of the night.

Not wishing to experience a repetition of the previous night's escort through the narrows, and having had Pogo's report of a promising channel between Pike and Resor Islands, it was decided to investigate it with the ship. An invitation was sent to the local MSTS Ice Pilot, Captain John Osborne, to come along. He accepted and brought with him the captain of Redbud (Captain Mitchell - a civilian).

Departed Frobisher at 1000 on the 13th and made for the channel. At the entrance Pogo was lowered and in tandem the two vessels swept through emerging at the other end in the vicinity of Daniel Island. The channel was straight, deep and altogether ideal. Two additional lines of soundings were run on the return journey and by 2000 we were back at Frobisher. Both my guests were beside themselves with delight at this discovery though I wondered whether the Pilot might not have been just a little miffed at seeing his local black magic being diluted a trifle. Enclosure (C) shows the various approaches to Frobisher through the islands. For something like 15 years ships have been obliged to take the most difficult and dangerous routes. Channel (1) has had at some time an enormous hydrographic effort expended on it but it is impossible to use because of shoals, ice and tide rips. Channels (2) and (3), both of which have been proved by Labrador, are straight and safe with Channel (2) the better. It is a puzzle to contemplate why the obvious has been ignored for so long.

Before departing the area copies of our work were run off and distributed to the Ice Pilot and to the Masters of all ships then present. I understand since then the channel has been in general use including use by ships of the Imperial Oil Company calling at Frobisher.

On the evening of the 13th, 2,400 barrels of Diesel Fuel were taken from the USNS Tamalpais. During the 14th stores, gear and 30 men destined for the USAF site at Resolution Island, were embarked. At 0200 on the 15th Labrador departed intending to escort USNS Alatna and USNS Redbud through the new Resor-Pike Channel. The two ships, having sailed earlier, and reposing confidence in our work, did not wait for our assistance but went through the channel independently, it being ice-free. By 0530 Labrador too

was through and bound down Frobisher Bay for, we all earnestly hoped, the last time.

At 0945 arrived at York Sound which was still wrapped in fog. By 1430 our three campers and all their gear were aboard. They reported one or two good days during which they had reached the top, salvaged as much gear as they could manage in the way of guns, sleeping bags, etc., and reported the less damaged Bell in very good condition. They also reported the climb as dangerous, made more so by the tendency for fog to close in trapping the climbers in awkward spots. I consider Mr A.M. Brevig, Commissioned Electrical Officer, RCN, and C1SH4 Earl Martin, 50047-H, who were the two who reached the summit, to have done very well.

By 2145 the same day, the 15th, we hove to off Yellow Beach on Resolution Island where our 30 USAF passengers were disembarked. They were an apprehensive lot as it was a filthy night with strong winds cutter in support to make a reconnaissance run through Bellot, establish the western tide pole and party, and return. Air reconnaissance had reported the strait clear of ice.

At this stage of the proceedings it was thought there were three possible hazards to the successful completion of the operation. The first was Magpie Rock. This was a known hazard but its extent was not. The second was the possibility, based on Superintendent Larsen's account of his passage in St Roch, of a shoal halfway through the strait. The third was the belief that shoal water exists off the western approaches which would prevent deep draft ships from getting into the strait at all. The results of Pogo's preliminary 'look see' were therefore eagerly awaited.

Aircraft were employed all day assisting the hydrographers to set up their triangulation marks. At 1830 Pogo and her escort returned and reported that the Magpie Rock area appeared to be the only navigational hazard and that throughout the length of the strait there was deep water which also extended at least three miles beyond the western entrance. By 2100 flying for the day was finished and at 2200 a meeting took place to review the day's work. In summary the first day of Operation Bellot had seen:

- a. The establishment of Fort Ross as a base camp.
- b. Erection of tide poles at the eastern and western approaches to the strait together with watchers.

- c. Completion of the major portion of the triangulation work (10 beacons erected).
- d. Laying of three boat moorings.
- e. Completion of the initial sounding runs of the entire strait and three miles beyond the western entrance.

At 2200 ice began moving into the strait. It was then we realized how fortunate we had been in having conditions so good for the first day of our survey. It was the only day during the operation when ice conditions permitted an unobstructed small boat passage.

While it was necessary to progress the standard survey and to lay the groundwork to do it, I was impatient to get the ship herself through the strait to prove a deep draft passage. So in addition to the work associated with the standard survey was an added effort to locate a channel past Magpie Rock now thought to be our only obstacle.

On August 23rd boats and aircraft continued the work of setting up triangulation marks and temporary leading marks. By noon the initial triangulation work was completed. An LCVP had landed a party to experiment with the assembling of a 30 foot radar beacon ashore at Fort Ross.

During the evening, ice and tidal conditions in the vicinity of Magpie Rock being good, Pogo with the ship's hydrographer (Lieutenant N. St. C. Norton, RCN) was sent away to run lines of soundings past the rock to test the value of two temporary leading marks set up onshore by my navigator (Lieutenant Commander O.J.A. Cavenagh RCN). The two marks were jockeyed into position and Pogo with her sounding machine was able to prove the channel thus delineated. During this activity an LCVP had been away setting up and fixing boat marks along the shore of the strait in preparation for the boat soundings to follow. By 2330 this work was successfully completed and all parties, boats and aircraft recovered.

Thus the second day of Operation Bellot ended with the way cleared for the ship to face the challenge of Magpie Rock. The rock on which Labrador very nearly became a permanent part of the arctic scenery last year. The triangulation work was completed and good progress had been made on the standard survey. The 30 foot radar beacon, assembled and erected experimentally, was reported to be a first class device and far superior to those we used last year. The ice during this second day had been five tenths and well spread out so as not to interfere too seriously with our activities. But the area

in the vicinity of the rock was dangerous when the tidal stream was at full flood with ice blocks the size of houses being flung about in the eight knot stream.

Saturday the 24th of August was the day selected to attempt to get Labrador past Magpie and the weather could not have been more suitable for the purpose. At 0830 Pogo was lowered to precede the ship and to keep me in touch with the depths as we went. Stemming the fast east running stream we set off together at 0900 with Labrador keeping the leading marks in line. As the ship came abreast of, and what seemed quite close to, the waters seething around Magpie there was 60 feet under our keel. By 0915 the ship was past and on the bridge there was a distinct relaxation of tension.

The tidal stream was too much for Pogo's engine and it became necessary to hoist her as Labrador was being delayed. In addition to that there was ice ahead making it doubly necessary to get the little boat out of the way. While the ship was stopped and engaged in hoisting her tiny helper she was being swept back into shoal water north of Magpie. For a moment it was touch and go whether the boat would be hoisted in before the ship herself got into serious trouble. In the event all went well and Labrador moved off at speed.

The balance of our passage through the strait was uneventful. There was a belt of ice a mile west of the rock through which the ship punched a path, a passage only an icebreaker could have undertaken.

The portion of our journey through the narrows was both impressive and safe. The high cliffs on either side, topped by low cloud, caused the strait to resemble a tunnel. Water depths in that vicinity averaged 100 fathoms and the shallowest sounding recorded was 22 fathoms. By 1125 HMC ship had cleared the strait and to our gratification and relief was standing out into the wide open and ice-free waters of Peel Sound. The sun was shining, the sea was blue and everybody was in good spirits.

Off Pemmican Rock an LCVP went in to erect a radar beacon and to land hydrographers to carry out Tellurometer measurements. We then shaped course to the south in Franklin Strait. On reaching the latitude of Cape Swinburne on Prince of Wales Island our course was reversed. Neither ice nor shoal water worth worrying about had been encountered. By 2030 our shore parties had been recovered off Pemmican and we noted with satisfaction the 14 mile radar response obtained from the newly erected beacon.

During the night of the 24/25th, six oceanographic stations were occupied north and south of the strait. The third day of our survey had been most successful. Having thus proved the existence of a channel it was now necessary to develop it with the standard survey.

The morning of the 25th was foggy and the western end of the strait choked with ice. It was noticeable how quickly the ice came and went. We were never sure from one day to the next what conditions would be. Ice in the strait would move to and fro under the influence of the tide and finally be expelled out one end or the other. For boats trying to run lines of soundings this made matters difficult, dangerous and uncertain.

Being able to accomplish nothing at the western end we returned through the strait at 1315. At 1500, on arrival at the eastern end and again safely past Magpie, Pogo and a motor cutter were lowered to do sounding work. A party was sent ashore in the vicinity of Magpie to gather data on the tidal stream in the vicinity of the rock. Fort Ross was topped up with food and other necessaries but ice in the neighbourhood prevented the boats from using their moorings. At 1700 an LCVP went off to land two radar beacons to be used as leading marks in place of the temporary ones west of the rock. By midnight activities ceased, boats were hoisted and the ship stood out to sea to occupy three oceanographic stations during the night watches.

On the 26th August, on our return to the Bellot approaches, it was seen that the wind and tide had cleared out much of the ice. Pogo was sent away to do soundings but made little headway against the seven knot stream. It was on this day that a fire wiped out the camp of the tide pole party at the western end of the strait. This camp had been visited which had, by pure chance, to return later when it found the camp in poor shape. One man with burns was brought back and by afternoon fresh supplies and equipment had been taken out. Unfortunately the tidal records also had been lost.

In the afternoon I visited Fort Ross to inspect facilities there while the ship sounded in the outer approaches. An attempt to take a Tellurometer measurement between Long Island and the Shoran station in the vicinity of Murray Lake to the southward was unsuccessful. At 2345, ice conditions having improved, Pogo, and LCVP, and a motor cutter were sent away to be based on Fort Ross and HMC ship stood out to sea shaping course for Resolute.

On the 27th Labrador conducted oceanography in Prince Regent Inlet and visited Fury Beach where I flew ashore and inspected the remains of the stores and fittings of HMS Fury (Captain H.P. Hoppner RN) which ship was driven ashore in July, 1824.

Arrived Resolute at 0230 and at 0800 an aircraft went inshore to land and embark mail. During the day more oceanography was undertaken in Barrow Strait and at 0630 we departed for Bellot via Peel Sound. Ice was encountered at the head of the sound which frustrated efforts to occupy some oceanographic stations. Once in Peel Sound ice-free waters prevailed while water depths averaged 100 fathoms although Amundsen in 1903 had reported the sound as shoal and rocky. A quick run was made and Bellot's western end reached at 0800 on the 31st, Labrador having circumnavigated Somerset Island.

A boat was sent inshore to Pemmican to anchor the radar beacon permanently with concrete acquired at Resolute and the western tide pole watchers were replaced. A helicopter was sent off on surveying work and was caught by fog being guided back to the ship by an LCVP.

We transited the strait at 1315 and this time went with the eastgoing stream. Heavy ice was negotiated in mid-strait and the passage past Magpie was made at the rush and to us on the bridge the ship seemed, because of the maelstrom raging about the rock and the speed at which we were travelling, uncomfortably close; but all went well and we flew by and into the quieter waters further to the east.

Pogo was hoisted in for needed repairs having completed soundings three cables past the rock. She reported being caught between two sections of the pack ice and at one stage all aboard were in readiness to abandon her. To make good a course of 180 degrees in the strong stream she had had to steer 260 degrees. Going against it she barely made headway and when she turned to run her speed over the ground was 17 knots. Never has Pogo travelled so fast.

To HMCS Labrador from Commander Task Force Six:

The charting of the channel between Resor and Pike Islands by HMCS Labrador removes a major hazard to ships transiting Frobisher Bay. Your discerning the need and seizing the opportunity while accomplishing assigned duties and coping with unforeseen operational problems, was a very fine example of initiative, resourcefulness and professional competence reflecting great credit on the Royal Canadian Navy. Please convey my appreciation and congratulations to your Officers and Men. Well done.

// RADM ROY GANO USN

To HMCS Labrador from Commander, Military Sea Transport Service

For Captain Pullen. While at Frobisher during my recent operational inspection of MSTS Arctic Operations I was pleased to learn through your letter to Commodore Robertson of your very recent development of a new and significantly better channel in the upper reaches of Frobisher Bay. Use of this deeper, wider, straighter and safer channel will greatly facilitate shipping into this port where previously known approaches have been difficult and hazardous. The Military Sea Transportation Service realizes more than anyone else the great significance of your contribution to safer navigation in this area since we have had two serious and costly groundings in Frobisher Bay by USNS tankers WACISSA and CANEY. My congratulations to you and your Officers and Crew for your continued outstanding operations in developing the Arctic Sea Lanes. Well Done.

// VICE ADMIRAL JOHN M WILL USN

Pullen Diary, 1 September – 11 October 1957

Copy (incomplete) provided by W.A.B. Douglas

6 September

I altered to the south and then to the east and into Bellot for the pay-off of all our endeavours. The ships followed as though we had worked together for years, and with no cackling on the R/T either.

The high land was wreathed in fog but the vis. was good in the Strait. The water glassy calm and no ice. Much ado as boats and helicopters clicked and clacked with cameras. At 1315 the squadron was through and I detached (the ships) to act independently.

The HUP that landed at Fort Ross the other day and shut down could not be started. After much coming and going of experts it was decided to do an engine change. I flew ashore in the other HUP to watch the evolution of getting the 1,000 pounds of spare engine in its steel cocoon out of the VP and up the beach to the aircraft. Much use of timbers and tackles, luff upon luff, all good stuff. An engine change is a big job.

While ashore I had copies of a document I had composed signed, and one given to the captains of the ships and one to be put in with Captain Smellie's record (Nascopie 1937) in the cairn on Depot Point.

At 2245 Labrador led the ships out into the icefree waters of Prince Regent Inlet and at midnight released them to proceed to "CONUS" (Cawn-tinental-Yewnited States). Sent them off with "Isaiah 52-11 Ecclesiastes 9-7" and then returned alone to Bellot feeling tired and a little depressed.

7 September

Bellot Strait

A foggy day with not much going on. Pogo had broken down doing current studies and fell back onto Fort Ross until my return. Use of a VP to do the same thing had to be suspended because of ice. When all boats were inboard I decided to get on with oceanography in the Gulf of Boothia rather than sit idle and waste time. So at 2100 off we went running the first line of stations across the Gulf. Dull work this for everyone but the oceanographers, Mr Collin and his helpers, Mr Perry and Mr Forgeron. Dull but necessary.

From CTF 6 to Labrador

The determination of a useable deep water channel from Shepherds Bay in the Central Canadian Arctic eastward through Bellot Strait to the open Atlantic is an achievement of the first order. Upon completion of this historic Northwest Passage from the Pacific Ocean to the Atlantic Ocean, the first time in history for any US flag vessel, I extend to all concerned my heartiest congratulations for an operation smartly and smoothly executed.

It is worthy of note that this operation was carried out with such skill and initiative as to require no directives to the Task Group during the period of its existence: that this undertaking was planned by the US Navy, executed by the Royal Canadian Navy and the U.S. Coast Guard, with the Task Group under the operational control of a Canadian officer, ice reconnaissance support was supplied by the Royal Canadian Air Force, the U.S. Hydrographic Office provided the ice forecasting; and both the RCN and USN provided the basic communications networks. As an outstanding example of what can be achieved by Canadian and U.S. nationals of various services working together in a spirit of effective co-operation, I consider Operation Bellot to be without peer. Again my congratulations to all involved.

Admiral Roy Gano (USN)

--ooOoo--

8 September

Decided to carry on and finish the four lines of stations so that the ship won't have to backtrack and lose time. A dull dreary depressing Sunday -- how I despise these days. Puttered about doing odd jobs in my cabin while the ship rushed back and forth occupying stations.

9 September

Victoria Harbour

By 0830, the time I got to the bridge, the ship was hove-to off Thom Bay. I wanted to Investigate Victoria Harbour where Captain Ross wintered for three years - 1829 to 1833 in the ship Victory. (Henry) Larsen had written of a bronze cannon that was there when he paid a visit in 1942 during St Roch's NW Passage. Told Pilot he could close the land until the water shoaled to 75

feet under the keel and then went aft to the flightdeck. On arrival I was confronted by a man with one of those blasted lifejackets which require much wriggling and twisting to get into. While thus engaged my sun glasses were knocked askew and, alas, fell to the deck to smash into little pieces. This put me into a fine temper. Climbed into the HUP and with Lieutenant Zbitnew at the controls we flew to do a recce of Victoria Harbour. Found it and did a ...

[Diary pages for 9 – 16 September missing]

16 September

... kelp under the ship were clearly visible. The wind and tide appeared to be cancelling each other out so my hope that the ship would drift clear came to nothing.

The bottom so close the echo-sounder was not operating reliably so Mr Collin, using a weight on a wire, got me a depth using the oceanographic winch which was 32 feet from the surface. Assuming the ship was drawing 28 1/2 feet that gave me three and a half feet under the keel, which was a record of sorts.

Very carefully, and using one screw, backed the ship away and eventually into deep water. That was a close call. Quite close enough. Passed between Baillie-Hamilton Island and Grinnell Peninsula, having come by way of Maury Channel and, while there (was) shallow water, there was enough for the ship but I went carefully with both eyes on the echo-sounder and one hand on the engine controllers. Once into Wellington Channel I felt relatively safe from navigational hazards and there was no ice worth mentioning. Could not sleep that night. Paced up and down the bridge and then wrote to Betty.

17 September

Beechey Island

Entered Erebus Bay at 0900 and (hove to) off the beach not very far from where HMS North Star lay so long ago. Everything ashore white with snow. The hydrographers busy checking their balky Tellurometer ashore and an LCVP away with 26 men to do a small arms course.

At 1000 I climbed into all the paraphernalia for flying. less exposure suit, this time without breaking my last pair of tinted glasses. With Murray at the

controls off we went -- zoomed across the harbour and up the valley to the eastward. Was thankful to be over land -- one would not last long without an immersion suit in these waters. Spotted one muskox and we flew right at him. The beastie stood his ground and glared up at us. He must have been terrified. Then on and we sighted a herd of them. Eight, five bulls &/or cows and three small fry. They immediately took alarm and formed a circle, the three calves quite invisible amongst their hairy parents. The strain became too much for them and off they went, stampeding across the valley. One small one tripped and fell in a flurry of snow. Nobody waited and it was a desperate little animal that got onto its feet and fairly flew after the herd. Caught up too. Left them and flew to the top of Caswell Tower -- no cairn. Then back along the hills to the north of Erebus Bay and this year spotted Franklin's upper cairn.

M. landed and I walked a long way to it. Nothing inside. Found Ross's cairn and again nothing found. Then back along the shore from Cape Spencer to Union Bay and finally to the Franklin Memorial which I had had painted black. The little cairn we had left last year had been visited by a polar bear who had taken a swipe at our badge and broken a piece off. Also a wee bottle with a note saying that a Flight Lieutenant Charchuk, RCAF, an RCMP constable, and two Eskimos, had passed that way from Resolute in February of this year.

Flew back to the ship. A very large polar bear was chased round the point of Beechey Is. by Lieutenant Oliphant in a HUP. He ambled along getting very angry and finally flung himself into the sea to get rid of the pestiferous HUP but that was no better and so he climbed out and went past the Franklin Memorial at a fast gallop. Oliphant was overdoing it and Lieutenant Murray very wisely ordered him back to the ship. I wouldn't have wanted to be in his shoes if he had had to force land! The furious bear retraced his steps then swam out to sea.

Tony and I went in the LCVP to put a copper pipe in the Labrador cairn in lieu of the sealed tin, putting in it all the documents, then back to the ship keeping a sharp lookout over our shoulders, and then to sea. Leaving this historic spot we ran east along the south coast of Devon, then south across Lancaster Sound, running a line of four oceanographic stations to Prince Leopold Island.

18 September

Prince Regent Inlet

South in Prince Regent Inlet to Fury Beach to recover two cannons and Fury's bower anchor. To my annoyance it was a filthy day. Sent a VP away but it returned shortly after (as) the beach was littered with ice and a heavy sea was breaking on it. So we were thwarted. Difficult to know what to do -- seemed silly to wait. Finally decided to go north, run a line of four oceanographic stations and to return the next day. So off we went. Quite a lot of ice --nobody seemed sure where it had come from. It delayed us considerably. I suppose the weather cannot be expected to be good for long at this time of the year.

19 September

Fury Beach

Did the four stations and hurried south to Fury Beach again, arriving there at 1530. Markham had said I would find the beach choked with ice on our return, I said it wouldn't, and bet him a can of beer too. He won. Closed the beach, boating was out, but the day was nice so the Commander, the Bos'un and Murray flew in to investigate.

Then Oliphant flew in the second HUP. Attempts to fly out the two cannon failed -- too heavy. Two smaller anchors were brought out. A valiant effort was made to get 'that bower' which I had offered to the Barracks in Halifax and which had been accepted.

Murray flew in a line from the ship to the beach over the ice, the Bos'un and his helpers (flown in also) hauled miles of messenger. I had the ship 300 yards from the beach and, with 70 feet of shoaling water under her, maneuvering trying to stay opposite the object of all this activity. A strong tide was sweeping the ship and the ice steadily south. Then the line got caught on projections of ice floes, the more so as we moved to and fro. Much leaping about on floes by brave people in Darken's party clearing jams. Then Hunt went onto a floe from the FX by ladder, and fell through a soft spot, to my horror, but got up and out. His efforts failed. Then Murray was dropped by helicopter to try and clear a snagged line. No success. By 1900 I had decided that I had risked HMC ship quite long enough apart from the risk to planes and men, so called it quits, recovered everybody, lost quantities of line, and departed Fury B. defeated in my efforts again.

A piece of anchor cable (rope) was brought off, 13 inches in circumference, and when cut still redolent of tarred hemp after 133 years. Shaped course for Lancaster Sound, leaving Prince Regent Inlet for the last time.

20 September

Lancaster Sound

More oceanographic stations in Lancaster Sound. Ran two more lines of four stations each. A quiet day. Last week a message came in with me as an information addressee, from FOAC to Naval HQ. It made reference to a letter not held by us and protested the sending of Labrador to Saint John, N.B., for refit lasting until mid-Feb. saying that little thought had been given to morale considerations etc. This was stunning news. Fortunately the Yeoman, Petty Officer Billard, had the good sense to come straight to me with the message which was only Restricted. If the news got around the ship it would spoil everything for the men. I classified it Confidential, gave it to Norton and developed and discussed the implications of it with the XO and EO.

I feel this decision, if it has been decided, has been taken by a technical officer, possibly a/CNTS (Ships) in HQ, who has lost touch with men and can think only of inanimate objects like ships and docks. It could have very serious consequences. It would ruin morale of the ship's company and spoil the ship's reputation. It could even be more serious. Did not send a message considering FOAC's (signal) said all that needed saying at this stage.

[Diary pages missing for 21-22 September]

23 September

Lancaster Sound

A day doing oceanography and investigating a shoal at the entrance to Navy B. Inlet. I had hoped to land on Wollaston Is. to look for a deposit left by the North Star 100 years ago but high seas and wind prevented this.

Tony, Chief and I were sitting in my cabin at about 2100 having our evening cup of coffee when a signalman handed me one of the most shattering messages I've ever received and which explained why a lot of things to us up here have seemed odd. Like a kick in the stomach.

“As a measure of economy it has been decided to transfer the operation of Labrador to the Department of Transport about 1 April, 1958.

2. It is realized that this step will be deeply regretted by officers and men of the RCN particularly those who are now serving or have served in the ship.

3. However, such considerations must give way to those of economy if we are to make our most effective contribution to the defence of Canada and NATO.

4. The exploits of Labrador and the reputation she has gained for efficiency have done much for the prestige of Canada and the RCN. As the development of the Arctic continues this work will not be forgotten (?)

5. Further information on the programme up to 1 April will be promulgated.”

So there it is. I feel a mistake is being made by people who don't appreciate the significance of the Arctic. I believe the DOT will have one hell of a time trying to run this ship. We were all stunned. That explains why no officers have been appointed and my message has forced their hands?

I've got to tell the ship's company. Fortunately was able to clamp shut the mouths of the only two men who knew (including my mastheaded sailor!) so that I can speak to the people to-morrow. That will put the cat among the chickens. That, and a refit in Saint John. I feel a trifle let down. Those devils in HQ. Bill Landymore has had his way. VCNS, RADM. Lay, too. Blast their eyes. Why couldn't they have waited until we got back? The only cheery news was the rescue of five survivors from Pamir. She sank and all that was found, before the five were sighted, was wreckage and some lifeboats -- empty. What a black day this has been.

[Diary pages missing for 24-29 September]

29 September

...dithering incompetently in the middle. The next problem will be special leave. In all this hurly burly HQ and FOAC have never thought of it but the men haven't forgotten. It has been granted two years running now, 14 days in

'55 and seven in '56. To [withhold] it this year would be another blow to the people.

30 September

Baffin Bay southbound

Our 15th wedding anniversary. Sent off a Class E message to B. An otherwise uneventful day making more southing in deteriorating conditions. Cancelled one station and shifted the positions of a few others to suit me and make life easier in the growing swell. This has been a busy and eventful month. I reckon we've steamed a record distance. Later -- no, the third greatest since commissioning, 5,370.

1 October

Cape Dyer

Called in at Cape Dyer (Exeter Bay) pm to get three bags of mail and to land some too. A grim looking spot but a relief not to be wallowing in the heavy swell outside.

Another wet message from HQ to FOAC about our future. So far I have resisted the urge to tell them what I think should and should not be done.

Departed 'Dye' at dusk and poked our snout back into the heavy swell from the south. It must have been quite a blow to generate a heavy swell like that.

2 October

Davis Strait

In the Middle watch the vis. clamped down and I was on the verge of not altering into Cumberland Sound, but did. We arrived at midday and what excitement ashore in Pangnirtung where they had a problem. The Anglican missionary, the Rev. W.A. Graham, had been engaged to be married for 17 months. He could perform marriage ceremonies for everybody but himself, and he and his fiancée were resigned to wait until next August, when we hove into sight with a chaplain. Would we wait and help them? We would, then it was realized the local RCMP man who had to issue or sign the license was away. But the Constable we picked up in Clyde River was authorized. So much hurrying and scurrying ashore. Tony and I flew ashore wearing

Number Fives and medals. The service went off well, the little church filled, mostly Eskimos. At the reception I proposed the toast to the bride at five seconds notice. Our photographer did his stuff and Petty Officer La Croix, the P.O. Steward, passed the champagne and little eats which we provided. After arranging for various supplies to be landed we departed at 1700 leaving a breathless little community pinching (itself) to see if it was all true.

Padré told me later that on the night of the 1st the Rev. G and his 'wife' were very worried and could see no solution to their problem. Before parting for the night they had prayed to God putting their problem in His hands to deal with as they could do no more. All that day a gale had whipped up the sea, then the following morning all was calm and still and in we glided with the solution to all their problems. "God moves in a mysterious way, His wonders to perform; He plants his footsteps in the sea and rides upon the storm."

As Labrador withdrew from the Arctic, probably for the last time as one of Her Majesty's Canadian ships, it was good to know that we have been an instrument for good and to have brought so much happiness to that little community.

3 October

Frobisher Bay

Southbound endeavouring to reach York Sound before dark. Put six engines on the line and the old ship flew along at 16 knots. The sea was calm. Arrived in the Sound at 1715. Too windy and too late to do anything about the recovery of the two Bells which could still be seen up on top of Peter Point Mountain.

All of a sudden a USAF H21 roared into sight. He landed on, a terrifying sight from my foreshortened view from the bridge. Two of them had landed because of an oil pressure drop in one and the (other) machine had taken off to gain altitude and to send a message about their situation. When he first saw us he thought we were an iceberg. In the end we were able to give them all accommodation aboard for the night and in the morning to repair their machine. Our maintenance people were shocked at the poor state of both the US machines.

4 October

Frobisher Bay -- York Sound

Succeeded in landing four men atop the mountain where they set to work to dismantle the Bells and get as much stuff ready for lifting out as possible. Hopes that the big US machines would help us were dashed for various reasons, but mostly ...

[Diary pages missing for 4-10 October]

10 October

... weighed and proceeded. A beautiful evening with the moon just past full. We departed at a good turn of speed instead of 'creeping' out. Turned-in in the charthouse and very weary too.

Quite a hoo haw -- apparently Gagnon, the steward who ran amok last July 18, was inadvertently drafted to Lauzon and a message in that he was to be watched carefully and to be returned to Halifax in this ship! I remonstrated with Depot referring to my original message of last July but no, he was to be transferred and at this stage FOAC waded in and over-ruled FOAC in Halifax to my relief.

10 October

Messdeck Rounds in the a.m. and engineroom p.m. A good day. Sunny, warm and a slight easterly swell. I have \$1,009.00 back pay and allowances to draw which is something. A warm afternoon on the bridge chatting of this and that with the Admiral. In the evening a film on MSTS Operations in 1956 was run off. Not very much of Labrador in it. For laughs the Santa Claus film was shown.

11 October

Halifax, N.S.

Cleared lower deck at 1145. I warned the ship's company about not misbehaving ashore. Then the Admiral spoke to them. I was called away as in the low visibility we were closing two ships which turned out to be Bonaventure and Sioux. Exchanged signals while in sight.

Entered Halifax Harbour at 1400. Much buzzing about of helicopters bringing the Press out. Gave an interview while the ship was bound up

harbour, fairly bursting with a desire to express myself on the stupidity of the decision to turn the ship over to the DOT but I had the Admiral right beside me. So about all I could say was 'no comment' and rightly so too.

At 1500 I took Labrador alongside for the last time while I was in command, and quite probably for the last time as one of HMC Ships. Not as good an alongside as I would have liked but good enough. A large crowd of 'family' much cheerier than they were on the 25th of June. Also a band. All very happy. Betty and family, Helen, the twins, Margot and William, and Grannie, who did it again. All aboard for a gathering in the Cuddy. Much excitement and a flood of people milling about.

And so ends our 1957 Arctic Operation. We have been at sea for 109 days and steamed 18,500 miles. The achievement that was of most significance was the proving and sounding of the Pike-Resor Channel in Frobisher Bay, the job that attracted most notice was the Bellot Strait Survey. No ship has done more for Canada than Labrador. No ship is better known to people in Canada and abroad than Labrador, and yet the experts, in their purblind wisdom, have decided that she has nothing to contribute in a war that will never be fought. And so she is got rid of so that a couple of obsolete frigates can be commissioned. The news that Nautilus had reached 87 degrees North latitude by way of Kennedy Channel Kane Basin, and was able to surface anywhere at will and with ease, has had no effect.

All our inspired leaders can think of is fighting World War H over again in the N. Atlantic. Nautilus's only difficulty was one of navigation. The need for hydrographic work becomes urgent and Labrador is the only ship capable of doing it. The DOT has my sympathy as I don't believe they have the people to operate Labrador. This will mean she won't be ready for service and the DOT and the RCN will probably be embarrassed.

Part 2:
Manhattan Voyage

Preparations for the Voyage

This Volume contains, for the most part, my correspondence concerning plans for the Manhattan voyage while acting as a sort of staff officer to Admiral A.H.G. Storrs, Director of Marine Operations, Ministry of Transport. This is background information.

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Draft Memorandum for the Cabinet, “Canadian Sovereignty in the Arctic,” 20 March 1969

Original marked “Confidential”

March 20, 1969

DRAFT

MEMORANDUM FOR THE CABINET

CANADIAN SOVEREIGNTY IN THE ARCTIC

INTRODUCTION

The purpose of this memorandum is to outline the legal and other considerations relating to Canadian sovereignty over the Arctic islands, waters and offshore resources, and to make recommendations and request instructions in connection with these matters. The memorandum is supported by a number of Annexes and deals with:

- I - The Canadian Arctic islands
- II - The continental shelf in Arctic areas
- III - The waters and ice of the Polar Basin
- IV - The waters between the Canadian Arctic islands
- V - The “Manhattan” project

...

I - CANADIAN ARCTIC ISLANDS

Legal Position: Effective Occupation

2. Canada has complete and unchallenged sovereignty over the islands north of the Canadian mainland. The legal basis for Canada's claim arises mainly out of the doctrine of effective occupation, which under international law is the most generally recognized means of establishing sovereignty. Since falling heir to the rights of Great Britain in the 1860's, Canada has continuously and progressively asserted its administrative authority over the whole of the Arctic mainland and islands; and since 1904 it has depicted the limits of its claims by the publication of many official maps. Canada has supplied the whole area with a complete framework of lawmaking and law-enforcing organs, and has engaged in detailed acts of administration which have grown tremendously in number and variety to include, for instance, the distribution of Family Allowance cheques to the Eskimos. One leading international authority, Gustav Smedal, cites Canada's handling of its Arctic territories as a good precedent of how to take effective possession of polar regions. (See Annex I for a further discussion of effective occupation and Annex II for a summary of Canadian activities in the Arctic).

Other grounds for Canada's claim

3. The Canadian claim to sovereignty over the Arctic islands is also supplemented by **past discoveries and derivative** transfers from Great Britain. In addition, Canada's claim is supported under the doctrine of title by prescription (that is, the continuous and undisturbed exercise of sovereignty over a period of years), as well as by virtue of recognition by other states. Since resolving disputes with Norway (in 1930) and Denmark (in 1920) concerning the Sverdrup Islands and Ellesmere Island respectively, no foreign state has opposed Canada's claim to the Arctic islands for some forty years. In addition to the fact that they have advanced no competing claims, foreign states have implicitly recognized Canada's title by allowing their nationals to submit to Canadian licensing requirements in respect of scientific expeditions and mineral leaseholds. Tacit acquiescence is also indicated by the fact that school text-books, maps, scholarly treatises, newspaper articles, and official publications in foreign countries all over the world show the

Arctic islands, or refer to them, as being part of Canada. In particular, those foreign states with a special interest in the Arctic - Norway, Denmark, the USSR and the USA - for many years have all demonstrated their acceptance of Canada's claim in a variety of ways.

“Sector Principle”

4. References have been made in the House of Commons and in the press to the so-called “sector principle”, according to which countries bordering on the Arctic allegedly have a valid claim to the territory which is bounded by their northern coasts and lines projected from the extreme eastern and western limits thereof to the North Pole. Most jurists agree that this theory has a weak foundation in international law. Moreover, Canada's record of adherence to the theory has been uncertain and fluctuating. For these reasons previous Canadian governments have concluded that it would not be wise for Canada to stress the sector principle in support of its claim to the Arctic islands. Effective occupation is a much surer ground. (Attached as Annex III is a summary of state attitudes towards the “sector principle”).

Implications of Joint Defence and Scientific Effort

5. Although it is clear that Canada's title to the Arctic islands has been established and accepted beyond any reasonable doubt, questions from time to time have been raised regarding the possible implications of the joint US-Canadian military effort in the Arctic in the context of North American defence arrangements, particularly where the USA has assumed the major financial burden and responsibility. In addition, in the scientific field the two countries have set up a Joint Arctic Weather Stations Program in respect of which the costs are evenly shared. Questions may arise as to whether such arrangements, even with all possible safeguards for Canada's rights and with the best of intentions on both sides, might perhaps eventually lead to a situation in which effective authority in Canada's Arctic, in fact if not in law, would be exercised by the United States. Concern about this aspect of joint cooperation may help to explain the sensitivity occasionally displayed by the Canadian press and public in relation to Arctic matters. Such sensitivity, however, should not be permitted to obscure the fact that Canada's title to the Arctic islands is unassailable in law and unaffected by the joint arrangements with the USA. It goes without saying, of course, that Canada should do

everything possible to safeguard its actual control over these joint defence and scientific efforts, and in fact may wish to go further as suggested under the heading of "Conclusions & Recommendations".

II - CONTINENTAL SHELF IN ARCTIC AREAS

Legal Position

6. The Geneva Convention on the Continental Shelf gives to the coastal state sovereign rights for the exploration and exploitation of the natural resources of the seabed, and subsoil thereof, adjacent to its coast, to a depth of 200 metres or to the maximum depth at which the exploitation of these resources is a practical possibility. It does not affect the status of the waters or ice formations lying above the shelf. Although the convention was signed by Canada and has come into force, it has not been ratified by this country. However, the convention represents generally applicable principles of international law, under which Canada has assumed jurisdiction over the shelf adjacent to its coasts. Canada's rights in respect of the resources of the continental shelf are exclusive and do not depend on occupation or any express proclamation. Moreover, in the terms of the Geneva Convention, "the consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there".

Relation to Claim to Sovereignty

7. As a result of the legal doctrine of the continental shelf Canada's claim to the offshore resources of the Polar Basin and of the channels between the Arctic islands does not depend on any claim to sovereignty over these waters as internal waters or as territorial sea. However, it may be that the so-called "Maltese item" under study in the United Nations will eventually place some significant limitation on the physical extent of the coastal state's jurisdiction over the continental shelf. In that event, a Canadian claim to sovereignty over the waters of the Polar Basin might present some economic advantage. As regards the channels between the Arctic islands, it does not seem likely that the "Maltese item" would so severely restrict the limits of national jurisdiction over offshore resources as to deprive Canada of any part of its shelf within these areas, but this possibility perhaps cannot be entirely discounted.

Boundary Negotiations with USA

8. No boundaries have yet been delimited between the respective continental shelves of Canada and the USA in the Beaufort Sea (or in other areas where the boundary question arises). The basis for the Canadian position in early negotiations with the USA has been approved by Cabinet, except in the case of the Beaufort Sea area in respect of which the basis for the Canadian position is still under consideration by the Departments concerned.

III - WATERS AND ICE OF THE POLAR BASIN

Legal Position

9. Canada has never definitively formulated its position regarding sovereignty over the waters and ice of the Polar Basin lying to the north of Canadian lands. Existing international law provides no clear or firm basis upon which Canada could assert a claim to the Polar Basin. The difficulty in attempting to apply the sector principle in this respect is that this theory has never been used to claim sea areas in the Arctic or elsewhere. Moreover, as already indicated the legal validity of the sector principle is considered to be doubtful and has never been tested even as regards claims to land territory; only the USSR has officially proclaimed the principle (in 1926) and in doing so applied it only to lands known or unknown lying within its sector.

10. It has been argued that either the sector theory or the doctrine of effective occupation can be applied to ice formations in Arctic areas on the grounds that such formations can be more readily assimilated to land than water. The weakness of this argument arises from the relative lack of permanence of ice formations and, in the case of floes and ice islands, their constant movement which makes it very doubtful that they can be permanently appropriated and subjected to sovereignty. Furthermore, such an argument would likely be contested on the ground that it would be an infringement of the principle of freedom of the high seas. On the other hand, shelf ice, because it is both immobile and permanently attached to land, might be more easily assimilated to land territories than floes or ice islands lying beyond internal or territorial waters.

11. Another factor which should be borne in mind in determining the Canadian attitude to sovereignty over the waters and ice of the Polar Basin is that the doctrine of sovereignty under international law applies not merely to the surface of the sea but to areas below the surface and the airspace above it. In an era when international commercial transportation by air over the Pole or by submarines navigating under the Arctic ice has become a reality, it may be assumed that many countries have real interests in any claim by Canada, the Soviet Union or other states to sovereignty over polar waters and ice. Accordingly it must be expected that their reaction to such claims would be determined largely by the importance of these interests and be influenced as well as by the general defence or military implications which such claims would have for these countries.

IV - WATERS BETWEEN THE CANADIAN ARCTIC ISLANDS

Background

12. The clearest public assertion of a Canadian claim to the waters between the Canadian Arctic islands was made by the then Minister of Northern Affairs and National Resources in the Standing Committee on Mines, Forests and Waters on June 10, 1958, in these terms: "The area to the north of Canada, including the islands and the waters between the islands and areas beyond are looked upon as our own, and there is no doubt in the minds of this Government, nor do I think was there in the minds of former Governments of Canada, that this is national terrain."

13. In 1960, the same Minister recommended to Cabinet that a decision be reached in principle to lay claim to the waters between the Arctic islands. Subsequently, the Canadian Government decided to advance the claim by application of the straight baseline system in accordance with the 1958 Geneva Convention on the Territorial Sea and the pre-existing decision of the International Court of Justice in the Anglo-Norwegian fisheries case. If this action were successful the waters in question would be internal Canadian waters but could be subject to the right of innocent passage under the terms of the Geneva Convention, which provides that other states have the right of innocent passage in waters which were territorial sea or high seas before being

enclosed within straight baselines. That is, the right of innocent passage could be denied only if Canada could prove that the waters concerned were internal before the establishment of straight baselines, i.e. that there was a valid historic title as in the case of Hudson Bay.

14. It was recognized, however, that such action might arouse opposition by the USA which could have the effect of seriously weakening Canada's claim and leading to litigation before the International Court of Justice. It was therefore decided to notify the USA of the intention to enclose the channels of the Arctic islands within straight baselines before actually doing so. This decision was communicated to the United States Government and was included in the law of the sea discussions which Canada held with the USA in 1963 and 1964. The position adopted by the USA in respect of the waters between the islands was that they are and must remain high seas, except for the three-mile territorial sea surrounding each of the islands. The Americans expressed very strong objections to the course of action proposed by Canada on the grounds that it would be legally invalid and, if unopposed by the USA, would constitute a precedent for more sweeping (and in the Canadian view less well-founded) claims by the Philippines and Indonesia, to the serious detriment of vital strategic interests of the USA. The US reaction was so strongly adverse that no steps have been taken to implement the decision to draw baselines around the Arctic island group. The claim has not, however, been abandoned and Canadian Government departments have operated in accordance with the original directive cautioning them against taking any action which might compromise Canada's claim to the waters between the Arctic islands or the waters and ice of the Polar Basin.

Modus Vivendi with USA

15. Canada so far has managed to avoid a public confrontation (which would damage Canada's claim) with the United States on the status of the waters between the Arctic islands. A sort of modus vivendi has developed in connection with the entry of United States Government or naval vessels in "Canadian" Arctic waters, pursuant to which it has generally been possible to avoid forcing the issue of the status of these waters, whether territorial or internal, and thus compromising either the United States or Canadian position in this respect. In summary, the adherence to the modus vivendi has been uneven; on some occasions it has tended to support the Canadian claim

to sovereignty (because Canadian “concurrence” was obtained for certain USA activities in the Arctic channels), whereas on other occasions the results have been more blurred, with each country maintaining its position while refraining from asserting it in such a manner as to **embarrass the other publicly**. (Details on this subject are provided in Annex IV).

Legal Position

16. There is some evidence of continued Canadian administrative usage over the waters between the Arctic islands, or part of them, which might be of use in asserting an historic root of title (for instance the Ministerial statement referred to in paragraph 12 above, and the Orders-in-Council of 1929, 1942 and 1953 which included the water areas in the delimitation of the Arctic Island Game Preserve). However, the legal foundation for Canada's claim to the Arctic channels in the final analysis rests on the application of the straight baseline system approved in the Anglo-Norwegian fisheries case and substantially incorporated in the 1958 Geneva Convention on the Territorial Sea. In summary, it can be said that the Canadian claim is not strictly inconsistent with the Anglo-Norwegian case or the Geneva Convention. However, an unprecedented expansion or extension of these principles would be required to cover their application to the Canadian situation. Most important of all, from the legal as well as other points of view, is that Canada's claim is strongly opposed by the United States and also might not be recognized by other countries. The arguments for and against Canada's claim on the strength of the straight baseline system are discussed in Annex IV.

Advantages of Claiming Sovereignty

17. The major advantages of claiming the Arctic island channels as internal waters, even if subject to the right of innocent passage, may be summarized as follows:

- a) Canada would retain full control over the fish, sea mammals and other living resources of the sea in the areas concerned.
- b) Canada would retain a significant degree of control over the passage of commercial and especially naval vessels of other countries. This would be true despite the right of innocent passage

since this right is not as absolute as freedom of navigation on the high seas, and since the coastal state is in a position to adjudge whether passage is innocent or otherwise. If the Arctic channels were considered high seas, security considerations would arise since Canada would then have virtually no legal basis for barring the entry of foreign vessels carrying out intelligence or military reconnaissance activities.

c) By claiming the Arctic channels as internal waters Canada would avoid the risk that other states might undertake icebreaking operations, air and sea rescue services, aerial reconnaissance and perhaps even land surveys and the provision of shore-based facilities (although the latter two would presumably require Canadian consent) for the support of commercial navigation in these waters. Such foreign activities might give rise to objections from the Canadian public and to questions about possible implications for Canadian sovereignty over adjacent lands, which would be avoided by the maintenance of the Canadian claim to the inter-island channels. In exercising sovereignty over the channels Canada could provide the required aids to navigation and help defray their costs by imposing fees on ships making use of them.

d) From the security point of view the claim to sovereignty over the waters between the Arctic islands would appear to have somewhat similar advantages as the claims to Hudson Bay and the Gulf of St. Lawrence. (Legally speaking the claim to Hudson Bay, but not to the Gulf, has a strong historic basis). Actual or tacit abandonment of the claim to the Arctic channels in the eyes of the Canadian public, if only for reasons of “cartographic chauvinism”, might be considered inconsistent with the maintenance of these other claims and tantamount to a surrender of territory.

Disadvantages of Claiming Sovereignty

18. The major disadvantage of asserting a claim to the waters between the Arctic islands is the effect it could have on Canadian relations with the United States. Other countries such as Japan, Britain, Australia and the Scandinavian states might also object to a Canadian claim to sovereignty over the Arctic

channels, either on principle, or on economic grounds connected with the right to exploit fisheries and mammalian resources, or because the Northwest Passage may become an important sea route for international commerce, or because of fears that Canada's action would support the claims of Indonesia and the Philippines.

V - THE "MANHATTAN" PROJECT

Background

19. This summer, probably in July, three US and British oil companies (Humble, Atlantic Richfield, and British Petroleum) plan to spend approximately \$30 million in sending a specially reinforced oil tanker, the SS "Manhattan", on a test run through the Northwest Passage to Prudhoe Bay on the north slope of Alaska where enormous quantities of oil have been discovered. The purpose of the "Manhattan" trials is to determine the feasibility of this method of transporting Alaskan oil to northeastern United States markets and perhaps to Europe. If the project is successful it could be of great potential benefit to Canada and have a considerable impact on northern development. (Further background information on the project is given in Annex V).

20. The Canadian Government departments concerned welcomed discussions with the sponsoring oil companies and corresponding US agencies in view of the very significant benefits which the "Manhattan" trials may have for northern development. As a result of these discussions a Canadian Coast Guard icebreaker, the "John A. MacDonald" is scheduled to take part in the exercise. A complicating factor, however, has been introduced by the fact that a US Coast Guard icebreaker, the "Westwind", will support the "Manhattan" in the operation. Moreover, it appears that USA military aircraft will also lend support by means of aerial reconnaissance of ice conditions. In the circumstances the trials to be conducted by the "Manhattan" no longer have the simple character of a private project.

Implications for Sovereignty

21. Although the three oil companies concerned have sought the cooperation of the Canadian Government in the “Manhattan” project, it is relevant to note that Canada has not been consulted regarding the participation of the US Coast Guard icebreaker. (There have, however, been discussions between representatives of the US Coast Guard and the Canadian Department of Transport). Under the terms of an arrangement recommended by the Permanent Joint Board on Defence, and approved by the US and Canadian Governments, “public vessels” of the USA and Canada can pass through the territorial or internal waters of the other country upon “notification” to local naval commanding officers (in the case of “operational” or “informal” visits). No such notification has been received concerning the participation of the US Coast Guard icebreaker (which is of course a “public vessel”) in the “Manhattan” project. Nor has the State Department conveyed any notification or request for Canadian concurrence in this respect, although it is understood that such a course of action was proposed to the State Department by the sponsoring oil companies and that the question was also raised with the State Department by the US Coast Guard.

22. The State Department has volunteered to provide a written statement for possible use by the Government of Canada, to the effect that “... the voyage of the “Manhattan” is not intended to stake out any claim to territory or mineral rights in the Canadian Arctic”. (This statement, it will be noted, does not refer to any Arctic waters and also does not specify what the USA considers to be the Canadian Arctic). Washington officials, according to press reports, have also issued denials that Canadian participation in the “Manhattan” project was being discouraged on the grounds that such participation might support Canada’s claim to the waters between the Arctic islands. These denials are confirmed by the fact that none of the Canadian Government departments concerned have detected any effort by the US authorities to discourage Canadian participation in the project. The real question at issue is the status of the waters between the Arctic islands, or more precisely whether the US Government will allow the “Manhattan” project to develop into a test of the respective American and Canadian positions regarding the status of these waters.

23. The "Manhattan" project as it has developed so far does not necessarily admit or deny Canada's claim to the waters between the Arctic islands. As for the State Department's attitude, if it is in fact reluctant to request Canadian concurrence for the "Manhattan" project, this would be consistent with its policy of not taking any action which might be interpreted as acceptance of Canada's claim to the waters between the Arctic islands and which would thereby prejudice the US position in this regard. However, Canada's claim could be seriously prejudiced if the project is carried out without either a request for Canadian concurrence or notification on a service to service basis by the US Coast Guard. In this connection it may be significant that the US Navy has expressed great interest in the "Manhattan" project and wishes to give it full support. It is known that in the view of the US Navy the success of the project would lead to increasing military interest in the Arctic and result in a need to assure freedom of the Arctic sea. Also of relevance is the fact that the participation of the US Coast Guard icebreaker is not technically essential for the success of the project, since the "Manhattan" itself will have a better icebreaking potential than the Coast Guard vessel.

Canadian Involvement in the Project

24. As indicated above, the Canadian icebreaker "John A. MacDonald" will accompany the "Manhattan" and the US Coast Guard icebreaker. In order to avoid delicate questions of command (and the implications these might have for recognition or non-recognition of Canadian sovereignty) the understanding which has been developed is that there will be no overall commander of the three ships involved.

25. In addition to the services of the icebreaker "John A. MacDonald" the oil companies participating in the exercise have requested that the Canadian Department of Transport provide reconnaissance, analysis and forecasting of ice conditions, through existing facilities (the US Navy, it is understood, wishes to play a role in aerial reconnaissance and will in any event be doing so over Alaskan waters). The oil companies have also requested the appointment of a Canadian Government representative on board the "Manhattan", in order to (i) serve the function of national representation, (ii) provide Canadian Arctic expertise and (iii) act as liaison and coordination agent between the "Manhattan" and the Canadian icebreaker and other Canadian agencies involved in the support of Arctic navigation during the exercise.

26. The oil companies sponsoring the project have also invited the Panarctic Oil Consortium to contribute towards the costs of the project in return for access to the information obtained from the trials. The sponsoring oil companies are also prepared to discuss with the Canadian Coast Guard the terms and conditions under which some limited information would be made available to the Canadian service. These proposals, and other possibilities, are considered under the heading of “Conclusions and Recommendations”.

CONCLUSIONS AND RECOMMENDATIONS

I - CANADIAN ARCTIC ISLANDS

Canadian sovereignty over the islands north of the Canadian Mainland has been clearly established by virtue of effective occupation. The United States does not appear in any way to be challenging Canada’s title to or jurisdiction over the islands, and there are no grounds to believe that the activities of USA oil companies carrying out exploration work in the Canadian Arctic - all of them under Canadian permits - derogate from Canadian sovereignty. Indeed it is considered that the activities of foreign companies have constituted a recognition and affirmation of Canadian sovereignty. It has not been possible to find copies of the USA maps allegedly disputing Canadian sovereignty over certain Arctic areas (as reported by Mr. Diefenbaker and General Foulkes). There is no reason to believe that such maps have any official standing if they do exist; assurances to this effect have been received from the US State Department.

It is recognised that Canada’s joint defence and scientific arrangements in the Canadian Arctic do not detract from Canadian sovereignty in law; on the contrary they confirm that sovereignty. Nevertheless, it is recommended that the Government review existing joint arrangements, (and any which may be proposed in the future), to determine whether these may have long range implications for the effective exercise of Canadian jurisdiction and whether it may be advisable for Canada to assume greater or full responsibility for any of the activities involved.

II - CONTINENTAL SHELF IN ARCTIC AREAS

The Geneva Convention on the Continental Shelf provides a satisfactory guarantee that offshore resources in the Canadian Arctic are reserved exclusively for Canada. There is not evidence to suggest that the USA is in any way disputing Canada's rights in respect of these resources. It is likely that the "Maltese item" in the United Nations may eventually have some effect on the extent of the physical limits of Canada's jurisdiction over offshore resources in the Polar Basin. It is less likely that the United Nations initiative would affect Canada's jurisdiction over offshore resources within the channels of the Arctic islands; because of the intimate connection between these waters and islands it is considered undesirable that mineral resource jurisdiction in this area should in any way be limited.

It is recommended that the above considerations be taken into account in the position adopted by Canada in the discussion of the "Maltese item" within the United Nations Committee on the Seabed.

III - WATERS AND ICE OF THE POLAR BASIN

There would not appear to be any overriding reason to revise the view reached in an inter-departmental study of this matter in 1960 when it was concluded that a claim to the Polar Basin would entail few advantages of consequence, while on the other hand involving the likelihood of strong objections by other countries and real disadvantages as a precedent for a Soviet claim to the large "sector" lying north of the USSR mainland. Notwithstanding this conclusion, concepts of international law frequently change and future developments could lead to the recognition of certain types of ice as being capable of appropriation.

Consequently, it is recommended that the sector theory should not be repudiated as such (in the absence of any pressing need to do so) but be held in reserve for possible use if and when it became advisable to lay claim to sovereignty over any fixed or floating ice in the high seas of the "Canadian sector".

IV - WATERS BETWEEN THE CANADIAN ARCTIC ISLANDS

The status of the waters between the Canadian Arctic islands is not settled internationally. The legal and economic implications of the “Manhattan” project, as well as the attention it has received in the press and in Parliament may make it difficult for Canada to continue the attempt to safeguard its claim to sovereignty while avoiding a possible confrontation on this issue with the United States. Although it is uncertain whether the US Government would accept an arrangement that might avoid forcing the issue of sovereignty without prejudicing either the Canadian or American position, it appears very doubtful that agreement could be reached on an arrangement that would actually support Canada’s claim to sovereignty. In any event Canada may be standing on the threshold in respect of its claim to the waters between the Arctic islands and the question will perhaps be resolved one way or another by developments following in the wake of the “Manhattan’s” passage.

In the present circumstances the following possible courses of action appear to be available to the Canadian Government:

a) Asserting the Claim

i) Canada could attempt to prevent the erosion of its claim to sovereignty over the waters between the Arctic islands by formally asserting that claim and proceeding with the implementation of the straight baseline system in this area. However, since the United States has threatened litigation if Canada proceeds unilaterally with the closure of these and other waters, such a course could result in the defeat of the Canadian claim, unless Canada evaded an action before the International Court of Justice by pleading the “Connally amendment” against the United States or by qualifying or withdrawing its acceptance of the compulsory jurisdiction of the Court.

ii) Legal considerations aside, assertion of the Canadian claim could have serious political and economic implications. While it is difficult to foresee how far the United States might go in reacting against the Canadian move, it has been said (in a letter from the

American Secretary of State in September, 1966) that the United States Government would protest directly and publicly, would avail itself of the legal remedies open to it, and would instruct its ships and aircraft to disregard Canadian claims to such areas as the Gulf of St. Lawrence and the Arctic channels as internal waters.

iii) Leaving aside the possibility of direct economic retaliation (which was raised on an earlier occasion by United States officials) Canada could also be adversely affected if the US Government were simply to refuse to grant special concessions to Canada as the occasion arose for requests of this kind, for instance in connection with the American oil import policy. The possible consequences of asserting the claim to the Arctic channels should also be weighed in the light of the prevailing state of Canada's relations with the United States, and bearing in mind such particular considerations as the negotiation of USA-Canada continental shelf boundaries which is to begin in the near future.

b) Abandoning the Claim

i) Canada could abandon its claim to the Arctic channels, either explicitly or tacitly, and thereby avoid the risk of defeat before an international tribunal and the possibility of a confrontation with the United States and its attendant consequences. The major disadvantage of abandoning the claim or allowing it to erode is that Canada would then have sovereignty over only a three-mile territorial sea and a nine-mile fishing zone around each island of the archipelago, leaving access to the channels open to all countries as high seas, without any legal basis for Canadian control over their activities. Another possible disadvantage to abandoning the Canadian claim would be the adverse public reaction to such a course.

ii) In considering the possibility of abandoning Canada's claim to sovereignty over the waters of the Arctic archipelago, it is relevant to note that there exists an international trend in favour of a twelve-mile territorial sea. In fact, the United States and the Soviet Union are considering the possibility of calling a

conference on the law of the sea to secure international agreement on this limit. In the event of such agreement, Canadian sovereignty in the Arctic channels would extend over a twelve-mile belt (as compared to the present three miles) of territorial sea around each of the Arctic islands, i.e. a total of 24 miles in the straits and channels between the islands. (According to the terms of the draft convention agreed upon by the USA and the USSR freedom of navigation in international straits would be guaranteed by the maintenance of a high seas corridor in those straits which would otherwise be made completely territorial sea by application of the twelve-mile limit; this provision would affect at least one area of the Northwest Passage which is less than 24 miles wide). It might be considered that adoption of the twelve-mile limit could perhaps make the abandonment of Canada's claim to sovereignty over the whole of the channels more acceptable.

c) Status Quo

i) Canada could attempt to continue its present policy of maintaining its claim without asserting it in such a manner as to embarrass or provoke a confrontation with the United States. As already indicated, such a course is becoming increasingly difficult but possibly could be pursued successfully for some further period. In the event of success, its advantages are obvious. Its major disadvantage is that it may well not succeed; Canada's claim might then be irretrievably prejudiced in view of the heightened interest in commercial navigation through the Northwest Passage.

ii) If Canada wishes to assert de facto sovereignty over the Arctic channels while postponing the formal assertion of its claim, it would be vitally important to furnish the required aids to navigation and thus prevent any other country from doing so to the detriment of Canada's claim. Such aids would in any event be necessary to keep pace with and accelerate northern development. What may eventually be required is the kind of supporting services for navigation in ice-congested waters that

Canada now provides in the Gulf of St. Lawrence in winter, and in Hudson Bay and Strait, and to a limited extent in the Arctic, in summer. The provision of such services could become expensive (minimum facilities might cost approximately \$50 million over a period of years) but would contribute significantly to the basis of Canada's claim to sovereignty, which, if successful, would allow at least part of the expenses to be recovered by the imposition of navigation fees.

It is recommended that Canada should not abandon its claim to the waters between the Arctic islands and that the Government should consider instead the advisability of asserting the claim or attempting to maintain the status quo.

V - THE MANHATTAN PROJECT

The course of action to be adopted by the Canadian Government in respect of the "Manhattan" project would of course depend upon the Government's decision regarding the claim to sovereignty over the waters between the Arctic islands. Thus:

- a) If the Government were to decide to assert the Canadian claim by immediate implementation of the straight baseline system around the Arctic islands, the "Manhattan" project would become part of the broader issue or possible confrontation between Canada and the USA. In these circumstances, if it were to be asserted that the Canadian claim excluded the right of innocent passage, Canada could either insist on a request for consent to the passage of the US Coast Guard vessel (which action would present obvious risks); or, despite the lack of a request for consent, Canada could declare that it had no objection to the passage of the vessel. Alternatively, the Canadian claim could be asserted with the proviso that it did not exclude the right of innocent passage, with specific reference perhaps being made to the "Manhattan" project.

- b) If the Government were to decide to abandon the Canadian claim to the waters between the Arctic islands (excepting the belt of the territorial sea) the “Manhattan” project would present no difficulties from the point of view of Canadian sovereignty and would be of interest to Canada only for practical reasons connected with northern development.

- c) If the Government were to adhere to the status quo by attempting to continue its present policy of maintaining the Canadian claim without asserting it in such a way as to provoke a confrontation with the USA, it would not be appropriate to require that the State Department officially request Canadian consent or concurrence to the passage of the US Coast Guard vessel. This would be virtually equivalent to seeking US recognition of the Canadian claim or firmly asserting that claim. It would, however, be appropriate to attempt to obtain official notification of the US Coast Guard participation in the project on a service to service basis pursuant to the terms of the PJBD agreement regarding public vessels. If service to service notification is received the Canadian claim to sovereignty would be protected and could be further reinforced by a substantial degree of Canadian participation in the “Manhattan” trials. However, if service to service notification is not received but a public controversy with the USA is nevertheless avoided, Canada could attempt to minimize the consequent prejudice to its claim by supporting and participating in the “Manhattan” project and thus giving it the appearance and character of a joint undertaking. With or without notification Canada could:
 - i) Give official and public approval to the transit of the Northwest Passage by the “Manhattan” and the US Coast Guard vessel “Westwind”, with mention being made of the support to be given to the project through aerial reconnaissance by US military aircraft.

- ii) Approve the participation of the DOT icebreaker "John A. MacDonald" in the project on the understanding that it will operate under its own independent command.
- iii) Authorize the Department of Transport to provide aerial reconnaissance of ice conditions and to assume responsibility through its Meteorological Branch for the coordination of all ice reconnaissance and information analysis and dissemination.
- iv) Select and appoint an official Canadian Government representative on board the "Manhattan", who in addition to his representative capacity would act as a technical adviser and coordinator of Canadian support for the operation.
- v) Accept the invitation extended by the sponsoring oil companies for the Canadian Government to purchase a participating share in the "Manhattan" project at a cost of \$500,000, through the medium of the Panarctic Oil Consortium or some other appropriate agency. This would stress the Canadian participation in the exercise and give Canada access to the valuable information it will provide regarding Arctic navigation and icebreaker-tanker design.
- vi) Designate the Department of Transport Marine Services as the Canadian Government agency for direct liaison with the sponsoring oil companies and with the US Coast Guard in the planning of the operation, subject, however, to consultation with the Department of External Affairs and to the general supervision of the Task Force on Northern Oil development.
- vii) Assign a public relations officer to the Canadian Coast Guard icebreaker "John A. MacDonald" to insure that due publicity is given to the Canadian participation in the project.

[Signed: André Bissonnette]

Chairman,
Combined Sub-Committee of the
Interdepartmental Committee on Territorial
Waters and Advisory Committee on Northern
Development

ANNEX I

EFFECTIVE OCCUPATION OF
CANADIAN ARCTIC ISLANDS

Legal Considerations

Effective occupation implies taking possession of and setting up an administration over a territory. The customary form of administration in polar regions consists of the maintenance of police posts, customs houses, post offices, schools, hospitals, and scientific, wireless and weather stations. In general, where the climate is severe it is sufficient that administrative control be exercised only when weather conditions permit travel. It is unnecessary for state authority to be asserted without interruption in all parts of the land all year round. Nor is it necessary to occupy everyone of a group of islands provided that order can be maintained in all of them from those which are occupied; military and police forces may be used for this purpose.

Departmental Jurisdiction and Activities

2. The Minister of Indian Affairs and Northern Development is charged with the responsibility for the development of the north and the general coordination of federal activities in the area. The Commissioner of the Northwest Territories is appointed by the Federal Government and is responsible for the administration of the Territories under the direction of the Minister of Indian Affairs and Northern Development, who is responsible for the administration and development of the area's natural resources. Other Federal Government agencies, such as the Northern Health Services of the Department of National Health and Welfare and the Royal Canadian

Mounted Police, are responsible for health and police services, with the Territorial Government sharing costs. The Department of Transport operates mainline airports throughout the north and the Canadian Broadcasting Corporation provides special shortwave northern broadcasts and maintains a growing number of local stations in the Territories. Federal cost-shared national assistance programs within the competence of the Territorial Government are available to it on the same conditions which apply to the provinces. In the far north the R.C.M. Police maintain detachments at Sachs Harbour on Banks Island, Resolute Bay on Cornwallis Island, and Grise Fiord on Ellesmere Island. The detachment at Resolute Bay is responsible for patrolling the Arctic Islands. The Department of National Defence maintains two establishments in the Arctic - one at Inuvik and the other at Alert in the northeasterly corner of Ellesmere Island, the most northerly settlement in Canada. Full details concerning the responsibilities and activities of various departments are given in the official publication "Government Activities in the North 1967" issued by the Advisory Committee on Northern Development.

Oil and Gas Exploration

3. In the administration of natural resources, the Department of Indian Affairs and Northern Development has the authority to issue licences for the exploration of minerals, including oil and gas, in the Arctic Islands, the Arctic mainland, and the continental shelf offshore from these areas. The Department has issued oil and gas permits covering a large portion of the Queen Elizabeth Islands, the Mackenzie Delta, the continental shelf in the Beaufort Sea, and the continental shelf between many of the Arctic Islands. Figure 1 attached shows the area in the Northwest Territories, the Yukon and the Arctic islands at present under lease or licence for oil and gas exploration. These oil and gas permits have been issued primarily to Canadian citizens and companies incorporated in Canada, some of which may be regarded as Canadian-owned and others as subsidiaries of US, French and British corporations. On January 30, 1969, a sale of offshore oil permits amounted to \$15,491,561. These permits include a "work bonus bid", which is a commitment guaranteed by a deposit of money, bonds, etc., to do exploratory work over and above what is specified by the permit regulations during the original term (six years for an ocean area). Already three wells have been drilled for oil in the Arctic Islands and two more wells are expected to be

drilled this year. Firm commitments have been made for as many as fifteen wells to be drilled in the north over the period of the next three years.

4. The active drilling program, the number of companies engaged and the infra-structure committed in the form of camp sites, emergency airstrips, and the like, all of which are subject to Canadian Government regulations, together constitute a clear indication of Canada's sovereignty over the area. The exploratory work being carried out in the field of drilling, geology and geophysics, as well as transport, is being done almost exclusively by Canadian contractors. The issuance of mining and oil rights, the conduct of exploratory work and the maintenance of facilities at Resolute, Inuvik, and other centres in the far north, all contribute to effective occupation, development and use of the region, and clearly demonstrate in a practical manner Canada's sovereignty over all the land areas (and consequently the continental shelf) in the region. With more than 115 million acres in permits in the Arctic offshore area, there is a commitment for extensive exploration. Extensive geological and geophysical surveys will be conducted and these will doubtless be followed by some wildcat drilling. One further demonstration of Canada's effective occupation of the north has been the Polar Continental Shelf Project which has been conducted by the Department of Energy, Mines and Resources for the past ten years. Figure 2 shows the work of the Canadian geological survey without which the present Arctic exploration for minerals, oil and gas, would not have been possible.

ANNEX II

SUMMARY OUTLINE OF CANADA'S ADMINISTRATIVE AND OTHER ACTIVITIES IN THE CANADIAN ARCTIC ISLANDS OVER THE YEARS

The Canadian Government has:

- (1) Engaged in considerable exploration of the Arctic islands, surveying and mapping unknown regions.

- (2) Sent forth numerous official scientific expeditions to carry out investigations in nearly every scientific field but chiefly in the fields of geography, geology, hydrography, biology, and archaeology.
- (3) Taken aerial photographs of nearly all of the islands, and since 1904 has compiled and published official maps which show them as part of Canada.
- (4) Through the R.C.M. Police it has brought law and order to the whole region. Since 1900 the Police have carried out patrols throughout the Archipelago. At present, eleven R.C.M.P. detachments are in operation on Baffin, Cornwallis, Victoria, Banks and Ellesmere islands.
- (5) Established schools on Cornwallis, Baffin and Victoria islands; installed nursing stations and other medical care services; conducted regular medical patrols; given inoculations against disease; provided an "air ambulance service" to fly patients from the area to outside centres for treatment; developed relief measures for destitute Eskimos, and extended Family Allowance, Old Age Pensions and other national welfare programs to the inhabitants of the region.
- (6) Introduced orders-in-council, statutes and ordinances to regulate civil affairs and the disposition of natural resources such as furbearing and game animals, sea mammals, migratory and non-migratory birds, oil, gas and minerals, and has charged licence fees for the exploitation of these.

Moreover, since 1926, under "An Ordinance Respecting Scientists and Explorers" made by the Commissioner in Council of the Northwest Territories, scientists or explorers who wish to enter and conduct research in any part of the N.W.T. including the Arctic islands, must apply and receive from the Commissioner a special licence to do so. Special permits or licences are also issued to scientists who wish to undertake archaeological investigations or to take wildlife specimens and migratory and non-migratory birds. Such provisions have been observed by the nationals of many countries, including those with particular interests in the Arctic.

- (7) Established Post Offices in sixteen settlements on Baffin, Cornwallis, Ellesmere, Ellef Ringnes, Prince Patrick, Banks, Victoria and Southampton islands; compiled a population census; and appointed personnel to receive applications for citizenship and to act as customs and immigration officers.
- (8) Established a radio communications system and through the R.C.A.F. conducts an Arctic search and rescue service. In addition it has established three weather stations on Banks and Baffin islands. Since 1947, it has installed five weather stations with the U.S.A. under the Joint Arctic Weather Stations Program on Ellesmere, Ellef Ringnes, Prince Patrick, and Cornwallis islands. (In the operation of this program, although no formal exchange of notes has taken place between the two countries, the U.S.A. has respected Canadian sovereignty and has complied with Canada's wishes in the area.)
- (9) In mid 1960 passed the Canada Oil and Gas Land Regulations providing for the issuance of oil and gas exploration permits and leases in the Arctic islands and in the submerged lands of the Arctic continental shelf. By early 1969, over 4180 permits were issued covering in excess of 204 million acres and representing almost 90 percent of the island and channel areas of the Canadian Arctic island group, in addition to 230 permits covering in excess of 10 million acres in the Beaufort Sea region.
- (10) Licensed the drilling of "Dome et al Winter Harbour No. 1", located in September 1961 on the south coast of Melville Island. The well, abandoned at 12,543 feet on March 24, 1962, cost over \$2 million.
- (11) Licensed the drilling of "Canso et al Bathurst Caledonian River J-34" located in September 1963 on the east-central coast of Bathurst Island. The well, abandoned at 10,000 feet in February, 1964, cost more than \$2.1 million.
- (12) Licensed "Lobitos et al Cornwallis Resolute L-41" located in September 1963 near Resolute on the south coast of Cornwallis Island. The well, abandoned at 4840 feet on December 15, 1963, cost over \$1.5 million.

- (13) Entered into partnership on December 12, 1967 with a consortium of 20 mining and oil and gas companies and individuals, in Panarctic Oils Ltd. The Government granted \$9 million to the Company for which it obtained a 45 percent equity. The Company initiated a \$20 million massive exploration assault in the Arctic islands in the spring of 1968. Three airstrips over 4000 feet long, for staging this operation, have been constructed on Melville Island and others will be built on many other islands during the next few years. At least two wells are being located in March, 1969 on Melville Island, and Panarctic Oils alone will drill at least 15 more wells on other islands in the Queen Elizabeth Group.

- (14) Sold 22 permits covering blocks containing a total of almost 1.2 million acres in the Beaufort Sea in water depths ranging up to 700 feet, for approximately \$15.5 million of work bonus commitment.

- (15) Exploratory work commitments associated with oil and gas permits in the Arctic Islands and Arctic offshore well, to the end of 1972, will total more than \$100 million. This exploration activity will support a great increase in the tonnage of goods transported by convoyed ships into the Arctic islands. The increased activity has already permitted two scheduled flights per week to be flown to Resolute from Edmonton by Pacific Western Airlines and from Montreal by Nordair.

Military Activities in the Canadian North in 1968

<u>Type of</u>	<u>Activity</u>	<u>Remarks</u>
1) Canadian Forces Radio Stations:		
- ALERT		- 177 Military Personnel
- INUVIK		- 200 Military and 7 civilian Personnel
2) DEW Line Main Sites at:		
- CAPE DYER		- Sites are maintained and managed by the Federal Electric Corporation under contract to the USAF. Each site includes 5 Canadian Forces personnel including the Military Commander. Sites are visited periodically by Canadian Forces aircraft.
- HALL BEACH		
- CAMBRIDGE BAY		
- CAPE PARRY		
3) Search and Rescue Operations		- In 1968 there were four major searches conducted north of the 60th parallel involving 100 flying hours.
4) Maritime Patrol Flights		- Four reconnaissance flights were conducted in 1968 by Maritime Command aircraft.
5) Land Forces exercises		- During the year a tactical exercise was conducted at Fort Churchill. The aim of the exercise was to evaluate new short-range radio sets for tactical communications in the Arctic and to conduct limited

- field trials of certain land vehicles.
- 6) Support for DEW Line re-supply operations - Two naval clearance diving teams assisted in eastern and western DEW Line re-supply operations during July, August and September.
- 7) Support for British Trans-Arctic Expedition - Four re-supply airdrops by 6 C130 aircraft.

ANNEX III

ATTITUDES OF NATIONS WITH SPECIAL INTERESTS IN THE ARCTIC AREA REGARDING ACCEPTANCE OF THE SECTOR PRINCIPLE

- (1) The U.K. used the sector principle in official declarations in 1917, 1923 and 1925 relating to the Falkland and Ross sectors in the Antarctic. In 1916 it tacitly accepted a Russian claim to islands north of Siberia on the grounds of "geographical continuity". Moreover, in 1930 it tacitly recognized the Soviet sector.
- (2) By a Decree of April 15, 1926, the U.S.S.R. officially recognized the sector principle and included as part of the territory of the U.S.S.R.
- “all lands and islands already discovered, as well as those which are to be discovered in the future, which at the moment of the publication of the present decree are not recognized by the Union of Soviet Socialistic Republics as the territory of any foreign state, and which lie in the Northern Frozen Ocean north of the coast of the Union of Soviet Socialistic Republics up to the North Pole ...”
- (3) The U.S.A. has never committed itself. It has usually put forward effective occupation as the basis for sovereignty in polar regions and has opposed the application of sectors in Antarctica.

- (4) Denmark, although never specifically declaring adherence to the principle, in practice is partly committed to it because of its claim to Greenland on the basis of the “essential unity of the whole area.”
- (5) Norway has never claimed a sector. When it accepted the Canadian position with regard to the Sverdrup Islands in 1930, it stated that its recognition was in “no way based on any sanction whatever of what is named the sector principle.”

ANNEX IV

WATERS BETWEEN THE CANADIAN ARCTIC ISLANDS

Modus Vivendi With U.S.A.

In the case of U.S. convoys supplying installations in the Arctic, the American practice has been to request waivers of the provision of the Canada Shipping Act which reserve the coasting trade to Canadian ships. On occasion these U.S. convoys entered Canadian territorial waters within three miles from shore; and the waivers issued by the Canadian Government could therefore be interpreted as applying only to such entries within the three-mile limit, in which case they would not constitute acquiescence in Canada’s claim beyond three miles. This arrangement is no longer in effect since Canada has assumed the responsibility for the annual resupply by sea of the DEW-line installations and of the Joint Arctic Weather Stations.

2. The first submarine passage through the waters between the Arctic islands occurred in 1960 when the “Seadragon”, traversed Lancaster Sound, Viscount Melville Sound and McLure Strait. (Earlier, in 1958 and 1959, the U.S. submarines, “Skate”, “Nautilus” and “Sargo” had made extensive cruises in the Polar Basin but reportedly did not enter the inter-island waters.) The “Seadragon’s” voyage was made after the U.S. Navy had obtained Canadian “concurrence” in the proposed cruise on a service to service basis pursuant to the Permanent Joint Board of Defence agreement regarding “public vessels” of

the U.S.A. and Canada. A similar procedure was followed at about the same time in connection with a cruise by the U.S. submarine "Archerfish" in Hudson Bay, Ungava Bay, Foxe Basin, Frobisher Bay and Cumberland Sound. In these two cases the procedure followed was such that it could be taken as acquiescence in Canada's claim to sovereignty. In 1962, however, the USS "Skate" and another submarine traversed the inter-island waters without a request for concurrence; in this case the procedure followed was that of simple notification. It is relevant to note that passage by a submarine in another country's territorial sea, according to the 1958 Geneva Convention on the Territorial Sea, to be "innocent" must be on the surface and not underwater. Thus a foreign submarine cannot navigate submerged in territorial waters without the consent of the coastal state; in the Arctic, of course, the object of using submarines is to avoid the ice barrier to surface navigation.

Arguments for Canadian Claim to Sovereignty

3. Article 4 of the Geneva Convention specifies that straight baselines may be used "where the coastline is deeply indented or cut into or if there is a fringe of islands along the coast in its immediate vicinity". The baselines should follow the "general direction of the coast" and the sea areas and land must be "closely linked". Against these criteria the Canadian claim to the waters between the Arctic islands is supported by the fact that this formation constitutes a coastal rather than an outlying or oceanic archipelago. The Arctic islands represent an extension of the continental land mass, and have a geographical unity with the Canadian mainland which makes the Arctic archipelago similar in this respect to the formation involved in the Anglo-Norwegian fisheries case and helps to distinguish it from such oceanic archipelagos as the Philippines and Indonesia.

4. The linkage between the sea areas and the land domain is at least as pronounced in the Canadian Arctic as along the Norwegian coast. The islands are a completely dependent area where human activity and life is only possible with close and constant support from the mainland. Another factor which should weigh on this point is that the water areas are frozen or impassable most of the year, some of them never being free of ice all year round. They are therefore more assimilable to land than water. This factor supplies an element of physical unity between the land and the frozen water

which is unique. Moreover, the icebound channels of the Arctic islands could not normally be navigated (except by submarine) without Canadian assistance by means of icebreakers, aerial reconnaissance and other aids to navigation; this factor again distinguishes the Arctic channels from international straits having the character of high seas.

5. An important consideration (which would no doubt influence the views of other countries in respect of Canada's claim to the waters between the Arctic islands) is that Canada presumably would allow foreign vessels the right of innocent passage, pursuant to article 5 of the Geneva Convention, in the event that these channels were closed as internal waters by means of straight baselines. Much of the opposition to the claims of Indonesia and Philippines stems from fears that application of the straight baseline system to these oceanic archipelago would imperil freedom of navigation and consequently strategic interests as well.

Arguments Against Canadian Sovereignty

6. Although the Arctic islands form a coastal archipelago, its configuration is not that of a "fringe" in the terms of the Geneva Convention. Or, what is much the same thing, the massiveness of the formation tells against its qualifying under the Norwegian formula adopted in the Convention. The Canadian claim to the Arctic archipelago exceeds in terms both of area and length of lines the Norwegian precedent by such a magnitude that it becomes difficult to reconcile the two situations. An enclosure involving baselines which total 3000 miles, it can be argued, is very different from a baseline system hugging a shore with a trend line of about 650 miles in all.

Indications of Canadian Sovereignty

7. Since the "C.D. Howe" was acquired in 1950 the Canadian Coast Guard has provided the Eastern Arctic Patrol which was formerly done by other vessels. This service has been in operation since 1903 when the Department of Transport chartered the "Neptune" to show the flag in northern waters. In 1904 the Department sent its own steamer the "Arctic", under Captain Bernier, which carried out a series of patrols lasting until 1925, after which more voyages were made by chartered vessels until the building of

the "C.D. Howe" in 1950. Since Canada assumed the responsibility for the annual resupply by sea of the DEW-Line and Joint Arctic Weather Stations, the Department of Transport has organized the chartering and stevedoring services for the annual sea lift and has also provided icebreaker support and the landing craft and other equipment necessary for the over-the-beach movement of cargo.

8. Each summer when not actively employed in supporting the vessels of the sea lift, Canadian Coast Guard icebreakers have been used to conduct hydrographic and oceanographic investigations and to make exploratory probes in various parts of the Arctic. In the western Arctic each year since 1960 a Canadian Coast Guard icebreaker has been sent to support the movement of cargo for the replenishment of DEW-line stations in the western Arctic sent by the Mackenzie River route. In addition to icebreaking services, the same vessel also lays aids to navigation.

ANNEX V

THE “MANHATTAN” PROJECT

Background

The intention of the oil companies concerned with the development of the oil finds on the north slope of Alaska are that initially the oil should be fed into the western United States market complex by pipeline across Alaska to an open water port and thence by tanker to a west coast terminal. However, the dimensions of the field are such that in order to exploit it to the full, access to the United States eastern market and perhaps to Europe is necessary. There are a number of alternative routes to achieve this which are being studied by the oil companies using - all pipeline, pipeline and tanker, and tanker only. Tanker transport through the Northwest Passage is the most economically favourable method if it is technically feasible. Preliminary studies show that very large tankers of about 250,000 tons deadweight reinforced for operation in ice and with extra power can probably transit the Northwest Passage. However because of the limitation of our knowledge of ice conditions in winter in the Arctic, some sort of a trial and further information-gathering is necessary in order to prove the thesis. The oil companies have therefore chartered the SS “Manhattan” to do this.

2. The “Manhattan”, at 145,000 tons displacement, is a little over half the size of the tankers that would be required and her own ability to make the passage is problematical. Nevertheless, as a half-scale model she will provide information on the performance of very large bulk carriers in ice that should enable the oil companies to make the decisions they require. She is now in US yards cut into three pieces for strengthening, for the fitting of a completely new icebreaking bow, and for instrumentation to make precise measurements of the stresses and conditions to which she will be subjected. It is expected that she will be completed and ready to sail in the first half of July. The proposal is that she should make the passage from the US to Alaska through the deep water Northwest Passage (see attached map for possible alternative routes for the “Manhattan”) under controlled conditions of precise measurement of stress, power expenditure for measured ice conditions, effect on ship, structure and strength of ice and so forth. If she completes the passage from east to west a decision will then be taken on whether to retrace

the route or to proceed on into the Pacific around the tip of Alaska. The original hope was that the trial would be done in May when Arctic ice conditions are still characteristic of winter. However, the ship will not now be able to enter the Parry Channel before the end of July when conditions may be a good deal less severe. If, too, it is a relatively easy season the test may not give all the information needed and it may be necessary to repeat it later in the winter.

Request for Canadian Participation

3. Soon after the decision was taken by the oil companies to undertake the trials, informal contact was established with the Department of Transport and other Departments with interests in the Arctic by the Humble Oil Company acting as the operating agent for the companies involved in the project. The expectations of the oil companies for Canadian support and assistance in the project are:

- a) Provision of an icebreaker to accompany the "Manhattan". It was fully realized by both sides that the icebreakers available have limited capability in polar ice and that the "Manhattan" will probably have a better icebreaking potential than the icebreakers. Nevertheless, for emergency and for general help it is essential that there should be icebreaker support for the tanker. Originally it had been hoped that the "Louis S. St. Laurent", which will be the most powerful icebreaker in the world outside Russia, would be available but there have been so many delays in the completion of this ship that she will not be ready in time and the icebreaker to accompany the "Manhattan" will be the "John A. MacDonald".
- b) Canadian provision of reconnaissance of ice conditions, analysis and forecasting through the Department of Transport organization which already exists for this purpose. It is understood that the U.S. Navy would also wish to have a part in this role and would in any event be doing the ice reconnaissance over Alaskan waters, but it is still the hope of the oil companies that Canada would take the major part and be responsible for the coordination of the whole function.

c) The appointment of a Canadian representative on board the “Manhattan” who, it is hoped by Humble Oil, will combine the three functions of - national representation; the provision of Canadian Arctic expertise; and coordination between the “Manhattan” and the Canadian icebreaker and other Canadian agencies involved in the support of Arctic navigation during the actual operation.

4. The provision of an icebreaker during the first passage of the “Manhattan” is not a serious problem since Canadian icebreakers are operating in the Arctic at that time of year in any event and all that is required is a diversion from regular duties at no extra cost, though at some inconvenience to other Arctic activities. In view of the potential importance of the “Manhattan”’s operations to Canada, this inconvenience should be accepted.

5. The coordination and provision of ice reconnaissance, analysis and information during the first phase of the trial in July and August requires little more than approval to take the lead in this activity and to provide the necessary information to the “Manhattan” as the Department of Transport normally is active in this field for the annual resupply of Arctic installations. If a second trial of the “Manhattan” in winter is necessary, additional unprogrammed ice reconnaissance activities will be necessary involving the provision of aircraft and personnel. Tentative estimates of cost are approximately \$150,000.

6. The selection of the official Canadian representative involves finding someone with the qualities to help in coordination between the civilian, para-military and a government non-military elements of a Canadian/American group as well as having a sufficient knowledge of the Canadian Arctic and of navigation in ice to be able to give technical advice to the Captain of the “Manhattan”. The oil companies have already decided on the individual they believe to be most suitable and whom they know to be acceptable to their own people, to the U.S. Coast Guard and to the Canadian Coast Guard. They hope that he will be the individual selected by Canada, but will of course abide by any choice made by the Canadian Government. Because of the limitations of space in the “Manhattan”, they are anxious not to have to duplicate any of the positions earmarked for representatives and technicians, but if the Government appoints a person who in their opinion is not suitable,

they are prepared to accept him as a token Canadian representative and to retain on their own behalf the Canadian of their choice.

7. The planning of the operation has now reached a stage when it is important that a decision on Canadian participation should be taken.

Information Obtainable from "Manhattan" Project

8. The Humble Oil Company (which is the chief sponsor of the project) has offered to release to the Panarctic Oil Consortium the information obtained during the trial run of the "Manhattan" through the Northwest Passage, on the same terms as those offered to other oil companies. These are:

- (a) a payment of \$500,000 now, and
- (b) a payment of \$2 million if the information is used in the design of an ice-breaking tanker before 1976.

In return Humble would provide Panarctic with all the scientific and technical data obtained during the trials and agree to Panarctic having an observer on board the "Manhattan". It is understood that both British Petroleum and Atlantic Richfield have already paid \$2 million each for substantially the same rights, and that Phillips Petroleum are considering acceptance of a similar offer, which will be open until April 30, 1969, after which the price of participation will probably be increased. It is also understood that the offer made to Panarctic would also apply alternatively to some other Canadian Government agency.

9. In the event that the Canadian Government did not agree to Humble's offer (involving the payment of \$500,000), the oil company is prepared to discuss with the Canadian Coast Guard the terms and conditions under which some limited information would be made available to that service. It has been suggested that any such information would only be made available on condition that:

- (a) the information would not be passed on to any commercial users, and

- (b) the information would be limited to what was needed for designing an Arctic rescue icebreaker and/or for control and regulation purposes.

10. The advantages of obtaining the “Manhattan” information might be even greater if the trials are not completely successful than otherwise. If the trials were completely successful it would be demonstrated that ships can be built to navigate in the Arctic all year round. If the trials are only partly successful, Canada could obtain information which would extend the shipping season for Baffin Island, and for Panarctic, from two months to perhaps eight or even ten months. Detailed information on the trials would be required if it was to be used to speed northern development.

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Memorandum: Letter of Instruction to Captain T.C. Pullen, from Admiral A.H.G. Storrs, Director of Marine Operations, Department of Transport, to Captain T.C. Pullen, 11 July 1969

This memorandum is to confirm that you have been appointed the Department of Transport’s representative onboard the U.S. Flag Tanker MANHATTAN for the duration of the forthcoming Arctic tanker test being undertaken by the Humble Oil & Refining Company of Houston, Texas.

You are further advised that you have been named as the Government of Canada’s representative onboard the MANHATTAN for the duration of the operation.

You should make your own arrangements to report onboard the above-named vessel at the Sun Shipyard, Chester, Pa., as convenient before sailing on or about 31st July, 1969. You should plan to remain in the ship until Arctic tests have been completed or, at the discretion of the Director of Marine Operations, your presence onboard is no longer required.

Also embarking in the MANHATTAN will be Mr. Emil Stasyshyn, an Ice Observer with the Department of Transport’s Meteorological Branch in Toronto. He will be the only other Canadian representative.

On completion of the operation it is requested that a suitable post-operation report be prepared with the assistance of, and using the facilities available in, the Marine Services Branch. Mr. Stasyshyn should be informed of this requirement and be prepared to assist in its compilation.

Canadian participation in the operation is at the request of the Humble Oil Company. The tanker test is being conducted on the initiative of United States oil interests and there is no intention on the part of the Canadian Government to assume any responsibility whatsoever for its outcome. Canada is, as you are aware, contributing the services of the C.C.G.S. JOHN A MACDONALD together with a specially equipped ice-reconnaissance aircraft. These contributions are being provided, not only in response to a request from the sponsors of the test, but also to ensure a meaningful and obvious Canadian presence in our Arctic waters and to gather information and data which will be of subsequent benefit to Canada.

It is possible that during the course of the trial the MANHATTAN and her accompanying U.S.C.G. Icebreaker will enter waters that are unquestionably Canadian territorial waters. This may occur in Pond Inlet, Prince of Wales Strait and along the coasts of the Islands. Such an event is regarded as a normal part of the whole operation which has the concurrence and support of the Canadian Government.

The role of the JOHN A MACDONALD is to accompany rather than escort the tanker through the Northwest Passage. In the event the latter vessel gets into difficulties she will undoubtedly request assistance from the MACDONALD which the Master may, at his discretion, supply. He is under no obligation to provide assistance which would, in his opinion, jeopardize the safety of his own vessel. He should, of course, do everything he can short of this to ensure the success of the test.

The matter of command relationships, not only vis-à-vis yourself and the Master of the MACDONALD, but with both of you and the other authorities who will be present poses a problem. In addition to the Mission Commander himself, there will be the Master of the MANHATTAN and his two Staff Captains, the U.S. Coast Guard representative onboard and the Captain of the U.S.C.G. Icebreaker. An unhealthy repletion of leaders. It is impossible to give helpful direction as to how such a situation should best be handled. It is clear that as far as the tanker is concerned the Mission Commander has complete authority. With reference to the MACDONALD, however, he can only request assistance and in all his dealings with that ship he should first seek your concurrence, after having consulted with you, before passing any requests to the Master of the MACDONALD. This procedure should also apply to the other American authorities listed above.

In addition to your other responsibilities you should collaborate directly with the Master of the MACDONALD and endeavour always to represent his

views and wishes to the Mission Commander and vice-versa.

The Master of the MACDONALD will be requested to provide you with helicopter transport for meetings in his ship at your request, subject always to operational commitments.

For the duration of this operation you are hereby appointed the Director of Marine Operations' 'on scene' representative. You are empowered to take whatever action you deem necessary to advise the Director in the event the situation requires it. Such traffic should be passed through the MACDONALD's facilities, after discussions with the Master, if necessary, using the encrypting facilities with which she is being supplied.

You will also be the channel through which special instructions may be passed by the Director of Marine Operations to the Master of the MACDONALD.

In the event of a major disaster in Canadian waters and the situation is such that the Mission Commander and the Master of the MANHATTAN have been defeated by circumstances, a state of affairs which should be recorded in writing at the time, you should be prepared to act as 'on scene' co-ordinator. In this capacity you should also be prepared to initiate and direct whatever action is required enlisting the co-operation and support of the accompanying U.S.C.G. Icebreaker and passing to the Director of Marine Operations whatever requests you consider necessary for additional support.

In similar circumstances, but in United States waters, it is presumed that the U.S. Coast Guard representative onboard the Tanker would have similar responsibilities and you should, in similar fashion, co-operate accordingly with him.

Should such a situation arise in waters that are clearly international, it is considered that the responsibility to provide leadership and co-ordination, in the event of disaster, should fall on the U.S. Coast Guard as the operation is essentially American. Again, Canadian assistance and co-operation would be willingly forthcoming.

It is clear that a very high degree of understanding and co-operation will be required of all concerned and particularly is this the case with yourself and your U.S. Coast Guard counterpart in the MANHATTAN. Only in this way could the most effective use be made of all available icebreaker and aircraft resources.

You should take steps to ensure that Canadian laws governing such matters in the Arctic as the shooting of animals, the harassment of game from helicopters, traffic with the Eskimoes, the disturbance of archeological sites

and the pumping of bilges and the disposal of garbage are scrupulously observed.

Should you at any time require advice or guidance in your dual role you are authorized to seek this through the Director of Marine Operations in Ottawa.

A.H.G. Storrs.

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Memorandum from Captain T.C. Pullen, 25 July 1969

The following is the latest program of the MANHATTAN as a result of the telecon Haas/Pullen, 25th July 1969:

River Trials	2 August
Philadelphia	12 " Departure
Halifax	15 "
Rendezvous with J.A.MACDONALD (62°N 54° W)	19 "
Thule, Greenland	23 "
Pond Inlet	25 "
Resolute Bay	28 "
Melville Island	1 September
Sachs Harbour (hopefully by way of POW Strait)	8 "
Barter Island	15 "
Prudhoe Bay	17 "
Point Barrow	20 "
<u>RETURN</u>	
Prudhoe Bay (Testing S.Edge of Polar Pack)	24 September
Resolute Bay (hopefully by way of M'Clure Strait)	28 October
Thule, Greenland	1 November
New York	10 "

- NOTE: 1. This program assumes successful River Trials.
2. Planned visit to Anchorage, Alaska, has been cancelled because of delay to the program.

T.C. Pullen

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1969
NORTHWEST PASSAGE VOYAGE
of
S. S. MANHATTAN



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Personal Journal of Captain T.C. Pullen R.C.N.
Canadian Government Representative, Co-ordinator
of Canadian icebreaker support on behalf of the Department
of Transport, and Ice Adviser to Humble Oil (now
Exxon), sponsors of the 73 day undertaking

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“MANHATTAN” NORTHWEST PASSAGE - 1969
C O N T E N T S

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Title Page
Introduction
Background to the Arctic Tanker Test
Sailing Orders
People involved

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28 August	Day 1	Depart Halifax.
29 August	Day 2	Cabot Strait.
30 August	Day 3	Belle Isle, first iceberg & northbound in the Labrador Sea.
31 August	Day 4	Rendezvous with CCGS John A <i>Macdonald</i> . Proceeding in company.
1 September	Day 5	Cross the Arctic Circle.
2 September	Day 6	First encounter with ice. Timidity among the floes
3 September	Day 7	Boreas Rex.
4 September	Day 8	Thule, Greenland. Embark officials from Houston.
5 September	Day 9	Entering Lancaster Sound. High speed jousting with heavy floes.
6 September	Day 10	Off Resolute Bay. USCGC Northwind joins. Parliamentarians on board.
7 September	Day 11	Westbound in Viscount Melville Sound in ice.
8 September	Day 12	Difficulties in ten tenths pack.
9 September	Day 13	Ice problems and slow headway. Northwind withdraws with engine problems.
10 September	Day 14	Steering for M'Clure Strait through heavy heavy pack.
11 September	Day 15	Beset off Cape Vesey Hamilton, Banks Is.

12 September	Day 16	Struggling to free <i>Manhattan</i> .
13 September	Day 17	Problems in Prince of Wales Strait.
14 September	Day 18	More problems in the Strait.
15 September	Day 19	Sachs Harbour. My kyack is bigger than your kyack.
16 September	Day 20	Near grounding in the Beaufort Sea.
17 September	Day 21	On passage to Barter Is. in fog.
18 September	Day 22	Barter Is. More VIP's on board.
19 September	Day 23	Prudhoe Bay and the Golden Barrel.
20 September	Day 24	Point Barrow, Chukchi Sea & the Northwest Passage achieved.
21 September	Day 25	At Barrow.
22 September	Day 26	Eastbound.
23 September	Day 27	Stuck.
24 September	Day 28	Struggling.
25 September	Day 29	Sachs Harbour again.
26 September	Day 30	Arguments with management.
27 September	Day 31	More arguments. Fournier erupts.
28 September	Day 32	Viscount Melville Sound. Full ahead, full astern, full ahead, all day at \$600,000 a day.
29 September	Day 33	<i>Louis St Laurent</i> (Captain W. Dufour) arrives.
30 September	Day 34	<i>Manhattan</i> sundering floes 22 ft thick.
1 October	Day 35	Ill-advised visit to Winter Harbour.
2 October	Day 36	Visit to John A <i>Macdonald</i> for planning.
3 October	Day 37	First visit to Canada's newest and biggest icebreaker.
4 October	Day 38	S.S. Mushroom.
5 October	Day 39	Ice tests - difficulties.
6 October	Day 40	Striving. <i>St Laurent</i> to the rescue.
7 October	Day 41	Winter Harbour transfer.
8 October	Day 42	Poor navigational practises in <i>Manhattan</i> .
9 October	Day 43	Viscount Melville Sound ice tests continue.

10 October	Day 44	<i>St Laurent</i> fuels before departure.
11 October	Day 45	Polar bears and orange paint
12 October	Day 46	Tour of <i>St Laurent</i> & her departure for Resolute.
13 October	Day 47	Northwards to Byam Martin Island.
14 October	Day 48	Machinery problems on board <i>St Laurent</i> .
15 October	Day 49	Fun among the floes - too many Chiefs.
16 October	Day 50	<i>Manhattan</i> to the rescue and bogs down for her efforts.
17 October	Day 51	Breakout.
18 October	Day 52	Polar porridge, polar bears & poetry.
19 October	Day 53	<i>Manhattan</i> bangs away at an ice island.
20 October	Day 54	A day onboard <i>Macdonald</i> and <i>St Laurent</i> .
21 October	Day 55	Assessing the captains.
22 October	Day 56	Visit to <i>Staten Island</i> .
23 October	Day 57	Bumping that ice island fragment.
24 October	Day 58	Looking for test ice.
25 October	Day 59	Still searching.
26 October	Day 60	Ennui - drafting document for Beechey.
27 October	Day 61	Resolute thence Beechey Island.
28 October	Day 62	Franklin's cairn.
29 October	Day 63	Iceberg collision.
30 October	Day 64	Driving pack and a lee shore.
31 October	Day 65	Homeward bound.
1 November	Day 66	Our icebreakers depart.
2 November	Day 67	What price Danish sovereignty?
3 November	Day 68	Storm.
4 November	Day 69	Driving south at 18 knots.
5 November	Day 70	Reviewing the voyage with Stan.
6 November	Day 71	Passing Belle Isle inbound.
7 November	Day 72	Stan and Bram insist on a copy of my Journal.
8 November	Day 73	Halifax and hubbub.

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Captain T.C. Pullen RCN
Personal record of the 1969
Northwest Passage voyage of the icebreaking tanker
MANHATTAN

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Thursday, 28 August 1969

Day One of the long-awaited Arctic Tanker Test for Canada's official representative. The first day of how many I wonder? *Manhattan*, having arrived from Chester, Pa., I arrived by car from Chester, N.S. The tanker, looking immense at her anchorage north of George's Island, had been there since 0830.

The morning was clear and sunny and all new arrivals, including myself, were welcomed on board by the three captains (Steward, Smith and Graham) and Stan Haas, the Project Manager. There were speeches, briefings and tours during which I humped my gear to my quarters and prepared to settle in. My "quarters" it turns out are in fact a four berth cabin with which I am to share with my new friend Captain F.A. (Beef) Goettel, U.S. Coast Guard, Emil Stasyshyn, the Canadian ice observer from the Met. Branch, and Donald Nevel, an ice physicist from the University of Alaska.

While weighing anchor at 1430 a stream of radio messages arrived instructing me to contact Admiral Storrs in Ottawa on a matter of extreme urgency. All manner of chilling thoughts crossed my mind as to what this was all about. The summons stated he wished to speak with me over the telephone and not by radio where others could overhear the conversation. In all the confusion of setting sail in a huge and strange ship it was difficult to catch anybody's attention for help in dealing with this distraction. In the end a Coast Guard helicopter arrived on our flight deck to take me ashore to the Dartmouth base of the Department of Transport. To my considerable relief I found the flap had to do with some sort of complaint by a Liberal M.P. (St Pierre) concerning remarks allegedly made by me at a press interview in Chester, Pa., some weeks ago on the subject of Arctic sovereignty. My version of the event seemed to satisfy D.M.O. after which I was promptly flown back

to the ship by then just north of Maugers Beach and outbound. When flying over the spot where she had been at anchor we could see that a deal of mud had been stirred up by her propellers and at that her draft is only 43 feet being still in the light condition.

The food is very good, well prepared and plentiful even if the hours seem somewhat unusual - breakfast at 0730, lunch 1130 and dinner at 1730. Moving very slowly we eventually cleared the harbour and shaped course eastward along the coast of Nova Scotia. Off Egg Island the schooner *Bluenose II* passed down our port side bound for Halifax. Despite the fact that *Manhattan's* voice callsign is *Bluenose I* could generate no interest among the people on the bridge at the sight of a ship of the same name sailing by at sunset. Everybody too busy socializing in the wheelhouse.

Later that evening Stan Haas came to our quarters for a talk. We were told that a jet aircraft will be flying into Barter Island, Alaska, when we are in the area and will have seats for nearly 25 passengers on its return flight to Fairbanks. This could be helpful for both of us (Beef and I) in arranging flights for people wishing to leave the ship. He also indicated that Bechtel Corporation had made an approach to Indian Affairs and Northern Development in Ottawa about the possibility of using Franklin Bay as a site for a tanker terminal instead of Prudhoe Bay -- this was news to me.

Apparently the doppler-sonar is out of action and there is considerable dissatisfaction over the performance of the company responsible and its representative - especially the latter. The young man concerned was interested only in getting off the ship before she sailed from Halifax as though we were bound for the end of the world instead of the Arctic.

Displacing 155,000 tons and more than 1,000 feet long there is little or no sensation of being at sea. Inside this massive ship there is no engine noise, vibration or sense of motion. Destroyer life was never like this.

By dark speed was increased to 15 knots and we are well and truly on our way.

Saturday, 30 August - Day Three

At 0800 we are passing Belle Isle after which course will be altered to the north for the long run up the Labrador Sea. Clear skies and sunshine.

While all was well with our weather, matters were a little different in the chain of command on board. Roger Steward furious (rightly so) that he had not been consulted about the fuss over that weakened plate, and discussions

relating to it, convened by Stan and others in which he had not been included. Roger apparently made quite clear to all and sundry, especially to Stan, that as Master of the vessel he should have been consulted and had better be in future.

At 0900 a flurry of excitement at the report of a small iceberg aground on the Labrador coast. It is the first ice to be sighted and there was some disappointment that it looked so unimpressive. They need not fuss for they'll be sick of the sight of ice before many weeks are out.

Beef and I had a lengthy interview with Bill Smith of the New York Times who is on board for the voyage and writing a series of articles.

At seven bells Roger invited me into his cabin to sample the Puerto Rican rum he had for distribution and I was quick to endorse his choice. While thus engaged Stan knocked at the door so he and Roger withdrew to his day cabin or office for a brief conference. With the chain of command already appearing to be a little strained Beef and I find ourselves in a position where we must avoid giving any appearance of taking sides in what could become a power struggle between the “flag” (Stan) and the “flag captain” (Roger), not to mention others on board with influence.

At noon our position 53 deg. 14.5 min North latitude, 55 deg. 21.5 min West longitude, course north and making good 16.5 knots.

An idle afternoon reading and enjoying Beef's music.

The ideal weather didn't take long to give way to what I would call more normal conditions for the Labrador Sea. By 1800 fog, drizzle, and a rising wind from the northwest. A few icebergs visible in the distance and during the afternoon watch a modern, red-hulled tanker was sighted on the horizon. By 1830 we were moving at 80 revolutions (about 12/13 knots) and at last people are paying more attention to their radars which are showing the occasional large berg. As for smaller pieces of glacial ice we might not know of their existence until it is too late but in this area the chances are slim and I expressed this view to Roger who was enquiring.

[Section missing] ... really would be better if Beef and I had a cabin to ourselves as was originally promised and, in the present circumstances, infinitely better if Emil did not smoke cigars.

Before dinner, while standing near our doorway measuring distances on the chart, I suddenly realized Roger Steward was right behind me. He said he didn't want to startle me - he detested “porthole peepers”. He had come to tell us our ETA off Cape Atholl, near Thule, would be 0900 on September

3rd - 1400Z. This was to be the first of numerous visits he would make to chat with us - visits which were always entertaining.

Beef showed me a message sent by the Commandant of the U.S. Coast Guard, Admiral Willard J. Smith, to Michael Wright, Chairman of the Board, Humble Oil and Refining Company:

“In four centuries of exploration in the Arctic, no expedition has been more significant nor promised more potential benefit than the voyage of the *Manhattan*. It may herald a new era in Arctic transportation. It may unlock a treasure of natural resources in Alaska undreamed of a few years ago.

“We deeply admire the daring pioneer spirit of you and your company. By challenging one of our (!) last frontiers, Humble has exemplified the dynamic energy and enterprise of the American petroleum industry. After nearly 100 years of Arctic operations the Coast Guard is pleased that the experience and data we have accumulated is being put to practical use.”

“We are proud that the Coast Guard has played an important part in the concept and execution of the *Manhattan* project. We are even more proud that our officers and men and a Coast Guard icebreaker will accompany the *Manhattan* on this historic voyage.”

“We will follow the progress of the *Manhattan* with great interest and look forward to saluting her return.”

Subsequently the Commandant's bit about the accompanying icebreaker was to cause the U.S. Coast Guard considerable embarrassment.

Sunday, 31 August - Day Four

Overcast - temperature 50 deg F. Slight swell from the northwest. Visibility good.

I had always understood we were to have daily planning conferences with Stan, Roger, Emil, Beef, Bram, plus selected other characters, but to date no sign of this. I find it increasingly difficult to set up a rendezvous with the *John A. Macdonald*, not to mention other matters. Beef agrees but we can't agitate for we are, in part observers.

Visits to the bridge produced quite a lot of information. We have had to pump out the ballast we have presently in the tanks because it is brackish and replace it with best quality salt water from the Labrador Sea.

Remarkable how things work out for the best if one can abide in patience - while typing this Stan came in and we talked over the *Macdonald's* plans plus other matters and the upshot was agreement to convene the first planning conference at 1400.

Learned from Roger and Charlie Hahn, Third Mate, that radar interference was experienced during the first watch last night although no shipping was showing on the PPI. This interference lasted for ten or fifteen seconds and then disappeared. Roger wanted to know if we had any patrol aircraft in the area but I reckoned that we wouldn't see an Argus from Maritime Command over us until to-morrow at the earliest, but more likely the next day in the vicinity of Cape Dyer. It is possible this interference could have been caused by mutual interference between the ship's (radar) scanners (unlikely because of its brief duration) but it is also possible we were being looked at by a submarine - U.S. or Soviet - take your choice. Anyway, Roger is going to keep a check on future occurrences. It is interesting because I learned in Halifax there had been a sighting of a submarine off Greenland in Baffin Bay not many days ago and there is not much doubt that with all the interest in this epic voyage there is no reason why there couldn't be Soviet submarines snooping about.

Roger also told me about the maneuverability of this ship. For example off the Delaware on trials, between 92 and 95 rpm (about 12 or 13 knots) and four and a half to five degrees of rudder angle, her turning circle was one mile in diameter. He also said that in a "Williamson Turn" she always ended up inside and that at any reasonable speed and big rudder angles she really turned in a very short radius for such a big ship. This is good for a leviathan destined to work in ice.

Fell into conversation with Captain Louis A. Kellar, an observer from Atlantic Richfield. I had heard that he is pessimistic about the ship's chances in ice, mainly because of her length and the resulting inability to maneuver. It didn't take him long to steer the conversation in that direction and he asked me for my views. I told him that I felt all the signs were favourable and that in an open area such as the Beaufort Sea, with plenty of sea room, I didn't see much of a problem. But in a constricted waterway, as in the case of Prince of Wales Strait, lack of maneuverability by virtue of her great length, could pose a danger. But really we have to await the event and not try to anticipate such situations.

Keller, in answer to a query from me about operating costs, building costs, voyage cycles, suggested that the best fellow for me to talk to is Chuck Heil, a

naval architect who is also with Atlantic Richfield. This I'll do to have my calculations checked out and to compare notes on passage speeds etc.

Roger appeared at 1030 to say that we were in touch with the *Macdonald* who wanted our position. This was passed. Then I asked Sparks if he was working the icebreaker only to discover that he had a position etc if he could find it in the wastepaper basket. He did. It would seem she is out of Frobisher Bay eastbound to intercept us. What a way to do business.

At 1415 we duly met in Stan's office and had a fruitful session. Emil Stasyshyn, fellow Canadian and Ice Observer, gave a picture of the met. and ice conditions to be expected. Stan was apprised of the rendezvous with the *Macdonald* who had sent a proper message giving his (Fournier's) position, course and speed. Roger reckoned we would meet at 010400 (2300 to-night Local Time) in position 61 degrees 50 minutes North, 57 degrees 45 minutes West.

Ballasting ship was discussed in view of our arrival at the ice edge now estimated to be at approximately 1600 to-morrow. Our draft then will be 49 feet forward and 55 feet aft. Bram Mookhoek was concerned about the freezing of salt water ballast in the wing tanks. Also the risk to the propellers but the tips of the screws, when passing through their highest (and shallowest) point of travel, will be 33 feet below the waterline which makes them pretty well immune to ice damage in my view and he agreed.

On joining us the *Macdonald* will be asked to take station on our port bow at a distance of two miles. Stan arranged a further meeting for to-morrow at 0815 to decide where we enter the ice and I am to arrange a transfer by helo to have talks with Fournier about future plans. They want him to remain in company and to precede the tanker in the ice. This is a good idea, I think, as we should get on with the business of developing ice escort techniques for giant ships.

Drafted various messages, one for Stan re Eskimo carvings at Pond Inlet, a sitrep for DMO, and a joining message for the *Macdonald*.

Sunday afternoon routine - a stretch off the land in our bunks. This will probably be the last peaceful day we'll have. From here on the tempo will build.

The first movie was shown (Thoroughly Modern Millie) of the 100 that are on board. At 2200 *Macdonald* was detected on radar closing on a steady bearing. She made a very good approach and at three minutes to eleven took up her station on our port bow two miles away as requested. Everyone on our

bridge was impressed and I derived some considerable satisfaction from this. It was a good maneuver.

Ended up in Captain Don Graham's cabin with Beef for a tot, to be joined later by Arthur Smith and Roger. A pleasant session originally convened to discuss the forthcoming "Crossing the Line" ceremony. Don showed me the special certificates which have been prepared for distribution, including one for me. Very impressive, full colour, embellished throughout with illustrations of animals, flags, Neptune, and so forth.

Turned in after midnight. It is generally agreed that it is good to have another ship in company.

Monday, 1 September - Day Five

At 0955 the helicopter came across from the *Macdonald* while one of our S 62's took to the air from our deck to make room. Stan and I went over to the icebreaker and as usually happens on these occasions I ran out of film with no opportunity to reload. "Midnight", Fournier's dog, was as usual in the helo getting more flying time.

Fournier met us on the flight deck and together we went to his cabin. Everything looking familiar. We discussed the operation, his part in it, and so forth. To my embarrassment I learned that one of the ten reporters on board, the Southam News Service representative, had filed a story to the effect that there was no one in the *Manhattan* who knew anything about ice and arctic navigation other than TCP etc.

Fournier agreed to accompany us all the way and to steam ahead at night to act as a radar picket - so that's a good thing. Three miles ahead was the distance he felt was sufficient.

He gave us lunch after a drink in the cuddy. The old Chief Engineer, McClintock and Dr Herman also attended. Like old times to be sitting there nodding agreement to everything everybody said. Fournier told me there was little ice of any significance in Viscount Melville Sound - that he went through it at twelve knots. That sounds good but M'Clure Strait, according to him, is a different story.

A quick visit to the bridge and then we were on our way back. The pilot gave us a quick fly-around and this time I was ready to get a number of pictures.

A while later Fournier came over for a return visit. I always thought he never left his ship but this was a sufficiently interesting enticement that he

accepted Stan's invitation to come. His announcement on our bridge that on the course we were steering we wouldn't see any ice was a bit of a blow. We, Emil, Beef and I, had assured everyone that ice would be in our grain by 1600. In the event, however, despite Paul's statement, there was indeed ice nearby to the west at the advertised time to Emil's relief - and mine.

Roger decreed that we would alter to the northeast and steam into ice-free waters, that there wouldn't be any ice testing to-day and that we would make an early start (to-morrow). Stan and I escorted Paul back to the flight deck for his return and on the way back I apprised Stan of this development. I don't think he liked it. Here was a case of Roger making a decision without consulting Stan and Bram - rather than the reverse. Ho-hum - I can't become involved in this breakdown in the decision-making process without getting burnt.

At 1600 we crossed the Arctic Circle (66 deg 33 min North) in 58 deg West long, course north at 15 knots. Speaking of the Arctic Circle, Beef convened a meeting of the group undertaking the forthcoming Crossing the Line ceremony now slated for Wednesday next. I am, for reasons not clear to me but acceptable enough, to be Davy Jones.

I am so tired I can barely keep my eyes open. An attempt to turn in frustrated by Roger tapping at our door seeking company for a wee nip. We know how he feels about things and are happy to offer a haven.

Tuesday 2 September - Day Six

An early start, Roger having advised us he planned to be up at 0400 to move into the ice. Beef up before 0500 and I followed shortly after. Scattered ice in sight ahead, two to three tenths, some heavy floes and a sprinkling of icebergs.

When still some miles from the nearest ice the ship went astern and by 0535 was stopped. By the time her propeller swirl reaches a point below the bridge wings she is, as with most ships, dead in the water. Then, at 20 rpm, two to three knots, we advanced cautiously towards our icy objective but it takes such a long time to get this great behemoth moving it is a tedious procedure. I note that when viewed from the centreline of the bridge the stem is wooded (blanked) by the foremast.

An ice report over the R/T from the *Macdonald* so Stan asked if Emil could come up and take it as Mr Silcox (Mate) was having difficulty making out what was being said - so did I. Called Emil who, asleep in the upper

bunk, sat bolt upright cracking his head on the deckhead. A lesser man might have fallen back unconscious but not our Emil who assured me he could arise and cope.

By 0630 I was wondering whether we would ever reach the ice. Under the influence of a northerly wind it was moving faster than us. Roger had selected various points of entry into the so-called pack but they were long gone before we got close. At 0645 he asked me whether the ice was moving as fast as we were and I allowed as how this certainly seemed to be the case.

A grey day, overcast and raw with rain and drizzle. At 0733 the first piece of ice touched the ship. We didn't touch it. Moving so slowly the ice, a minute fragment, was blown against the starboard side. At 0740 we pushed between two heavy multi-year floes, 50 to 100 feet in extent and about fourteen feet thick, which the ship had no difficulty in thrusting aside. The picture from the closed circuit TV camera mounted on the starboard bow is excellent, showing the stem moving through the water, cracking and splitting the ice. There is so much bow overhang it is impossible to see anything standing in the eyes of the ship.

Our first real contact with the ice took a long time to come to fruition. It was almost noon before we were really in amongst the floes. I told Beef that if we approached all ice like this we would never get anywhere. Timidity is something which shiphandling can do without.

At noon, Arthur Smith, who had the con, approached two very heavy multi-year floes in such a manner it was clear we were going to glance off the first floe and then carom on to the second. This is exactly what happened but even when moving at twelve knots the ship emerged unscathed. We were doing trials through this ice, deliberately seeking the heavy floes to satisfy the requirements of the test experts. The shiphandlers were doing what they were told.

Ice was discovered to be going under the ship, travelling her entire length, to emerge at the stern between the propellers. An observer said one chunk measured eight feet in thickness and fifteen feet across, heavy enough to inflict damage. We believe the reason for this is that at speeds in excess of eight knots there isn't time for the ice to escape to the side and is simply swept under the ship. Being able to break ice at these higher speeds was already producing new and useful information.

Because of this ice going underneath the hull Beef and I went aft to see for ourselves. Took a picture of one chunk showing the helical cuts from the propellers. As we were walking forward along the catwalk the ship struck a

very heavy floe a glancing blow on the port bow. She lurched sideways, something I did not think she could or would do. The ice was shattered and there were fragments, according to Dr Frankenstein who is an expert in these matters, estimated to be 60 feet thick. The ship's bow also rose out of the water, an amount I was unable to gauge, something else which was unexpected.

Because of danger to her rudders a maximum rudder angle of five degrees was imposed by the bridge but at slow speeds it was found she simply could not be maneuvered effectively. So, at Arthur Smith's request, this limitation was lifted. It seemed that the ice thus attacked moved well clear of the bow after being smashed but then there was open water into which the broken pieces could be forced.

We have here a ship fitted with a variety of sophisticated measuring devices including satellite navigation equipment capable of printing out latitudes and longitudes accurate, so it is alleged, to four places of decimals. But the doppler sonar for measuring speed is not working so as an alternative I was delighted to see the old chip log system being used to good effect. Someone hurls a piece of two by four over the side from the bridge while others time its travel to the stern, and a speed, quite accurate too, resulted. At 40 rpm, for example, the chip was timed at 73 seconds giving a speed of 3.7 knots. A curious blend of ancient and modern technology.

Bram Mookhoek took me on a tour of the instrument van.

On completion of the ice work at 1600 we broke clear, triumphant and unscathed, to steer for Thule. *Macdonald* stationed ahead, speed fifteen knots. Temperatures getting noticeably colder and daylight hours fewer. Rain, a dreary scene.

Beef and I get the distinct impression the staff captains are slipping into a one in three watchkeeping routine - something we thought was not a good thing and about which we have had fierce discussions with management in the past including the original planning sessions in Dallas. (We felt that Roger, by joining a one in three watchkeeping regimen, would abrogate his operational responsibilities as master and that operational decisions would, then, by default fall to Stan Haas. This may, in fact, have been the latter's intention from the outset. Despite vigorous protestations by management to the contrary there never was the slightest intention of acting on our concerns.

John Wayne entertained us on film in a thing called the War Wagon - passed the time.

This day's demonstration was impressive. *Manhattan* tackled some very hard ice, at unfair angles, and emerged undamaged having shattered and fragmented the heavier floes. I had been concerned at the outset with timidity but ended the day wondering whether there was too much recklessness. There must be a limit to what a large icebreaking ship can take when hitting scattered floes in open water at speed but up to now it has not been reached.

Wednesday, 3 September - Day Seven

Northbound in Baffin Bay. Clear and sunny but a strong wind. *Macdonald* ahead at three miles.

This day is reserved for the Line Crossing ceremony, if what is planned can be called that. We actually crossed the Arctic Circle two days ago but there were more important matters to occupy us.

Spent hours working up some sort of script, for my role was to be Davy Jones, requiring me to deal with the Master of this “cockleshell”.

Beef had organized costumes including for me a tattered USN admiral's frock coat, a battered cocked hat and some trousers sewn all over with brightly coloured patches. One way of making admiral I suppose but not quite what I had in mind when I joined the navy more than 30 years ago.

Boreas Rex was Don Graham, one of the staff captains, his Queen Gunther Frankenstein of CREL, myself as Davy Jones, and Beef the Royal Baby. C. Lincoln Crane the Policeman, Emil Stasyshyn the Professor and Jimmy James the Doctor. Lieut. Keith and Lt Cdr Rod Edwards, USCG, and Mr Helfridge of the University of Alaska, were Royal Scribes. This was the team and at 1515 we were scrambling about the inhospitable regions of the bow getting into our costumes.

At that time Roger did a Williamson turn to cut the wind and we tumbled out on deck. I advanced on the bridge and from a position on the upper deck, feeling utterly insignificant, bellowed up at Roger peering down at me from the port bridge wing:

Davy Jones	Bridge there
Roger Steward	Aye sir
DJ	What ship, pray?
RS	SS <i>Manhattan</i> . You mean you haven't heard?
DJ	What course might you be steering?
RS	North

- DJ Aha - 'tis what I suspected. Be advised that I, Davy Jones, have a message from no less a person than His Royal Highness, Boreas Rex
- RS You have
- DJ Oh yes, I do, I do indeed
- RS What message is that? As if I didn't know
- DJ Well actually, its a summons and I have [*missing section?*] Have I your permission, sir?
- RS Why, of course
- DJ The SS *Manhattan*, having entered the realm of Boreas Rex, should take notice, by tricing the ears of her people out on bowlines the better to hear, that Boreas Rex orders and commands you to appear before him and His Royal Court, to be initiated in the mysteries of his Empire. Failing this, ye shall become fodder for white whales, right whales, narwhales and sharks, as a warning to lubberly characters, including 'tween deck men and idlers, entering my Domain without a Warrant. You are charged with bashing my ice about, without authority, in a reckless and destructive manner, therefore appear and obey or suffer the penalty.
Given under my hand, this 3rd day September, 1969
Signed
Davy Jones
Secretary to His Majesty
- RS A sailor's welcome awaits Boreas Rex. It will be a pleasure to have him, and his court, on board

When all this had been disposed of we advanced with bloodthirsty cries and to the considerable amusement of the onlookers by then gathering in some numbers to watch. We went up on the bridge deck and members of the Court spread themselves out on chairs, the various officials took post, and the initiates started to queue.

There was no rough stuff and one particular young man with the Press, indeed the son of the President of the American Broadcasting Company, with

hippie hair, was terrified that this would be an excuse for it to be cut. But this was not our intention. He and just about everybody else, went through the line to shouts of laughter and much activity.

Proceedings became so strenuous that Beef demolished two chairs. Initiates had their noses painted blue and were invited to search for the Line through cardboard tubes masquerading as telescopes and binoculars, checked in with a scribe, given a hard time by the King and Queen, and then had to (or almost) kiss the Royal Baby's belly and what a sight that was, smeared with an evil-smelling concoction created by Beef. With so many Press people about there was no shortage of photographs.

I think it went well. We were all pretty hoarse by the time it was done. We then retired to our cabin where there was a celebration which went on rather longer than we had expected. I seemed to have turned in fully dressed partly because of the late hour and partly because I was too tired to undress.

Thursday, 4 September - Day Eight

Northbound in Baffin Bay and making for Thule. An impressive array of icebergs has the photographic fraternity rushing about recording the scene for posterity. *Macdonald* still ahead at three miles delineating a track for us and earning praise from the bridge personnel here. It was decided that we would go in and anchor as there is some work to be done which can best be carried out this way.

Dan Guravich asked me to try and set up a helo trip so that he could take pictures of the area. This I was able to do although Paul Fournier took a deal of convincing because he was under the impression that flying in the Thule area is forbidden.

Entering the bay was a prolonged undertaking, measured in hours. I know *Manhattan* is a bloody great ship but I wonder if she really has to travel so slowly. Bram Mookhoek beside himself with anger at the loss of time.

On arrival a team from shore flew off in Southwind's helos - the BMEWS Commander, the Base Commander, the local Danish representative and others. All the top people and it was because of this I was able to get clearance for the picture-taking expedition desired by Guravich. In return he gave me three rolls of film which will I think see me through the voyage.

Another message to call DMO in Ottawa without fail on arrival. This, too, I was able to arrange with the visiting officials.

At noon we anchored in 21 fathoms, port anchor, seventh shackle on the waterline.

After lunch Beef and I flew in to the air base in one of Southwind's S-61's. He to return the Crossing the Line costumery to the States and I to make the call to Tony Storrs. Stan went with us and we had a successful tour. Got off a letter to Bett, visited the Exchange where I bought a new watch to replace my Omega Seamaster which has broken down - the hands flop about. A poor show this because I had taken the trouble to have it serviced just before leaving. Got a Zodiac Electronic, which retails for \$125.00[,] for \$75.00.

After a struggle with assorted telephone operators and long delays I got through to DMO. No real problems but I had made an ambiguous signal, referring to dinner in one and lunch in the other - tidied that up. He is flying up in the evening and will be in Resolute, weather permitting, to-morrow. He wondered if there would be accommodation here for Chretien and Jamieson between Sachs (Harbour) and Barrow. I thought so but will confirm with Stan. Told him that there is to be an aircraft with 25 empty seats or so going back to Fairbanks from Barter Island and they could stage out that way rather than hang on to Barrow.

I gather the *Macdonald* will detach before we get to Sachs and proceed towards Tuk to pick them up and bring them to us. Tony in a good humour - asked him to call Bett and say that all is well. Its just too difficult to try and place a personal call - it would take hours too because even with a priority I had to wait around.

Flew back on board to meet Lt Cdr Stolee and Lt Nethercott for a few minutes. They seem content and their only request was for more film.

A quick shift and then to a reception and dinner set up in Stan's large office area under the bridge. This was for the party flown up from Houston to Thule and the reason for our call here. The Jetstar can't land at Resolute because of the risk of damage from gravel and stones on the unpaved runway there. In addition to Stan, there were in attendance Roger, Bram, Beef, Hank Rosenthal and myself. Don and Arthur attended for the drinking session and then retired.

The guests were Mr Russell Venn, a Humble Oil director; Mr T.J. Fuson, General Manager of Humble's Marine Department; Mr Harry Fleming, Special Assistant to President Nixon; Mr Robert Blackwell, Deputy Administrator, Maritime Administration; Mrs Helen Bentley, Chairman designate of the U.S. Maritime Administration; Admiral Orvan Smeder, Head

of Engineering for the U.S.C.G. and, finally, Mr Edward Huffcut, Executive Assistant to the Administrator of the Maritime Administration.

An enjoyable evening. Fell into discussion with Mr Venn and learned that studies are going ahead on the feasibility of 250,000 ton nuclear-propelled submarines. They would measure 90 feet from keel to the top of the sail. There would be a concrete pad on the ocean floor which would be a resting place for the vessel and where the “product” would be embarked. Routes would be through the Canadian Arctic or via the Arctic Ocean and east about Greenland. This would be Phase II - Phase I being the tanker operation.

Friday, 5 September - Day Nine

Weighed and proceeded at 0425, an event I was happy to leave to Roger. When I awoke two hours later I could not tell whether we were still at anchor or under way so quiet and steady is the ship.

A letter from Jake (Captain J. Th. Jacobsen confirming that J. Lauritzen did indeed want a detailed (cruise) report from me but no mention of price. I can only assume that the \$700 figure is acceptable.

Uneventful run across Baffin Bay to the entrance of Lancaster Sound. No ice other than the usual number of bergs. As we neared the Canadian side the wind increased and the sea began to make up.

The Canadian press representatives in the *Macdonald* chattered over for a session with Mr Venn and Mr Fuson which went off well we thought. One probe on the sovereignty question was turned aside by Mr Fleming. Norman Depoe has never spoken with me though I have had words with all the others. He seems an odd cove.

After entering the Sound, romping along at 15 knots, we encountered scattered multi-year floes, about two tenths. As we continued the cover increased until it was impossible to avoid them all and it was then we began cannoning into them. This ice was fifteen feet thick, blue and hard, and the ship was going far too fast in such conditions. Finally I remonstrated with Roger who, thank goodness, was in the process of reducing speed. That still was not enough as we continued to career around and through these hard centers splitting them, shattering them, into huge blocks of blue granite before thrusting them aside. Spoke again to Roger and he ordered another reduction. Beef and I both unhappy over this state of affairs. It is a difficult situation to be in as we are not really sure of our status. Stan and Bram went into the bow to check on how things were and came back to report that all

was well. Such tactics with any icebreaker would, we felt sure, inevitably result in unnecessary damage.

Visibility dropped to a quarter of a mile or so, the wind strong from the west, and quite a few bergs about. Our escorting icebreaker remained ahead rendering useful service. Our speed was seven knots and by 2100 things had improved considerably. No more ice and several miles visibility so speed was increased again to fifteen knots as we press on towards Resolute.

During all the excitement in the heavy ice, which lasted about half an hour but was more than enough for us, a message came in from the Canadian parliamentarians who flew overhead invisible to us in the murk. They were to have dropped a Canadian flag but thank heavens conditions were unsuitable for this blatant act of chauvinism. The message read:

Your daring voyage through the Canadian Arctic Archipelago will stir the imagination of people everywhere who are interested in arctic development. Welcome to Canadian waters. Bienvenue a l'eau Canadienne. We wish you God- speed. Signed Ian Watson. Chairman of the Canadian House of Commons Standing Committee on Arctic Development.

They are due to board to-morrow for a reception and dinner at which Stan will be the host.

I should have made reference to CCGS *d'Iberville* sighted astern steaming towards us in the afternoon at speed also en route to Resolute Bay. She has completed her re-supply mission to Eureka and come south by way of Jones Sound. We were going [too] fast for her to overtake.

Reverting to that wild ride over and through the ice, Beef was overheard to say: "I hope to God they don't break their new toy the first day." It wasn't for want of trying. Subsequently, if there is damage to *Manhattan's* bow it could have been sustained this day.

An unexpected message for me from Bill Tetley"

"To Captain Thomas C Pullen RCN (Retired), SS *Manhattan*, Arctic waters of Canada. Please fly the Canadian flag on the *Manhattan* in Canadian waters stop We have enough flag trouble without American interference stop Best regards from your former boats officer in La Hullose signed William Tetley, Member of the Quebec Legislature [from] Notre Dame de Grace Montreal."

The Americans here have been very particular to hoist our flag in accordance with the custom of the sea and I have no doubt they will carry on

doing so. Southern Canadians are unnecessarily exercised. As for Bill Tetley he should know me better than that!

Saturday, 6 September - Day Ten

Pressing on up Lancaster Sound with *Macdonald* quite properly leading the way.

We seem to have a few unserviceabilities - the Simrad Depthfinder not operating properly, the Bludworth echo-sounder functioning but I find it hard to overcome my prejudice against this device ever since Provider days. In any event the graphic display is in the chart house next door where it is of little use to people on the bridge handling the ship. The doppler sonar is also acting up. Beef returned from a ride in the ship's helo to report there are no internal communications and that the machine cannot communicate with anyone at ranges greater than fifteen miles.

Labrador arrived in the morning, passing down our port side, her bridge crowded with members of the Parliamentary group scheduled to come over later this day.

As Roger gave no indication of acknowledging the message from Mr Watson of the previous evening, I drafted one for him and got his approval to pass it - Stan agreed with this. I sent:

“Captain Steward and Mr Haas send greetings and thank Mr Watson for his message and look forward meeting pm to-day. Captain Pullen is pleased to see his old ship again.”

Not long after *Labrador's* appearance, came *Northwind* looking fine in her white paint. She, too, came up our port side for a closer look then dropped astern as we continued to gallop along at fifteen and a half knots past Resolute Bay where *Macdonald* detached to go in with the mail and then rejoin.

Hank Rosenthal, Humble's press representative here, taped an interview with me for use by some station in the U.S.

At 0930 a staff meeting presided over by Stan at which Mr Venn and Mr Fuson attended. Plans for the day were discussed, mainly the intention to carry out two tests in the ice expected later in the forenoon. It was, in fact, in sight by noon and a ship's helo took off with Beef and Emil to do a recce. As we approached the ice edge Roger decided to turn around and head in the opposite direction.

This tactic [infuriated] Beef when he returned in the helo because it seemed so unnecessary and time wasting to say nothing of being a mite risky

in view of the shaky ship/helo communications setup. He and Emil reported suitable ice for the so-called demonstration a few miles ahead - a floe some six miles in extent. Round we came and urged this great vessel in that direction.

Ralph Maybourn, British Petroleum representative, to see me and discuss the rather difficult position in which he finds himself here. Despite the fact that he is BP's official rep., and that they are paying for the privilege by participating financially in the test, he is being denied information, denied access to meetings, and generally being ignored. It seems a difficult state of affairs but there is nothing I can do but offer sympathy. I think eventually he must have it out with Stan.

The ice test is meant to involve a reduction in power until the point is reached when the ship stops and then to reverse the procedure. In the ice at 1400 turning up 40 rpm. These were reduced to 20 and the ship began to slow coming to a stop at 1427. Generally, when a ship comes to a halt in ice, at the last moment before coming to rest, one can feel the ice grab the hull - but not in our case. She simply, almost imperceptibly, came to a standstill.

At 1415, 30 rpm rung on and we were turning these a minute later. No movement. We increased to 40 rpm and by 1419 she began to advance. 50 rpm at 1429 and shortly thereafter we stopped again, having encountered a heavier section of ice. 60 rpm at 1430 and a minute later we were moving again and at 1435 our speed was one and a half knots.

I was impressed at the length of time the ship maintained her movement even when dead slow, also the low power needed to get her started again.

At 1330 Emil Stasyshyn sighted the first polar bear eating a seal on a floe some miles away. There was a lot of interest as we got closer but the bear, other than a few questing sniffs in our direction, demonstrated his lack of concern by turning away and defecating in our direction.

At 1600 helicopters from *Labrador* began the process of delivering twelve members of the Parliamentary Committee to our flight deck plus what seemed an endless stream of press reps.

I met Mr St Pierre, the Deputy Chairman, a man I could detest with little effort. Mr Watson, the Chairman, young and affable. We got them all up to Stan's room for introductions, a briefing, and questions. In the meantime the reporters were cluttering up our cabin, drinking our liquor, and getting boisterous. Admiral Storrs arrived during the briefing, with Pat Carney, reporter for the Vancouver Sun, who greeted me like a friend. The press reps quickly filled Stan's room and from then on it was bedlam.

I can't derive any pleasant memories from this visit. Somehow or other we got the reporters out, the MP's aft for dinner, and then fog (the meteorological sort) closed in blotting out the other ships and putting a stop to flying. Norman Depoe and I got onto a first name basis and had a good chat, he having got his beak into the sauce and in an expansive mood.

After a nightmare period of rushed journeys up and down that catwalk, signals to *Labrador*, and the sustained roar of aircraft engines and rotor wash, we got rid of the whole damn lot for return to Resolute. Paul Fournier was also here and had to go back the same way to reach his own ship. I wasn't able to have dinner with the group so T.J. (Fuson - a delightful person) arranged for a huge steak, weighing about four pounds it seemed, to be brought to me to gnaw on while he sat with me in the empty saloon. He thoughtfully also ordered a fine bottle of Medoc which we finished between us.

We talked of many things, the impact of the visit, the risk that too much attention was being paid generally to looking after the press and visitors to the detriment of the test. He told me that in his opinion the Panarctic fiasco with the tug and barges indicated to him that they were "poor manning" and that it was the sophomore approach. Apparently last year they had a Humble Oil man on board the expedition and his report was not favourable.

Stan convened a late night session of the three captains (Roger, Don and Arthur) plus Beef and myself, to review a few things. I think we cleared the air on a lot of contentious issues. As a Canadian I felt embarrassed at the poor impression made on all concerned here to-day by some members of the Canadian press corps.

Getting late but Beef and I nipped below for a cup of cocoa and encountered Stan who joined us. He and Beef had another joust while I sat there propping my eyes open. Finally turned in at 0200.

Note. Stan handed out cigarette lighters and medallions all round plus an ESSO badge. Seems as if everyone who comes near the ship gets one. Tony was not able to call Betty - no answer and there was no mail except for a note from Bim Waters (my First Lieutenant in HMCS *Saskatchewan* in 1944) at Resolute who is there with Tower Corp. I hope he will still be there on our return.

Messages to the LABRADOR [and] the Parliamentarians

1. From Captain Pullen. Did the Parliamentarians receive Mr. Haas's invitation to come aboard pm to-day. If so will you endeavour to remain in our vicinity for transfer here about 1900Z by helicopter. Are your machines available for this purpose. Will you please remain in area to recover party for return to Resolute.

The answer to this was in the affirmative and in reply to a request for the number in the party I was told 16 of which 8 would be press reps.

LABRADOR asked if the reps could come and the following was sent:

Your press reps welcome to come over by helicopter with Parliamentarians starting at 2100Z for briefing and reception. Space prevents including press reps at Mr. Haas's dinner but other arrangements being made here to provide mean for press.

Sunday, 7 September - Day Eleven

Passed the night lying off the eastern end of Griffith Island waiting for the visibility to improve so that the choppers can go into Resolute to collect a stator (1,000 lbs) for Colos Bennett, the Chief Engineer. *Macdonald* anchored in the bay.

Ralph Maybourn, the B.P. rep, tackled Stan in the Chartroom in the presence of Beef and myself as to whether he would be permitted to attend planning conferences and to voice a general complaint that he was not getting the information to which he felt he was entitled. Stan turned him down cold on the basis that nowhere in the agreement was it stated [that] he, Maybourn, was entitled to participate in management decisions. It was embarrassing to be there when the talk took this turn but Ralph obviously intended to have witnesses.

It seems there was a slight oil spill on deck during the night. About 0100 there was a requirement for diesel oil aft and someone opened a valve forward but, because another one aft was left closed, oil erupted through an overflow pipe. Men were seen spreading sawdust and sweeping up the evidence at breakfast time. Lucky it didn't happen yesterday when all the Canadian press reps were here prowling about looking for trouble.

Planning conference at 0930. Efforts to centralize and co-ordinate the operation of the heliport - this will be a bridge function, quite rightly, and the

pilots will be asked to act as controllers, especially when they themselves are not involved in flying ops. The lounge aft is to be a ready room and signs put up directing people to the flight deck instead, as happened yesterday to the point of annoyance, of visitors blundering into cabins.

I raised two points; first the need to take soundings in uncharted waters. I resisted the temptation to stress again the need to pay special attention to the echo-sounders. Secondly, what did they want to do with the accompanying icebreakers? Roger thought we should all be in line abreast until it was explained that one ahead of him at, say, two miles, could serve to warn him of shoaling water while the other could be on the beam. He agreed and Beef and I sent off the necessary messages to “our” ships. Northwind on the port beam about five cables and *Macdonald* ahead about two miles while in open water and at his discretion when in ice. In the midst of these operational talks Roger left us to pay money to some worthies - seems strange that such a chore couldn't be postponed, delegated to a staff captain or, perish the thought, even someone more junior.

Another talk with Maybourn about his unsuccessful attempt to modify the hard-nosed attitude of Humble Oil. I know Stan's views on this but I am not sure I know enough to make an assessment as to the fairness of them. Gave Ralph a copy of that paper on tanker economics, which forms a small part of our feasibility study, for his comments.

At noon, as a result of my suggestion at the meeting, we were south of Griffith Island en route to Winter Harbour on Melville Island rather than wait for the fog to clear, which could take days. I don't believe we have that sort of time to waste. Steering west at five knots.

Handed over my latest chart (an ozalid print) of Viscount Melville Sound which has some additional soundings near an alleged 20 fathom patch which concerns me, and which should concern others. The depth-finders (or echo-sounders) are both working and it was a relief to see them registering 78 fathoms, both of them, and to find that depth on the chart in our position.

Noon also saw us entering scattered ice which continued most of the day, indeed by dark it got thicker, ten tenths, varying in thickness from one to six feet, but mostly four feet. No problem for this ship. At 1515 four tenths and fog. Dead slow. The visibility has been poor all day. Our two icebreakers moved in under our stern to follow along behind in this stuff. Seems strange for an oil tanker to be escorting two icebreakers through the ice!

Spoke to Stan about the parkas Mr Evin's company, E & R Inc., had supplied. He had his on complete with the special wolverine fur collar, his

name, and title. He said that everyone was delighted. He thought them excellent and that comments were being made that Humble Oil was "sure going first class".

The ice test people were out on their little platform with an eight foot measuring rod to get ice thicknesses. At one point I estimated a piece as four feet just before Dr Frankenstein called out five and a half. From the height of a ship's bridge one tends to under-estimate ice thickness.

"Well, that's close enough for Government work" is Roger's standard remark after he has plotted a quick fix on the chart. I hope so.

The ice we were tackling at rpm for nine knots (60) saw us actually advancing at only five and a half.

We attacked one heavy, hard floe, what we would call a hard center, cracking it and sending fragments spinning out and away from the bow and in the process slowing us by a knot. It looked to be about eight feet thick.

Embarrassment on the bridge when it was discovered that *Macdonald* was on our starboard bow when for some time they had been tracking her, or so they thought, on the port bow. By 1920 the icebreakers had resumed their positions astern, *Macdonald* followed by *Northwind*.

Prowling about in the chart house I discovered the hand book for the Simrad echo-sounder and found it is equipped with a depth alarm, a feature I could have done with in Labrador years back. With this good news I asked Don if he knew about it. If he did he must have forgotten because he said they had used it in the Delaware River during trials and that it worked fine. Well, was it switched on now? No, it wasn't. Why the hell not was the question I was tempted to ask but didn't. Young Mr Hahn, Third Mate, knew how it worked and it was agreed it should be switched on and set to give warning when the water shoaled to 40 fathoms.

I admire Roger. He asked me to show him where we should be concerned about uncharted waters. I suggested that when we cross the 100th meridian of west longitude we should be just about in those sort of waters - blank on the chart. He then drew a course from our present position in Barrow Strait, north of Young Island, direct to Winter Harbour on Melville Island passing just south of that 20 fathom sounding with which I was concerned. It will be interesting to see if that Simrad horn blows.

At 2115 I went onto the bridge to check the state of play. Doing nine knots (60 rpm) and logging 7.2. Don told me the Simrad alarm had rung and almost while he said this it went off again. Apparently fish or ice passing under the ship. At least it tells us when ice is moving along under the keel.

Up to the bridge at 2215 to look over conditions. Ten tenths ice and tighter and thicker but we are still advancing without difficulty. Mr Hahn's contribution to the arctic test voyage was a statement that "if we couldn't break this sort of ice there wouldn't be any point in carrying on".

Rigged the Polaroid camera attachment to the radar with the help of the electronics technician, Al Tschirhart, and got the first pictures of conditions. Now I know how [it's] done and how easy. The results were good.

Monday, 8 September - Day Twelve

So much is happening, and the calls on my time so demanding, it is difficult to record events. Letters are out of the question.

Up at 0330 to see how things were going and we appeared to be belting along in fine shape through ten tenths ice. Roger had the middle and we chatted until 0400. Two mercury vapour lights sited either [side] of the stem give good illumination ahead but Roger said the heavy ice is difficult to detect and that the ridges, which one would expect to be heavy going, give little difficulty. Turned in again hoping the shaking and shuddering which occasionally passed through the hull was only ice and not something permanently attached to Canada.

At 0740 I looked out to see the ship was motionless and that we were surrounded by much heavier ice than before. It had that blue look about it which means multi-year floes. A rush to get dressed and onto the bridge to assess the situation. No doubt about it, we were not going anywhere for the time being.

According to Ralph Maybourn we stopped at 0545 or even a little before that. Arthur Smith had the watch, or whatever it is the staff captains have when they are in command, and had been somewhat non-committal about what had happened. The ship had been backing and ramming, going astern each time about 100 yards and on each charge making a little progress, but not much.

So it was decided to call a halt to this fruitless activity for the time being and instead put men onto the ice to collect data. In other words it was being assumed this was a "voluntary" stop for test purposes. Actually, the ship was not in fact stuck because when the engines were put either ahead or astern she immediately started to move in the appropriate direction. It was noted that the ice was not pressing against the ice belt, indeed there was an air gap of several inches between it and the hull.

Ice thicknesses of eight and a half feet, eight feet nine inches and nine feet were obtained by drilling so it was quite a heavy customer after all.

At 1140 testing was finished and the *Macdonald* came along to assist us by loosening up the pack. At that time there were pieces of ice twenty feet square and perhaps three feet thick up-ended forming a barrier against the after part of the ship. This, together with the accumulated brash and slush that had also closed in astern, prevented us from backing down without outside assistance.

Our position at that time was 74 deg 40 min North 103 deg 38 min West, southeast of Byam Martin Island. The bridge was experiencing difficulty in getting a fix as the island is low and makes a poor radar target.

During all the activity I was choppered over to the *Macdonald* to meet with DMO and discuss matters of interest and to see how he was getting along.

A little after 1340 the ship broke free of the floe and made good headway. Part of her trouble had been an attempt to turn to exploit a crack in the floe but this is not easy. One or two very large pieces of ice were tipped on edge and passed down the ship's side. One piece was so high it very nearly damaged the gangway. It continued aft along the ice belt and then as it reached the stern began to resume a horizontal position. Thirty feet of it must have extended under water, all of it four feet thick or more, and been close to a propeller. For this operation the heeling system was, as they say, activated. In this ship (in pursuit of contrived variation) it is called the "rolling" system.

At 1800 *Manhattan* running at reduced speed in moderate to heavy ice and progressing westward. At 2100 the ship proceeding through ice varying in cover from nine to ten tenths with heavy ridging. At 2350 she was brought to a standstill.

Tuesday, 9 September - Day Thirteen

At 0030 the ship began moving and making headway westward for at 0115 Cape Bounty on Melville Island was picked up at 26 miles.

At 0200, because I was concerned about this business of careering through the night, I went onto the bridge to see how Roger was getting along. Everything seemed to be alright, ten tenths ice but a good six knots through it with the headlights providing illumination. Things seemed so good I departed at 0230 and turned in.

Subsequently there were various versions of what happened but in general it seems *Northwind* got into difficulty and dropped a long way astern.

Macdonald endeavoured to provide assistance and she too eventually got into trouble. This was apparently too much for Arthur Smith here who decided to do something about it and at 0600 or shortly after, *Manhattan* swung off to port en route to *Northwind* and that did it. By 0630 we were stuck - the lot of us. Splendid disarray with which to greet a new day.

Paul told me later in the day that he wasn't able to assist *Northwind* last night because the ice was under quite a lot of pressure. The wake of his ship, for instance, was only one quarter of its usual width and he had been getting a great deal of heavy ice through his propellers, his whole ship had been shaken and he was concerned lest he lose a propeller - and a strangely prophetic statement that turned out to be. On the subject of icebreakers holding close astern of the tanker, Paul said they had both been told by *Manhattan* they were too close and to fall farther back.

During the forenoon watch Donald Graham bustled about doing everything with the engines and rudders but play a tune. It was no good and so we asked *Macdonald*, by that time mobile again, to nibble at the ice on our quarters and maybe loosen things up a bit. This she did with a splendid display of ice seamanship and shiphandling.

Just as soon as the pressure was removed from our ship's sides here it was remarkable to see how much ice and slush came gushing up from under the ice belt. It must have been packed a long way down. No wonder we couldn't get her moving. Anyway, we were once more in business.

At 1445 *Macdonald* alongside for bunkers and fresh water. An opportunity to get over to see DMO and Paul. The latter adamant that he could provide assistance to *Manhattan* but he simply couldn't look after *Northwind* too. With only five out of six engines available she just was not able to hack it. She was still away astern of us where we had left her this morning.

The upshot of all this was the detachment of *Northwind* to return to Resolute and make her own way west along the coastal route. A sad day for Beef.

By 0800 *Macdonald* departed and by 1000 this ship was working in ice at various speeds and doing some testing.

Macdonald sent a man out onto the floe this morning to settle a bet between Paul and DMO as to its thickness. He ran out of drill bits at eight feet and that on the flat of the floe. They reckoned it was all of ten feet thick on the level and fourteen on the hummocks.

Overheard by DMO on Paul's bridge earlier in the day was a crack that someone should tell *Northwind* "to put a Tiger in her tank."

After this morning's frustrating experience I think there is much less "cock-a-hoop" confidence about this ship's icebreaking capability. Up to now things have gone too well for all concerned.

Wednesday, 10 September - Day Fourteen

To-day dawned clear and fine but the situation is very little changed from what I saw when I left the bridge at 0100 to turn in. At that time, according to Roger, we planned to maneuver the ship in the open lead until he could get maximum run and charge the ice at speed heading on a southwesterly course to take us over towards Banks Island. What happened was that the ship was taken over by the technicians and trials experts for their own purposes and by the time we were finished she was stuck in heavy ice and on a northwesterly heading. I watched Don Graham back and fill, to the encouragement of Mrs Bentley (now back on board), and all the other experts. After several hours I departed for my bunk after asking Mr Scara that should any message go to the *Macdonald* involving her Master could I please be called - without fail. Yes sir, captain, yes sir.

I thought we were doing well when I got to the bridge at 0730 but not so. Indeed, we had travelled virtually no distance from our position at midnight. *Northwind* still in sight and I gather we had been stuck for hours. Then Don Graham sidled up to inform me that it was a poor show, and not at all the sort of thing which should happen, but that the *Macdonald* had indeed been called in for help and that she had cut us out at 0400 or so. Actually from 0100 to 0600 we had been in the "stuck and ramming" mode as they call it.

Beef's bad day yesterday with the anguish involving the detachment of *Northwind* looks as though it will be matched to-day by my problems at not being informed about matters falling within my terms of reference.

In my view most of the ice through which we were advancing was first-year with a mixture of second and multi-year floes thrown in. It is in these conditions where the ship get stuck mostly because they cannot be side-stepped or because the man handling the ship is so accustomed to steering a straight course to go from A to B that any thought of going the long way round is repugnant.

Called Fournier and told him we hoped to be continuing on our present heading and I would be in touch again after the 1000 planning meeting.

Denny Farmer, the USN photo expert, gave us a briefing on the infra-red and laser material received yesterday from the ice recce aircraft by air drop. It had been recovered by *Macdonald's* chopper as was the case the other day when the DC-4 did the same thing. Conditions were what we expected although I feel there is a tendency among most people here to under-estimate the ice yet to be encountered in M'Clure Strait and the Arctic Ocean.

Overflown by an Argus of Maritime Command on two occasions to-day and also a naval Tracker clattered by overhead - such a familiar engine sound but strange in these parts.

Bram Mookhoek, the prickly Dutchman, organized matters so that a helo flew an ice party ahead of the ship to obtain test data. It was about this time that the visibility began to shut down with snow and fog - no time for people to be choppering about the Arctic.

My afternoon snooze, my first for the voyage, was curtailed by Ray Stone, our PRO in the *Macdonald*, shaking me and saying that Admiral Storrs wanted me on the radio. This was to obtain data concerning the fuelling connection for the *St Laurent*, concerning which details were supplied by Dave Abernathy, Chief Officer. He's a man who seems to work 24 hours a day, is always where the action is and who, no matter what the provocation, remains unruffled. A good man to have on this sort of a party. During the afternoon the next event was a steering breakdown caused by a break in the hydraulics and so we hove to in a large lead for repairs.

While this was going on word came that one of our helos had a wheel through the ice, that the machine was leaning and in trouble. Then word came that she was on her side and would I ask *Macdonald* if she would be prepared to undertake her salvage. Fortunately there were no injuries. Paul Fournier said he would be ready shortly and then Roger was urging me to get the *Macdonald* on her way which I did giving her my best estimate of the helo's situation following which - silence. I refused all bids to call Fournier again just to see how things were getting on. Undoubtedly better if he is left alone to do the job but it is difficult to conceal one's impatience at the lack of any news.

Visibility was not good, there was doubt as to where the icebreaker was, where the downed chopper was, and whether the remaining chopper could find her way there and back. I stood by on the bridge until Beef got back from his lunch to relieve me and went aft. On my return he reported that all was well, the machine recovered and everyone on board. So that's a relief. More glory for the *Macdonald*, I suppose, and more fodder for the press.

So much has happened this day it has been a challenge to get the correct sequence of events. While waiting for the injured bird to be brought back and dumped on the main deck, to await a factory overhaul, we all observed an oil slick from our vantage point on the wing of the bridge. It covered quite a large area and seemed to be welling up from below. Roger, Arthur, Don, Beef, T.J. and I all studied it. I threw a couple of boards which splashed into the stuff revealing it to be an inch or so thick and gobbets of it coming to the surface. There was speculation of submarines, holed tanks, and so forth. Had the *Macdonald* come alongside with all those news-hungry members of the Canadian Press on board, this would really put the cat among the pigeons and have ramifications far beyond the incident itself.

Plans were drawn up to send the helos 70 miles ahead of the ship to drop ice parties and Raydist equipment - the latter to make accurate measurements of the ship's speed and distance. The weather by this time overcast and occasional lowering of visibility.

Stan was called away on some urgent call so that we were able to argue about ice types and thicknesses. I relayed the report given me by Ralph Maybourn about the piece of ice which he saw bob up from under the ship immediately below the taffrail - he estimated it as being 20 by 10 by 10 feet. A very substantial chunk which had that machined look about it ice gets when it has been worked over by propellers. With this in mind I was able to get confirmation that our shafts had only eight pins installed out of a total of 24 in case of an ice-jammed propeller. They would shear thus protecting the gearing from damage.

In the interests of better planning we now will have a session at 2000 plus one at 0900. After handing out some photos of the ship we adjourned. Before we did, however, I asked that in future I be called whenever the *Macdonald* was to be involved in activities in support of *Manhattan* - this evoked queries from Arthur Smith but I persisted and it was agreed.

Roger did come up to me and apologise before the meeting for not having called me and as for little Mr Scara, he should have his backside booted. Afterwards I explained that I should be present in the event, say, of a collision between the two ships so that I could assess the situation from the tanker's side of the operation.

It was decided that we will skirt the coast of Banks Island into M'Clure Strait to see if we might be able to sniff the heavy ice reported there and assess the possibility of running all the way round to Sachs Harbour where we are due about the 14th.

Got a call from DMO asking whether there would be fuel available for the *Louis St Laurent*. This involved me in a search for the Chief Engineer who I eventually located in the after deckhouse. It turns out there will be about 30,000 barrels of Bunker C and/or Navy Special, probably more of the former, for *St Laurent* and so I passed the word back on this basis.

All day pounding along through ten tenths ice, the definition of which defied unanimity. In my view most of it was first-year ice with a healthy sprinkling of second-year and multi-year throughout. In the afternoon, with Roger at the controls, we became stuck in a heavy floe which an experienced eye should have recognized and skirted. We took two attempts at backing before the ship emerged on the other side to continue on her way.

I suggested to anyone who would listen that a move away, or farther into the ice, was essential. Eventually this was done but only after T.J. urged action. It was discovered, of course, that the Engineering Department had done something wrong, probably pumping bilges, and there was some blunt talk from Arthur. Roger excused himself to go to his cabin for further discussions with the Chief Engineer.

While the stranded ice party was awaiting rescue the ice recce aircraft, Kilo Alpha Echo, flew overhead with a can of photographic imagery to drop. Seeing people standing about doing nothing in particular, down it came. Losing one of our helicopters was bad enough but to be bombed by one's friends is a bit much.

At the evening meal I sat opposite Dr Frankenstein and we were discussing the helo accident. He told me it was completely unnecessary as the pilot put down in a hollow where there was frozen melt water and a thaw hole and, of course, went through. They all stood around trying to give him a wave-off but he wasn't looking. At this point Mrs Bentley, the lady reporter, or maybe she is Madam Chairman (Designate) of the Maritime Commission, sat down beside me. To her query as to what was going on my luncheon companion began to talk about the helo affair but I directed a kick at him under the table, rather more fiercely than I intended, as a warning not to open the subject. She didn't know about it and if we blew the gaff we'd all be subjected to a merciless interrogation. Later I apologised to him but he had been quick to react.

She was grumbling about something so more out of politeness than interest I enquired as to what it was all about. It seems that last night she was transmitting a news despatch over the air when the man at the receiving end made a mistake which caused her to shout "oh shit" over the air. Well, the

FCC has clamped down because of the violation and stopped all members of press from sending material from the ship unless they are licensed radio operators. That has earned Mrs B no marks at all and she's aware of it. Full of threats to get the White House to tell the FCC to get off her back and so forth. Now there's an example to set for a U.S. Government official.

What else happened? Another steering breakdown which held us up. *Macdonald* came to our port side, a good maneuver until her stem struck a heavy floe caroming off it onto us bending a bit of our gangway but nothing else. While the crane was doing its stuff and cameras were clicking I nipped across to see DMO, to report all the latest developments, and offer Fournier my congratulations.

By 2100 we were under way with the icebreaker astern, feeling our way around as many foes as possible. Don Graham on watch and a delight to see some common sense input to the maneuvering of this ship. She is handy for so large a vessel so why make work if you can avoid it?

A stream of hectoring messages from Bill Markham in Ice Central in Halifax prompted Stan to approve a telephone call by Emil through Cedar Rapids to explain the situation. This was done and arrangements put in hand to have KAE, the DOT ice recce aircraft and the Slar aircraft, fly sorties in M'Clure Strait to-morrow giving us a feel for conditions there ahead of the ship. The last report was not much help because bad visibility blotted out a view of the ice surface almost entirely.

In my view, and also that of Beef, our estimate of shiphandling ability displayed thus far by the three captains puts Don Graham in the lead, followed by Roger, and then Arthur. This order of merit may change in time. Certainly this assessment was reinforced in my mind last night during the first watch when Don expertly maneuvered *Manhattan* in and around light floes and open water, avoiding the heavy stuff where she almost always gets stuck.

The following comments, which speak for themselves, were overheard between two of the helicopter pilots after losing their machine because of a thaw hole - "it probably won't ever fly just right after this" and "it looks like a major factory overhaul."

Stan came up to me on the bridge and described a message he had sent to the Chairman of Humble who is to make some sort of presentation to the Board of Standard Oil of New Jersey to-morrow. He made three points, apparently, firstly that the ship was doing very much better than some press reports indicate, secondly that she is undoubtedly the best icebreaker in the world and, thirdly, that the Esso Tiger has taken over the Arctic. Not so sure

about the last one - the vision of a cartoon with a tiger's tail sticking out of the mouth of a polar bear comes to mind. Time will tell.

While *Macdonald* was alongside transferring the helo to a position aft on the main deck, port side, I took the opportunity to go over and see DMO and Fournier to report on developments. This included a confidential report to the former on the oil spill plus various tidbits of the day's doings. No time to tarry, Roger shouting mock orders at me from the bridge wing to "return to my ship" which involves much scrambling up and down ladders taking care not to fall into the unforgiving crevasse between the two hulls.

Thursday, 11 September - Day Fifteen

After midnight I visited the bridge to check on progress to find Mr Scara in charge and sign of Roger. However, it appeared we were steering a straight line battering unnecessarily through heavy floes and making a meal of the whole process. I wanted to suggest various maneuvers but reckoned on getting small thanks for what might be considered as interference and so went below to catch up on my writing.

When I peered out on the scene of battle at 0730 it was to see us moving ever less grandly and speedily through the ice. Mr Silcox managed to turn over the watch to Charlie Hahn in time for him to get to breakfast before she became stuck. As usual, the cause of this was an old floe embedded in an even larger one, the former being twelve feet thick.

At Roger's request I called Paul and explained the situation asking him if he would come over again and nibble away at our quarters to ease the pressure. Very shortly we were treated to a fine display of shiphandling by a man who is a master of the art. But it was a prolonged struggle and fascinating to how much ice bursts free from under *Manhattan* when the pressure is eased. By 1040 we were moving and on our way.

Freedom of choice, however, was short-lived for within ten minutes we were stuck once more and again I call on the *Macdonald* to come and bust us loose.

At our daily meeting Denny Farmer gave us information on ice conditions awaiting us in M'Clure Strait. Stan was called away to talk to Houston returning to report that he was told "the whole world is watching your attempt to get through M'Clure Strait" or words to that effect. Seems the decision to go all the way will be based more on prestige than prudence. Loss

of face would result if we turned around and scuttled through Prince of Wales Strait, reported yesterday by the Argus aircraft to be open water.

No other ship has ever made the east to west passage of this waterway and Humble will be tempted to go for it. The decision will probably be made tonight or to-morrow once all the ice intelligence is in. I think it will be worth it and conditions may be easier than we think but it is late in the season to be tempting fate and Roger is aware of the need to keep a good offing in case the wind should shift and drive the pack, and this ship, onto the northwest coast of Banks Island.

Emil came into the meeting with some local ice information. Apparently we have blundered into a huge floe, about five miles in extent, and are only a mile from our entry point. Obviously we must reverse or maneuver clear and this we did. By noon into easier conditions and once again on our way.

I suggested an ice recce by helo just before dark would be a good move to get the feel for conditions ahead of us so that the bridge can make a plan rather than become enmeshed again. Similarly, a helo flight in the morning would also set the stage for ship's intended track. Finally, if the conning officer can't see where he is going in the dark, I recommend the ship stop rather than get into a situation which takes forever to sort out. Denny Farmer's report included intelligence that in the middle of M'Clure Strait ridges and fractures alternate.

Once again an ice testing party was flown ahead of the ship by helo and we hope all will be well this time. I deplore the arrangement here where fully loaded revolvers and rifles are handed out for survival purposes. It is dangerous but then what price the old American frontier tradition?

The remarkable agility of this brute of a ship continues to amaze. After backing into heavy brash ice astern it takes only fifteen seconds from the time the engine room telegraphs are rung from "full astern" to "full ahead" for the ship to start gathering headway. The spongy springy effect of the compressed ice aft has some effect here but it is still a remarkable feat.

There is a filthy habit in this ship which I have never before witnessed in my sea career. A few crew members, and one in particular, clear their throats and spit on the deck. This happened once when Ralph Maybourn and I were talking nearby and we looked at one another in disgust and disbelief.

Our Humble leader, Stan, reports another S-62 helo will be waiting for us at Sachs Harbour, together with a gyro compass for the helo still in service here. The hurt bird will go ashore at Barter Island by sky-crane helo. These people certainly react quickly and effectively when problems arise.

I note the Simrad depth finder is out of action with wires dangling here and there.

A summons to the bridge for a message from the icebreaker passed to her by Captain deRosenroll of Defence H.Q. in Ottawa, through an Argus that had just flown by not long since, to the effect that “Betty sends her love and that all is well ..!” Rather a public path for a private message but it was very welcome.

Beef also got a message from his old ship Westwind, either at Thule or en route there from east Greenland, saying they are monitoring messages from this ship and offering their services. I think they would like to be here. So both of us are cheerier than we were a few minutes back.

At 1330 Roger came to our cabin to get me to invite the icebreaker to come once again to assist. This time we were locked in a heavy ridge. Called Fournier to find he was turned in. Nobody likes to disturb a Master’s well earned rest but what choice is there? He wound up his famous ship and came up our port side. Before he was finished I had to leave at Stan’s request to attend a press conference. It was for the U.S. media (Fortune, Time, Wall Street Journal, NBC, etc). Norman Depoe and Ray Stone also attended. Roger arrived and after Stan’s presentation he was exposed to all the questioning and I was not required to play any part which was fine with me. He handled everything with considerable flair if with some substantial inaccuracies but I don’t suppose that matters.

A question as to how Roger would feel to be the first man to navigate M’Clure Strait westbound brought the reply that he would be “underwhelmed”. This sally was greeted with appreciative chuckles all round. Unbeknownst to Roger, however, Mother nature was at that very moment seeing to it that M’Clure’s icy defences were not to be dismissed quite so easily.

At 1500, having unwisely meandered into another large floe, the ship became stuck fast in a massive ridge - beset. She had made a mighty effort to bull her way through, and very nearly did, but at the last stage she simply ran out of momentum. This ice was more than a match for her and so there we were.

Roger very discouraged at this latest development and confessed to me that he was worried about his reputation in the icebreaker. It seems that every time we get stuck he is on watch. I was going to assure him that this was not strictly true for Arthur Smith has been pretty effective at getting into trouble but then thought it best to say nothing.

Don Graham took over at 1600 and did his best to get her moving in any direction but to no avail. The *Macdonald* was invited once more to give assistance and immediately attacked the ice, making passes on both sides, but it was a lost cause. In the process, one great blue chunk, estimated to be fourteen feet thick, rose slowly out of the surrounding mass of ice floes. The ice is very heavy but there is nowhere for it to move or be moved. The icebreaker, on our starboard side, was able to maintain a parallel track for a short distance but eventually that tactic too failed and she came to a stop.

A meeting had been scheduled for 2000 at which the final decision was to be made whether to continue around Banks Island or withdraw and seek the Prince of Wales Strait alternative. At 1930 or so I could stand the strain no longer so arranged for a helo from the *Macdonald* to fetch me. Tony met me (how thankful I am that he is here) and we went to Fournier's cabin, shut the door, and got down to it.

Clearly, Paul was tired and furious that we were engaged on such a fruitless task. If he had been asked in the morning he would have warned about straying into these big floes, that his ship is at the limit of her capabilities, and that the risk to his propellers and rudders was more than he could accept. Then Tony told me that Paul is under no obligation to remain if he felt endangered and at risk of freezing in. All too true but what to do now? Various courses of action were discussed and it was agreed we would continue our attempts to move astern while Fournier would turn his ship around and do his bit to assist by using his wake to shift the very heavy ice which has accumulated under our counter.

Paul left the room to deal with some matter and while he was away Tony explained how tired he was and said that it is effecting his judgment. A good night's sleep is indicated so we agreed to press on with the wake washing treatment until dark and then pack up for the night. I returned to my ship thankful that I had not delayed having that discussion.

The 2000 meeting was in progress when I got back all the while Don was striving to get the ship deeper into the floe. I had to sit at the table while Denny Farmer described infra-red and laser imagery. There was much discussion about the next day's ice recce flights all this assuming we will be well ahead of our present position. It was impossible to sit still and it was apparent, according to Beef and Stan, that I was busting to make my report.

Someone said "Where will we be at 2130Z to-morrow?" at which point I had the opening I needed and started my report by saying that it was probable we would be right where we are now - stuck in the ice. If we didn't take a

hard look at our icebreaking tactics we might well be there for the winter. This seemed to get people's attention and I went on to describe my visit to the *Macdonald* and the tense atmosphere I met there as a result of what we had been doing. I think the message got across that we might well be involved in a difficult situation and that we should concern ourselves with the immediate need to get the ship out of her present predicament. M'Clure Strait is working on us now with a vengeance.

Back to the bridge where Don was still hard at it but obviously not getting anywhere at all and aware of the fact. We agreed it was a futile business and after consulting with Fournier it was decided to pack up for the night as agreed earlier over the radio when I suggested we work until dark and then stop for the night. Don's indication that we could go to bed brought such an emphatic concurrence from Fournier over the radio there could be no doubt he had a bellyful and was even then heading for his bunk.

And so silence settles over M'Clure Strait. Our position six miles to seaward of Cape Vesey Hamilton. I talked with Stan and T.J. who offered me a tot which by then I felt I had earned. An undercurrent of concern beginning to manifest itself among those in authority. A final nightcap with Beef and so to bed. What the morrow will bring I don't know but we could be in trouble and unnecessarily so if only they, the bridge gang, had heeded our repeated advice to do local ice reconnaissance flights and so forth. Roger always has insisted that he and his team have big ears and were always prepared to listen. Maybe so but it seems as if all those ears have in fact been plugged tight.

During all the evening's dramatics I tried to keep Ralph Maybourn and Lou Keller briefed on developments.

The final action before the ship lapsed into quiet was to arrange with Fournier and Storrs to meet in the icebreaker in the morning to make plans with Stan, Roger and myself.

Tony's plan to sail Louis *St Laurent* for the Arctic to-morrow makes great sense. We will likely need her and maybe sooner than we thought.

Ray Stone, at some point while I was rushing around *Macdonald's* decks, told me the ship had a big celebration a day or so earlier, it being the ship's ninth birthday. Also that all the members of the press corps were unanimous in endorsing a recommendation to the Prime Minister, apparently sent by a press member who knows him personally, that Fournier should be considered for the Order of Canada. I endorse that with enthusiasm. He is bringing lustre to Canada's name by his efforts in support of this epic voyage.

Friday, 12 September - Day Sixteen

Up at 0700 anxious to get to grips with the day. Poor visibility and a thirty knot wind from the north. We have been drifting in our ice floe quite a distance. Ralph Maybourn estimated it to have been at the rate of three quarters of a knot in a direction of 125 degrees (True). Certainly the one thousand foot cliffs of Banks Island look a deal closer than they did last night and the Mate on Watch said we had moved a mile closer, the distance from shore now five miles.

At 0830, unable to wait any longer, I called the icebreaker and it was agreed we would meet there at 0900 and we would use our helicopter.

Tony and Paul met us and we were soon crouched around the green baize table in Paul's cabin hard at it. He was in a good mood having had an uninterrupted night's sleep and matters proceeded smoothly. Notice was taken of our drift overnight in the right direction, that is to the east, and that there was no real risk of us being carried into danger along such a steep-to coast.

Paul undertook to take his ship back down the track we had taken to get into our present situation to see how heavy conditions were there and to stir it up. We agreed to use the day to get test parties out onto the ice taking advantage of the lull and that we would also fly a helo recce to get a sense of the local ice problem before deciding on a final course of action.

So after a cup of coffee and reference to the possibility of towing us astern through the channel, we broke up. I had sat there all through this session wondering when someone would bring up the subject of a tow and Roger finally took the plunge. Fournier at first rejected the suggestion out of hand but quickly came round and it was agreed wires would be dragged up and got ready in our ship. It may not be necessary but alternatives must be considered.

Back to the flight deck, in the *Macdonald* a journey of a few feet, whereas in the tanker it is a good two hundred yards from bridge to flight deck. With Stan in the left front passenger seat, Roger and I in the back, all peering through the windows, we did a recce of the area before landing on. The position of the two ships bang in the middle of the floe was apparent. The distance to escape into easier conditions being the same ahead as astern, about one and three quarter miles. The shape of the floe, its extent, and the easy ice lying around its periphery, were obvious and Stan really hoisted in the

significance of helo recce for the first time. The scene laid out below, with the ships stuck in the middle of the largest floe in the area, was one which stated in the clearest of terms that this state of affairs would not have come about had someone with a grain of sense, taken to the air at regular intervals to conduct a reconnaissance whenever the situation ahead became unclear. And so back to the tanker. I was wondering what people were thinking now, those who had reckoned Esso's Tiger had taken over the Arctic.

The ice parties collected their gear and went out onto the ice to drill, obtain samples, and other data. I determined later from Stan that the ice was twelve to fourteen feet thick and as hard as it will get in winter. The engine room department taking advantage of the delay to make repairs to a leaking steam gland.

In the afternoon Beef and I got into our winter gear, slung cameras about our necks, and clambered down onto the ice. As a precaution, of course, I encourage my friend to precede me across the floes happy in the knowledge that if they support him they will support anybody. We walked around the bow to the starboard side, the ladder being on the port side amidships, and got some pictures of our immobilized giant with the cliffs of Banks Island in the background. All the ice churned up the previous night had refrozen and *Manhattan* appears to be locked tight. Looking at her wide bows it seems unlikely she will ever move again but move she must or she will be here for the winter. A loudspeaker recall for us to return for a meeting convened at short notice by Roger.

A quick tot of rum for, as Beef decreed, medicinal purposes and we were at the meeting. Roger in charge with Stan, Arthur Smith, Don Graham, Walter Devine, T.J. Fuson, Hank Rosenthal, Bram Mookhoek, Colos Bennett, Beef and myself plus some others whose names escape me.

Roger announced that it was intended to make a mighty effort to get the ship moving ahead. There followed an examination of the operation of the steam plant making available every ounce of power. It was reckoned that by shutting down steam supply to deck machinery plus other economies there would be a gain of 10,000 pounds of steam for the turbines equivalent to 1,000 horsepower and representing two to three percent of the ship's maximum power. It could make the difference and so it was agreed. Other arrangements were made for the handling of telegraphs and throttles so as not to lose power at non-critical moments when backing and charging.

The heeling system is to be in operation as soon as possible to break the ship loose from the ice now gripping her and to this end all ice parties were

summarily recalled. This precipitate action infuriated Dr Frankenstein, the man chiefly involved, but it is not a matter which concerns me.

Washing down the bows was organized, wetting by use of hoses through the hawse pipes both sides. It is to be hoped this will provide a measure of lubrication between the ship's sides and the ice.

1800 is the agreed hour and the statement was made that "when the glamour's over and we're out" such and such would be done. My private thought was that the "when" of that boast might better be preceded by an "if".

Roger announced that once the ship is free she would be parked for the night in what he is pleased to describe as "friendly ice" to avoid any chance of wandering into another floe and repeating the besetment process. The lessons are being learned and learned the hard way.

Maximum rudder angle of fifteen degrees was approved though Roger would like more. Bram says the greater the angle and the higher the speed through the water the more serious the risk of ice getting jammed between the fixed and moving portions of the structure so the limitation was accepted as a reasonable compromise. No angle, of course, in heavy ice when the ship is moving and all available thrust from the screws is needed.

Preliminary ice reconnaissance indicates that on leaving the floe our course should be to the north into the center of the channel and easier conditions.

With all arrangements made, plans agreed upon, the meeting adjourned and with looks of determination on every face all departed to prepare for the great event.

By this time *Macdonald* had completed her churning commitment down the channel with Fournier reporting that a quarter of a mile astern is the ridge which was our undoing yesterday and that it would be quite a challenge to get us backed through it. From there on conditions are easier and should not present any difficulty. He also indicates it is nearly two miles to easier conditions astern so if we had tried to score a bulls-eye in this floe with *Manhattan* we certainly succeeded.

I informed him of the plan in train here and he agreed it seemed the best course of action. He had flown an ice recce in his own helo to see for himself the overall situation. To my relief, he told me he would turn his ship around again and be ready to help by 1800. Turning in that welter of broken ice is a tedious process but in one respect, I suppose, it stirs it up even more and should facilitate our ability to move astern.

I get the feeling, as 1800 approaches, that there is so much pent-up energy, emotional and otherwise, being generated in the ship for this supreme test that if it should fail something will explode!

Precisely at 1800, the heeling system having prepared the way, things began to happen. The bridge filled with people to the annoyance of the Master I feel sure but each body had a reason to be there except possibly for Helen Bentley and one or two others. *Macdonald* at this time very close under our starboard quarter and there was moment of apprehension when it was discovered our engines were going full astern threatening the icebreaker with a collision. An urgent signal from her enabled us to reverse engines and the situation was saved.

The icebreaker then went about the business of breaking the heavy pack on our starboard side and was successful in loosening it considerably. Having backed down as much as the heavy brash under our counter would permit the engines were put full ahead at 1810 and we made our first lunge at the imprisoning ice. Four minutes later we were dead in the water and the engines put full astern. At 1818 once again we went ahead and this time the ship throbbed and shook with power as she slid through the broken ice filling our track. Propeller revolutions built up to a high value, reaching 95, and she generated impressive momentum. This was in fact her best run of the evening and for nine minutes she maintained headway coming to rest again at 1827.

Again and again the ritual of backing and charging was repeated, sometimes for short runs of four minutes, sometimes longer ones of seven. By 1930 a heavy ridge nipped the shoulders of the ship calling for repeated attacks to bull her way through. Finally, at 1949, having backed for the ninth time, the ship charged, breached the heavy blue ice blocking the way ahead to emerge into light going, mostly rotten one year stuff only a few feet thick. She maintained headway for fully twenty minutes and it became clear to everyone she was breaking out into an area where maneuvering would be possible. Her repeated attacks on the ice over this whole period were matched by our icebreaker synchronizing her movements with ours in backing and ramming to great effect.

As soon as it was apparent we were free the release of pent-up tension on the bridge was intense. People chattered and boasted in loud voices and there was a great outburst of “we did it, we got her out” and so on.

There’s little doubt that much of the credit belongs to the engineers led by Colos Bennett who performed with outstanding effect in getting the last ounce of thrust from his plant. She displayed a vigour far more impressive

than ever before. Admiral Storrs called on the radio to say it was a most impressive performance to which Stan replied with thanks. Later he felt he had not handled his response the way he would have wished. It is probable that without *Macdonald's* contribution *Manhattan* would not have got out.

Both ships moved off to the north skirting the floe to park in easy ice conditions for the night.

A meeting that evening to examine the most recent data obtained by the ice recce aircraft. The relief felt by everyone at getting out was still bubbling through the ship and minor celebrations were marking the achievement. I wonder how many people appreciate how near they were to an over-wintering situation. Anyway, full marks to all the *Manhattans* on choosing the gallant way out and not being dragged out ignominiously stern-first - some fate for that *Tiger* who is said to have taken over the Northwest Passage. Fournier, in one of our subsequent radio talks, said that he had little faith in the success of a towing operation had we been compelled to attempt it.

At the risk of giving offence I suggested to Roger, understandably relieved at the successful outcome and suffering somewhat from nervous reaction, that Paul might appreciate a word. All credit to Roger for he promptly called up the other ship and made a thank-you message en Francais causing a pleased Paul to erupt in return in a stream of incomprehensible Quebec French.

So ends an eventful day.

Saturday, 13 September - Day Seventeen

Under way again at 0400. By 0730 the ship was beginning to be held up by heavy pack but on each occasion got moving again unassisted.

At 0600 the helo took off on an ice recce with Arthur Smith and Emil as observers. The flight as planned bore no relation to the one actually flown. Because of compass trouble the aircraft flew north instead of south with Arthur mistaking the Dundas Peninsula for Peel Point. Communications broke down and the stage was set for a tricky situation if they had been obliged to make a forced landing. They eventually recognized the mistake, got a good picture of ice conditions, and returned safely to our deck.

At the 0900 staff meeting Arthur spoke up about the difficulties in navigation and communications. Stan at once took steps to have the matter corrected and we should get a gyro compass on arrival either at Sachs or Barter Island.

Roger very sensitive, or so he pretends, of the fact that whenever the ship gets hung up in ice there's this character running about the bridge in a brown duffle coat and tartan beret and he was offering them for sale cheap to any takers - there weren't any.

The ships tracking east before turning south to reach the entrance to Prince of Wales Strait (POW) by dark. The ice recce flight, it was agreed, was flown too early to see enough in the failing light.

Wind from the west at 28 knots which will move quite a lot of ice into the strait. When we were last in the vicinity it was reasonably open.

Stan remarked that he hoped because we lay-to last night this will not become a pattern of conduct in the future. If year-round operations are to become a reality such tactics would be counter to the company's interests.

Because it was such a beautiful day, warm sunshine, and easy ice conditions, I called Paul Fournier and asked if it would be convenient if T.J. Fuson could visit his ship and might I accompany him? The answer, of course, was favourable although I had some difficulty extracting an invitation to stay for lunch but this too was eventually forthcoming.

At 1120 on the dot *Macdonald's* helo collected us and was back on her deck a few minutes later. Both Paul and Tony met us and escorted us to the cuddy where we reviewed events. Tony expressed amazement at the display of power and icebreaking put on by *Manhattan* when she broke out of her ice trap. He said he'd have to revise his ideas of the chances of this sort of an operation after that.

Paul presented T.J. with a walrus tusk which pleased him immensely and soon we were off to lunch. Dr Herman and Mr M'Clintock (a famous polar name) the Chief Engineer, joined us for shrimp cocktails, trout, steak, and baked Alaska. This was followed by a tour of the ship and by 1500 we were back on board the tanker. T.J., I think, enjoyed this visit for it gave him a good feel for icebreaker operations.

Beef said he accidentally overheard part of a telephone conversation between the ship and Bob Stap in Houston. Bob reports alarm among the families of crew members at some of the wild rumours coming from the press representatives in the ship. But he was assured all is well and progress completely satisfactory, which was greeted by booming and oft-repeated shouts of "wonderful" and "you better believe it" from deep in the heart of Texas.

Repeated efforts by Beef to get the staff captains, and others, to use radar to assist in ice navigation go unheeded. A suggestion of his that one helo fly

cover for another on a long flight in case of problems with navigation, such as the unreliable compass in the Humble S-62, also go unheeded or are greeted with a remark such as "that may be the way they do it in the Coast Guard, but not here."

Some random thoughts as we move easily through loose ice. Our quarters, with four of us to share, are becoming increasingly untidy. More books, papers and pieces of equipment keep appearing and available space diminishes a little bit more each day. The plate over the door informs the reader that our accommodations are in fact certified for twenty seamen - something I would not wish to experience.

A minor triumph as Beef collars a supply of olives for the evening martini. As he remarked the other day, some chaps have sailed around the world, some have rowed across the Atlantic, but we're probably the only ones who have "skolled" their way through the Northwest Passage. These "shack locker mug ups" as he calls them, are a pleasant interlude if operations permit.

DMO's comment the other day that in his view we have been wrong in our assessment of the structure of ridges seems to have some validity. In our experience most, indeed likely all, of the ice which constitutes a ridge is on the surface of the floe and very little below. The view held up to now that depth to height ratio of a ridge is of the order of three to one would seem not to be the case. This ship certainly ploughs through these obstacles with little difficulty. It is the weathered hummocky ice that slows her.

Approaching the entrance to POW and in ice. At 0610 *Macdonald* reported having trouble getting through a ridge. By 0705 she was still there and Paul reported he would need another thirty minutes. I mistook signs of impatience on our bridge at this delay to our advance with what was in fact a genuine desire to go around and "break the Johnny Mac loose." While not wishing to dampen such worthwhile sentiments I did my best to indicate that she would be free any minute and that if we attempted a "cutting out expedition" we could end up having problems becoming involved in many hours of icebreaking to no real purpose at this stage.

True to his estimate, Fournier got his ship through and moving at 0735, precisely when he said he would, and accordingly we went ahead.

By 0920 *Manhattan* was having to back down to ram some heavy floes. It seems we are too enthusiastic in this evolution for reports came up that very heavy chunks of ice were moving in under the stern posing an obvious threat to our rudders. Ten minutes later, our charge having been unproductive, we were motionless in a large floe. At 2200 the icebreaker was on our port beam

and there we stopped. Our steering gear out of action and some hours needed for repairs.

At 2330, wanting to tell Fournier what is planned, I went into Roger's cabin where the three captains were in conference. Roger was set on remaining for the night, partly because of the time needed to complete repairs to the rudder, partly because of problems related to navigating in an area where it is difficult to tell where the ice stops and the beach begins. For this reason he had decided to remain for the night and accordingly called the bridge to have the word passed to the icebreaker. He then told Stan over the phone what his decision was. I joined in the discussion though I was not involved in the decision-making process.

At this time the phone in our cabin next door buzzed and I nipped out to be told by Mr Hahn on the bridge just what I had heard from Roger a moment before. While this was going on T.J. Fuson and Stan happened by with black looks of disapproval on their faces. They came into the cabin and behind a closed door we had what was for me a difficult conversation. I explained that I seemed to be like the ham in the sandwich and that I find my position vis-a-vis the captains and management a mite prickly. Stan made it clear I am his adviser, as is Beef, and that's what he wants. Would I, under the prevailing conditions, be prepared to take my ship into POW Strait at nighttime? That was his question and my answer was that of course I would. Beef agreed that he would too. That was all they wanted. Still looking disgruntled about the way things were going they departed. What to do? Go back to Roger, Arthur and Don and be seen by Stan to be conferring with them. In the end I turned in and tried, unsuccessfully, to forget the whole thing.

Earlier, when leaving Roger's cabin, I indicated I would be right back. What will they think of me now? Our door remained shut and they must have concluded the obvious, that I am now involved in command decisions and not anxious to face them after conferring with Stan and T.J.

More notes. Learned from Bram Mookhoek to-day that despite the terrific pounding the ship is taking in heavy ice of all descriptions no readings have been recorded by any of the strain gauges, no bending moments recorded nor any deflections. T.J. also told me that prices for oil leases on the North Slope of Alaska are going as high as \$30,000 an acre.

Sunday, 14 September - Day Eighteen

Up early - I want to be in at the beginning. At 0500, having showered (ten gallons of fuel for every gallon of precious water), shaved and dressed for the day, I opened the door and stepped into the passageway at the precise moment Roger emerged from his cabin. We looked at one another for a moment and he came over and said: "I recognize the signs when a gale is brewing, and take steps accordingly. I'm having problems with management." The only response I could come up with at that hour of the morning was something (inappropriate in the circumstances) about prudent sailors running for shelter at the approach of a storm.

During the night we had drifted eastward and were by then about ten miles off Peel Point. The ice had loosened its grip on the ship, there was a deal of open water between the floes, and *Macdonald* was on our port quarter. For radar fixing we reckoned the "land" showing up on radar was actually two and a half miles farther back from the point and what we were in fact looking at was piled up fast ice extending seaward from the land. One can never be certain.

I called our consort and said we would be moving off at 0600. Still having rudder problems and it was not until 0615 that we started moving, ignoring the open water nearby but making good headway nonetheless through the ice. Both echo sounders on and working. Canadian hydrographic charts in use were 7091 and 7833 plus Topographic series 88D and 88C.

An ice recce by our helo at this time with Arthur Smith dressed to kill in his flashy red parka, fur boots, pistol and a supply of glass beads in case he encountered any friendly natives along the way. Emil and Denny (Farmer) also went along. Their report indicates not much change in conditions in the strait but with some open water on its western side.

Ice concentrations grew heavier as we advanced and at 0815 we tangled with a very heavy floe with hummocking ten to fifteen feet high and the overall surface of the floe itself three to four feet above the water. When broken fragments moved slowly aside to let the ship through they appeared to be nearly twenty feet thick. Roger announced that because of the heavy nature of this ice he was going to "pick away at it, tap it with the ship until he could ease his bow around to starboard and slip past it in that fashion." Some pick! I urged him to put some drive into the ship's motion but this was not well received. Finally, we did hit the ice a hard blow, it cracked quite easily, and off we went. This was at 0855.

On we went leaving a trail of heavy ice fragments in our wake for *Macdonald* to negotiate. At 1030 we stopped in a mass of ten tenths ice, large floes separated by ridges indicating pressure. The wind at this time out of the east with the possibility of it driving the pack across the strait onto its western shore.

Called *Macdonald* at 1040 asking Paul to try and loosen the ice on our starboard side. The sequence events went as follows:

- 1100 Moving astern but not making much progress
- 1105 Moving astern again
- 1109 Full ahead - stopped by the ice
- 1112 Full astern - backing one ship's length
- 1123 Full ahead
- 1125 Full astern - waiting while the icebreaker goes to work again on the ice finally succeeding in overcoming a heavy ridge, the partial cause of our difficulty
- 1135 Full astern in readiness to charge
- 1145 Full ahead - this time *Manhattan* broke free and gathered headway

At 1130 or thereabouts, the ship found herself getting too far to the western side of the channel. This was because there was blue water over against the coast sparkling in the sun and luring us in that direction with the promise of ice-free navigation. Arthur Smith, who had the watch, kept insisting on moving over to starboard, more to starboard, if only we could get around this ice we'd be home free. Beef and I, both worried because there were no fixes on the chart, took the initiative and my friend began to plot radar fixes. These unquestionably put us outside soundings with 20, 19 and 18 fathoms under our keel. I advised Roger that he should work the ship back into soundings without delay. I confess to being uneasy for the first time but the echo sounder gave steady readings without shoaling. Beef, I know, felt the same way. Dave Abernathy, the Chief Mate, was standing at the back of the bridge shaking his head with a disapproving look on his face every time Arthur Smith, still aggressive in his glorious red parka, bellowing his desire to move even farther into unsounded waters. Roger kept his cool and ignored these suggestions by telling Arthur to make ground to port.

And so it went - Beef moving between radar and chart plotting fixes, Roger keeping an eye on the ship's position, Mr Scara, second, reporting depths from the *Bludworth* (that useless machine of unhappy memory), Mr

Silcox, first, doing likewise with the *Simrad*, and Mr Hahn, third, busy with the engine room annunciators.

At 1350 *Macdonald*, while trying to follow in our wake, became stuck in a ridge. I suspect it was partly her own fault for allowing herself to fall too far astern. Anyway, there she was none of us realizing how far back she had dropped. We stopped and Roger's next concern was whether we were far enough inside sounded waters not to have to worry about the wind-driven pack pushing us back into shoal water. Another flurry of fixing on this account. The icebreaker waiting for the pressure to ease and using her heeling system to help her wriggle through.

The plight of our icebreaker once more tempted the *Manhattan* to go to her assistance but it was explained such a move would surely risk the ship in shallow water and to maneuver such a great brute around and through the pack in confined waters was clearly unwise.

While all this was going on Weldy Phipps droned slowly around the ship in his twin Otter with its doughnut wheels. He landed on the nearby beach, the one from which we were trying to distance ourselves, to deliver mail and pick up passengers. To this end helicopters from both ships contributed noise and confusion to the hectic scene on our bridge. I received two letters to read later when all the hubbub had subsided.

At 1445 *Macdonald* succeeded in extricating herself and moved to join us. By 1500 we were in company again and moving to attack another heavy floe. After this the going became progressively easier and by 1645 we reached open water north of the Princess Royal Islands and pressed on down the strait.

So ended the hydrographic survey of POW Strait but, with the possible exception of Arthur Smith who wasn't asked, we all agreed that *Manhattan* is hardly an ideal surveying vessel for taking soundings in uncharted waters. On the other hand, it must be acknowledged that on the bridge during all this were no fewer than five captains and four mates clutching their master's papers.

This was the evening Beef's pouring hand slipped a tad while dispensing the martinis with which to celebrate our successful negotiation of the strait. I got more gin than I wanted or needed. This was also the evening a cartoon appeared, causing much merriment, showing a grinning polar bear sitting on an ice floe marked "M'Clure Strait", with the tail of the Esso Tiger disappearing into his maw. Management not amused.

Monday, 15 September - Day Nineteen

During the night and the following morning both ships wallowed along in open water thankful to be free of ice for a spell. Our adventures in the strait, and delays off its northern entrance, have delayed our advertised arrival off Sachs Harbour by a day but that is not too serious.

Our draft prevents us from getting much closer than five miles and so the approach to our anchor berth was slow and dignified. At 1256 down went the starboard anchor in 27 fathoms of water and when the ship had her cable we secured with the seventh shackle on deck.

Shortly after, at 1335, *Macdonald* came to our starboard side to take 40 tons of fresh water and about 800 tons of diesel. A job that will take ten hours.

Charlie Hahn, the young third mate, was instructed to get a sounding by lead and also a sample of the bottom there being nothing on the chart to indicate what it is. A piece of ivory soap was recommended and as he rushed off the bridge our irrepressible captain shouted after him not to forget to secure a line to the lead before heaving it over the side.

Clambered over to the *Macdonald* where Fournier gave me the bad news that some time the previous day, when we were in that heavy ice in the entrance to the strait, he lost a blade from his starboard propeller. His divers had just confirmed this and so a meeting with all concerned is obviously the order of the day. Went off in search of Tony and we had a long session discussing possibilities. He showed me a draft message to Ottawa which seemed to cover the situation with particular reference to the need for speed in returning to Viscount Melville Sound in view of the heavy ice conditions we had just experienced in POW Strait. Fournier also apprehensive about the problems confronting him if he has to worry about helping a Wind Class icebreaker. Only he knows what [it is] like following this ship but as an ex-Wind class icebreaker captain myself I have to bite my tongue whenever he opens up on this subject.

Back to the tanker to find that Stan was ashore but a meeting was arranged for 1800 at which Stan, Beef, Paul, Tony and myself participated. After a few opening pleasantries Tony explained to Stan that Paul was concerned with the lateness of the season and the difficulties which we might encounter if we dilly-dally in the Beaufort Sea. In his view we should return as soon as possible into the area west of Resolute Bay for testing, also that he felt Paul could not assist *Manhattan* and also be responsible for a Wind class icebreaker

that needed help. This poses quite a problem for Beef. Paul may be thinking about the immediate problem of icebreakers but there are other factors here which cannot be dismissed. We considered the whole subject.

Stan, who very quickly grasped the situation, came up with the following decisions:

Manhattan would return direct and quickly from Point Barrow

There would be no plans to make major forays into the polar pack in the western Arctic on the return journey, or at any other time either

All the remainder of the testing would be conducted in Viscount Melville Sound

There would have to be further discussions concerning the role of the *Staten Island*, the Wind class icebreaker which presumably is

assigned to accompany us on the return leg

Captain Fournier was encouraged, at any time, if he felt that something was amiss, to make recommendations or comments - this was especially emphasized by Stan.

An enquiry would be made by Beef as to future plans for *Staten Island*.

After all this there was a general discussion. Some surprise that it was fragmented ice in the tanker's wake that had done the damage. Divers report not a scratch on our propellers.

The reason we are going to Barrow, apparently, is because of the arrival and departure there of many senior people and it is a long standing commitment.

The *Macdonald* is to be encouraged to stay much closer, about two and a half cables. This should not be a problem as we rarely back down that far when working in heavy ice.

Stan reported that when a heavy piece of ice, measuring 12 by 10 by 10 feet went through our screws the revolutions dropped from 70 to 50 but there was an insignificant amount of torque reduction. All the red paint has been wiped off by ice but the undercoat still appears to be in good condition.

Tony asked Stan what minimum draft could be obtained if the ship was pumped up. He indicated 35 feet. The minimum sounding in Dolphin & Union Strait is 7 1/4 fathoms (43 1/2 ft) so an escape route that way and up through Victoria Strait, Peel Sound, and into Barrow Strait, could be considered a last ditch move. I wonder. It is certainly an intriguing thought

and would create a flurry of interest if it came off, and an even greater one if it didn't.

We then adjourned and DMO went off to report the damage to Ottawa. Until then the matter is to be kept from the press. I undertook to make enquiries about a proposed dinner party DMO wants to give for Admiral Willard Smith, USCG, coming on board at Barter Island. This means Tony must go on to Prudhoe Bay and he will have to invite the whole lot on board, politicians, Governor of Alaska, etc.

There was a staff meeting at 2100 where the damage to the ice-breaker was reported. Much time was spent discussing problems associated with the heeling system here. Colos Bennett, the Chief, is shorthanded for all the demands being placed on his hardworking team and maybe extra talent will be flown in.

After leaving Barter Island, with the various dignitaries embarked, we got to Prudhoe Bay arriving off there the next day. The ship will have to heave to about 25 miles to seaward because of shoal water and move people about by helo. I hope the visibility will be good enough to permit flying. If there is fog this really will create difficulties. There is to be some ceremony having to do with the embarkation of a symbolic barrel of crude to take back to New York with us. Roger asked facetiously what sort of crude it would be - West Texas maybe?

Stan informed the meeting that we would arrive off Barter by noon on the 18th and off Prudhoe by 1600 on the 19th. Point Barrow on the 21st where we would lie off for more helo work starting back to the east late the 22nd or early on the 23rd. Our ETA Sachs Harbour the 25th en route to Prince of Wales Strait.

Concern being felt, especially by Bram Mookhoek, on the paucity of testing achieved to date. Stan reckons that with six samples of test material gathered thus far the cost works out to about \$5 million per test.

The locals of Sachs Harbour complaining about the distance the ship is from the beach. One of them allowed as how they had a pretty good harbour there (ten feet or so!) but Roger's response was that, alas, his kayak was bigger than their kayaks - some kayak.

Tuesday, 16 September - Day Twenty

At 0133 the anchor was aweigh and by 0200 we were taking our departure from Sachs in open water. Steering a southwesterly course until 0820 when,

as a result of a Lambda-Decca fix from the *Macdonald* following in our wake, course was altered to 270 deg (T).

Our helo had taken off at 0815 for an ice recce and I suggested to Mr Heller, manning the radio on the bridge with which to work the aircraft, that our alteration should be passed so they might better plot our mean line of advance. The helo reported fog 18 miles ahead, probably an indication of ice, and shortly thereafter returned safely to the ship.

While this was going on Dave Abernathy and his trusty helpers were struggling with the anchor which was still a'cockbill. Attempts to trip the shackle joining the anchor to the cable so that it might be hove close home resulted in a broken strop but eventually they succeeded. It is not a good arrangement.

Discovered that our helo is due now for its 100 hour inspection which will take 18 hours. I don't believe the command is aware of this but it certainly can influence planning and operations now that the other machine is out of action.

The icebreaker called up and offered a Lambda fix at 1000 which was gratefully received. She was asked to pass these every two hours and in the end did it hourly. This service elicited a "Thank God for the Johnny Mac" from the First Mate, Mr Silcox.

Next, a Canadian navy Tracker appeared overhead at 1340 and gave both ships a working over with low passes up, down and across. It had come from Inuvik and Emil Stasyshyn was able to send it ahead on a short range ice recce.

Congressman Howard Pollick, Alaska's only congressman, appeared on the bridge being dogged by the ship's photographer, a giant of a man even bigger than Beef, who posed him in every imaginable situation. He must have taken 30 pictures. Pollick, who has a hook on his right arm, comes from these parts where he used to be a guide and hunter.

He, Beef, and Rod Edwards talked icebreaking and icebreakers in our cabin. We discussed big tankers with triple screws cruising on the center one and all of them when breaking ice; also the merit of even distribution of power on all shafts or whether it would be better to have more on the center shaft and less on the wing propellers. Opinion divided on this though I know Fournier is convinced that most of the power should be on the center shaft.

Beef described the time when *Staten Island* tackled a huge piece of ice which passed under the ship and clipped off a propeller. He went on to say that three or four men standing on the flight deck afterward swore blind that

the floe surfaced just off the ship with the prop resting on it. They were so excited over this that no one could get a picture of it before the floe tilted and the propeller slid into the sea.

Edwards emphasized the good protection twin rudders, with ice horns protecting them, provide the propellers in this ship and wondered whether in a triple screw arrangement triple rudders might be a good thing but this was only conjecture. He is also of the opinion that the ideal power plant for giant tankers would seem to be geared turbines with constant speed propellers - only in this way would it be possible to exploit the efficiency of turbines for large installations and ensure a powerful backing capability essential for any ship working in ice.

By 1515 our Tracker was back clattering overhead and making a few more passes before returning to Inuvik. Its ice report was passed to Emil.

In really quite shallow water - about 75 feet under the keel.

A steady stream of Lambda fixes from astern with more fervent thanks from the watchkeepers here. Its a good thing the *Macdonald* fitted the Lambda because both the U.S. Coast Guard and Humble Oil reckoned it wasn't necessary. With the disappointing performance of our satellite navigation installation it is a relief to have such a fixing capability in these waters.

At 1930 a message from DMO wanting to speak with me. As I reached the bridge a reduction of speed from nine to five knots was being ordered because of ice. DMO asked me if we had observed the shoal over which the icebreaker had just passed. I gave him a "Wait - out" and rushed into the chart house. There on the trace was an ugly looking pyramid rising from the seabed. By then there was not much to be done so I reported that we had slowed for ice and other reasons and asked that in the present open water conditions would *Macdonald* consider taking station ahead of us to provide warning. It was agreed and she was soon churning up our starboard side.

At 2000 we passed over a second shoal but not nearly so threatening. Roger understandably agitated at this development but we have warned the captains often in the past that this can happen in the Arctic. The water had been shoaling very gradually and then levelled off at 22 fathoms for some time when all of a sudden we passed over these shoals in an area on the chart showing no soundings.

Shortly after this Paul reported heavy ice ahead and that he would be obliged to drop astern again. I said this was OK and to use his discretion as to when he should move ahead or astern.

A staff meeting at 2000 where plans were tabled for tests on the morrow - we hope for suitable ice and I undertook to get *Macdonald* to prepare an ice test party plus a helo. We continue west for our next rendezvous off *Barter Island*.

Passed well to seaward of Pullen Island about which several people had questions.

This day would have been routine except for the narrow squeak with that first shoal. Bowling along drawing 55 feet and the momentum of nearly 160,000 tons, is an experience fraught with risk in such poorly charted waters. I can imagine how Roger must feel. Just what does one do if water does shoal suddenly ahead? If you are not in ice you cannot stop this beast in time, if you alter course propellers and rudders could also be imperilled. Ice, of course, can be used effectively as a brake. In open water it is best to station another smaller ship ahead to provide warning, failing that simply go dead slow.

Wednesday, 17 September - Day Twenty-one

We are so far west now yet resolutely keeping our clocks on +5 on GMT to suit the convenience of Houston Head Office. It doesn't get light until late in the forenoon. Up at 0630 sensing *Manhattan* was working through some heavy ice. On the bridge at 0700 it was still dark, the headlights on, and the ship moving without difficulty through what appeared to be loose pack. In the open patches new ice formed overnight tinkled and sang as we shattered it sending icy shards sliding across the unbroken surfaces.

From midnight until 0400 we covered 36 miles through this sort of ice which is good going - nine knots or so. This area has had about six inches of snow.

Beef was to call his Admiral at 0730 and when finished he told me the latest development in the unfolding drama of icebreakers. *Staten Island* has a crack in her stem making her less effective in support of this ship than was *Northwind*. This is a blow to planning for us and particularly for the U.S. Coast Guard which is having a really tough year with its ships. The overall situation would appear to be as follows:

<i>Northwind</i>	Five engines instead of six
<i>Southwind</i>	Grounded earlier this year & is either in Thule or en route to her home port for repairs

<i>Westwind</i>	Only four engines available
<i>Staten Island</i>	Cracked stem
<i>Glacier</i>	San Diego or Antarctic bound
<i>Burton Island</i>	San Diego or Antarctic bound
<i>Edisto</i>	Boston and earmarked for the Antarctic
<i>J A Macdonald</i>	In company but less one blade from her starboard propeller
<i>L St Laurent</i>	Recently accepted from builders, now northbound, probably in Davis Strait
<i>d'Iberville</i>	Short on fuel (black oil) & probably homeward bound from Resolute
<i>Labrador</i>	Hudson Strait & (as always) operational

Admiral Smith, Commandant USCG, will board us at *Barter Island* accompanied by Rear Admiral R.W. Goehring, Chief of Operations, USCG HQ in Washington, and Rear Admiral R.E. Hammon, Commander, 17th (Alaska) District, and Opcon of *Northwind*. There will be a “draining of the save-alls” at that time, I should imagine, as they try and sort out the icebreaker situation.

The shoal we missed last evening was, according to the nearest reckoning, in position 70 deg 39.7 min North, 132 deg 20.5 min West. The incident occurred about 1925 (Ship time) while we were steering 259 deg (T), speed about nine knots having reduced to five at that time because of ice. Charted depths in the vicinity indicate 22 fathoms. Allowing for our draft of nine fathoms, we had a margin of safety of 13 fathoms under our keel reduced to approximately four over the shoal. The Simrad has a trace too small to make an accurate assessment and there is too much gain on the trace. The sounding between us and trouble could have been less but was probably more.

Call from DMO asking if it would be convenient for him to come over and talk with Bram Mookhoek. This was arranged for 1130 using their helo.

Our morning helo recce, in preparation for the tests, aborted almost immediately after takeoff because of lowering visibility which was down to two cables or less.

During the forenoon watch, course was altered to the north to locate some heavy ice and about 1000 the ship stopped while Bram and his men carried out various tests. How useful they were I have no idea. Under way again at 1115 altering to 255 deg in ten tenths ice, a mixture of soft and hard floes, slush and snow. Chart in use Can 7080.

At 1130 DMO calls to cancel out because of fog. At the same time we moved into an area of open water. But this was short lived and it was back again into ice. Here there are many floes with a dirty brown colour, very like Foxe Basin ice, caused by sand blowing off shore along the Alaskan coast. Max Brewer told me last year this effect can be seen as much as 100 miles off the coast.

Slow progress westward towards Barter Island in low visibility and scattered floes, mostly soft and rotten but with a sprinkling of heavy, hard ice.

The fog lifted sufficiently for DMO to make his trip over and we discussed details of his dinner planned for to-morrow night in the *Macdonald* - a total of sixteen of which half will be guests from here. Had a talk with Stan to tidy up some details and then Tony discussed test data with Bram while T.J. and I talked about the need for a succinct report from Beef and I to Humble on the lessons learned on this voyage. T.J. admits there is too much of "business as usual" on the bridge in an area that is full of the unexpected. I agreed to do this and Beef, when I spoke with him later, supported me.

A quiet moment on the port wing of the bridge after dinner with Stan and Beef. Stan was commenting on how many photos had been taken of Congressman Pollick and I was able to point out the gallant Congressman, even then, posing and posturing on the foc'sle for the benefit of the hardworking ship's photographer still dogging him.

Interested in hearing Tony's exasperation with the quality (or rather lack of it) of professionalism in the *Macdonald*. He seems, and admitted as much to me, to have concluded that the only answer is to turn over the whole operation to DND. Its just too big and too important for the country to have it continue on its present basis, especially on the personnel side.

He was telling me about yesterday's incident when we passed over that shoal. He got so excited that when he stabbed his finger at the echo sounder trace he poked it right into the machine and squashed the stylus. They feel over there it should be called the "Admiral's Patch" but opinion here is that a more suitable name might be "Chase Bank".

This day has been purely routine, so far, and for the first time ennui is apparent. I would like a change of scenery and faces and no doubt to-morrow will fix all that.

At 2245 I was checking the echo sounder and then the chart to discover we were gliding along happily fixing the ship using information supplied by the *Macdonald*. According to the chart our track was in 260 fathoms, give or take a few, yet the sounder showed something like 39. Suggested to the

bridge that too much confidence should not be placed on the Lambda fixing this far west no matter how confident the voice sounds over the radio. Any way you look at it, actual depths under the keel are a bloody sight more important than chicken tracks across a chart based on dead reckoning and the outer fringes of Lambda.

Someone suggested a fishing expedition while we are off Barter Island using the Boston whaler hanging at our stern. I was tempted to warn of the risks involved in these sort of excursions, a motor that conks out or won't restart (mainly because of lack of use), a strong wind and current, no one on the bridge keeping an eye through binoculars, and so forth. All the ingredients for a search and rescue situation quite possibly with fatal consequences.

Thursday, 18 September - Day Twenty-two

Continued poor visibility while we close Barter Island and our anchorage. At 0930 let go the starboard anchor nine miles off in 25 fathoms, eighth shackle on the waterline. Barter, by radar, 9.2 miles to the south.

Now to wait out the weather and see if that chartered aircraft due at 1830 (+5 time), will make it. Roger suspicious that some damage has been done to the rudders because the ship is not answering her helm as well as usual, particularly when turning to port.

Asked *Macdonald* if they would like to come alongside after we had anchored but no, they prefer to anchor nearby. *Northwind* likewise, she having reappeared after taking the coastal route. Roger tells me *Northwind*, in response to an informative message from us about our intentions, instructed Roger to close to a certain point and heave to, a piece of impertinence prompting a typical Roger response.

Beef on the radio asking for *Northwind's* divers to inspect our rudders and screws. Don McCann seemed to have a flock of reasons why this might be difficult but in the end I gather it will be done.

In a conversation with Stan I discovered that he takes a dim view of T.J. being here at all, that his proper place is in Houston bird-dogging the three task forces set up and working hard to further the various aspects of the tanker operation, including vital negotiations with shipyards etc. T.J. apparently was determined to go through the Northwest Passage come hell or high water. Stan went on to tell me that in the beginning T.J. was against the whole idea of the tanker test, as was Russ Venn. Stan went behind the former's back and

got the project to the Board of Humble and won the backing of Mike Wright, the Chairman. Once it caught the attention of the press both Venn and T.J. jumped on the band wagon and off the whole project cantered. Told Stan I had been asked by T.J. to write a report for him and Stan said I should submit it to him first which I will do.

At 1330 learned that the flight from Fairbanks will not now arrive until 2030 (+5 time) and passed this intelligence on to DMO.

At 1340 Denny Farmer (the SLAR interpreter), and Bill Smith, our popular and genial New York Times rep, jumped into the water to test a new type of immersion suit. It didn't take long before they got into difficulties. A 20 knot wind from the east was blowing the landing craft quite quickly to leeward away from them. Fortunately, a life threatening situation was avoided by prompt and effective help from *Northwind's* frogmen who jumped in and got them to safety.

A boring afternoon, something that rarely happens. Whiled away the hours waiting for the general upheaval which will descend on us to-night with the arrival of the Governor of Alaska and a gaggle of other characters.

Called Fournier at 1845 to warn him, weather permitting, we will be shortening in starting at 1945. No word from DMO. I imagine he's just given up. In such circumstances planning is a waste of effort.

After several false alarms and doubts whether the weather would hold up to permit flying, word arrived that the visitors had landed at Barter. Our helo off to collect them assisted by another from *Northwind* but before long conditions deteriorated again and the USCG helo returned to its ship leaving the chore of ferrying people and baggage completely to our chopper. Don Graham furious over this and on the bridge he could scarcely conceal his feelings when talking to *Northwind* over the air.

Went aft to lend a hand greeting the Admirals but this was not needed. In addition to three of them we received on board the Governor, Keith H. Phillips, Tom Kelly, Minister of Resources in the State Legislature, both men seem young for the posts they hold. Also Mr Nelson Jones and Mr Galloway, Humble directors, a Dr Miller B. Spangler of the National Planning Association, plus a nondescript character said to be the leader of the opposition in the State Legislature.

Stan gave one of his standard briefings and then turned our visitors loose to browse among the sandwiches, cheese, claret, toothpicks and assorted spirituous liquors. Their time being different from ours by four or five hours they were not a little confused, tired and hungry.

General shift around in the cabins to make room for all the extra people. Emil and Don Nevel agreed to go aft to #111. Beef and I to take the two uppers and the two rear admirals our lowers. Even flag officers have to muck in on occasion.

Friday, 19 September - Day Twenty-three

Awoke to find Beef already up. He came creeping into the cabin heading my way with a message. I sat up and banged my head on the deck-head - the message: "Don't bang your head when you sit up."

Organized DMO's luncheon party - the agreed list to be the Governor, the three Admirals, Mr Jones, Mr Galloway, and myself. Arranged with Mr Heller, officer in charge of helicopters here, who agreed to provide the airlift. At the crucial moment word came that icing problems with our machine would prevent the flight. Fortunately, Beef came to the rescue, arranging for a chopper from *Northwind*. This eventually materialized and off we went in two groups.

I believe we had a successful luncheon, certainly the Chief Steward in *Macdonald* went all-out to give us a fine meal complete with wines. Then it became a matter of getting the party back again and for this we rather pre-empted a helo which had come on an another errand from *Northwind*. Their machines seem to make a great meal out of flying - climbing to 1,000 feet or so and taking long routes but it may be because of pilot inexperience.

Tony flew over after he had seen the Admirals off to the *Northwind*, with his gear, and we had an opportunity to talk before he headed ashore. He has told Paul Fournier about *Staten Island* joining us at Point Barrow and the news was not well received. We agreed there is nothing to be done about it at this stage and I'll just have to hope I can damp down any outbursts.

We let go our port anchor off Prudhoe Bay at 1230 in 17 fathoms and secured when the ship had got her cable with the seventh shackle on deck. It was good we anchored because we waited all afternoon for the gold drum (alleged by some to contain only water) and members of the press to fly out and record the event. By 1700 the drum arrived and the flight deck became a scene of frenzied activity as photographers took pictures and goofers watched. The Governor was there, all smiles, and everybody seemed to enjoy the event. While this was going on the *Macdonald* kept steaming around us in endless circles, the embodiment of impatience to be moving. Nothing I could do about it.

Watched my first complete movie to-night and then listened while Emil talked about ice reconnaissance with Bill Markham in Dartmouth, Nova Scotia. A very clear connection and I might someday try to call myself to Ottawa if things get out of hand here.

Stan in to have a word about *Staten Island* being ordered to accompany us. He doesn't like it at all and wonders how we might best cope with this situation, Paul having gone on record that he would have nothing to do with a Wind-class icebreaker on the basis that all he does is break them out of ice and he has all he can do to follow in our wake. Stan suggested we might go north from Barrow into the pack to see how good she is in heavy ice, establish a sort of "figure of merit" for the two breakers. Maybe in this way it could be demonstrated that she will be a hindrance rather than a help and be withdrawn. In any event we both thought it might be a prudent move for me to talk it over with Paul but this is something that may send him into orbit - just the mention of the subject. I would not enjoy such a mission in the slightest.

Read Admiral Goehring went over to spend the night in *Northwind* reducing the crowding in our cabin somewhat.

Saturday, 20 September - Day Twenty-four

Creeping along the Alaskan coast en route to Point Barrow, our most westerly point of travel. Thick fog. A report of an ice island (actually a fragment thereof) being passed during the morning watch. Also Arthur Smith noted a trench recorded by our echo sounder around 0530 where the depth increased by twelve fathoms or so in an area where there are no soundings on the chart. He was at some pains to show this to me and explain the details. While the information is of passing interest what does please me is the interest he took in this little event. This is the attitude one would hope everyone involved in the handling of this ship would emulate.

Loyce Jones, the ship's photographer, on the bridge taking pictures of the Coast Guard Commandant, Admiral Willard Smith. I was invited to participate in a couple of these and received guidance from Loyce how he wanted us to stand, smile, etc. Instructions one is inclined to obey observing that he stands a no-nonsense six foot seven inches with the build to go with it.

Interesting discussion at lunch on the matter of ballast water in the wing tanks. The tank heating arrangements in this ship, I am told, are so much junk and do not work. This was followed by talk about tank cleaning. Here

in this ship the problem doesn't arise as we are simply carrying ballast in and out but ships engaged in the Arctic oil trade would always be loaded to a draft affording them the best protection from ice. Only for that portion of the voyage from the unloading port (Delaware River say) to Davis Strait would be available for tank cleaning, thereafter the ballast would have to remain until arrival at the loading facility (Prudhoe Bay) where dirty ballast still remaining would have to be pumped ashore for storage or extensive arrangements be designed into the ships to handle this extra commitment.

Our noon position came from the *Macdonald* based on a good D/F fix. Our D/F in a state of disarray on the chart house deck while someone investigates why it isn't working.

The bridge read-out of the doppler sonar has been off now for days. Ice moving under the hull switches it off and this means the computer from which we should be getting good navigational fixes is pumping out useless data or none at all.

The computer/satellite navigation system is suspect, the D/F unserviceable, Loran unreliable, and nothing much for the radar to work on 30 miles off a low-lying coast, so we have a fixing problem on our hands. However, with a good echo sounder and a reasonable chart we should be able to manage.

Anchored off Barrow at 2100 in 23 fathoms two and a quarter miles from the beach. Here we'll remain until all the coming and going is finished tomorrow assuming visibility conditions permit.

During the evening Beef remarked that nobody had taken notice of the fact that *Northwind* had, on rounding Point Barrow, become the first ship to complete the Northwest Passage in both directions in a single season. One gets the impression that everyone in the *Manhattan* is so absorbed with this ship's activities and achievements they have no inclination to look outwards and recognize the accomplishments of others. Without delay we both sat down and composed messages. Mine went:

“From Capt. Pullen to Capt McCann. I offer my personal congratulations on your feat of completing the Northwest Passage in both directions in a single season. This is one of the significant Arctic firsts sought by many over the years. I think it is fitting, after the difficulties you have endured, you should share this distinction. Best wishes to you, your people and your stout ship.”

CANADA
DEPARTMENT OF TRANSPORT
MINISTÈRE DES TRANSPORTS

nearing Point Barrow
20 Sept 1969

My Darling:

I don't know whether I will be able to get this to you but it may come via Washington and so forth. Quite a lot of people are leaving us here and a few joining including Edward Platt of BP who you'll recall. [It's] a ¼ to 9 and black night outside -- I was up at 7. It doesn't get light this far west until 1000 or so we're 4 hours ahead of the local time zone.

We will anchor on arrival and be here until to-morrow night with goofers coming and going - Sec. Hickel, 65 legislators etc ad nauseam. Paul Fournier getting very impatient to be on our way and I don't blame him. Conditions here are easy which tends to lull people unfamiliar with the Arctic into a feeling that conditions are easy everywhere...

[Your] last two letters are full of information -- at least you know what we're up to with all the press reports even if they are not all that accurate.

We are to have 8 members of the NWT Council to visit (very briefly) at Sachs Harbour -- and I suddenly realized that Mr Gibson, of icebreaking log 'fame', will be there... That will be the 25th approx.

Your little tidbits of news give me much joy -- and thanks for reports on the little boys and their activities. Glad too that your Mother is better.

Heraldry - I'd forgotten all about it! Anyway something is happening there. If I come home early, by which I mean that if the ship gets back earlier, I'd have to go to that meeting but anything to be with you - even Alan Beddoe...

Tony went off yesterday - he had an official luncheon, which I set up for him in the MAC -- 3 Admirals, a Guvnor & 2 Humble Directors and me. Then he choppered over here to wait for a ride ashore to catch a plane to Fairbanks -- we sent him in early and it was good we did -- there was an awful crush of reporters and photographers later after the Golden Barrel ceremony.... Anyway he promised me he would tell you all about it. Was sorry to have him go because he's been a steadying influence on Paul F.

The USCG 'breaker STATEN ISLAND joins us at Barrow for the return voyage and Paul is annoyed about this -- he had enough trouble before the N'WIND was detached because she couldn't cope -- he's French enough to be v. temperamental and even go off and leave us -- or would he? I don't know but its my task to spread oil on troubled waters and keep the party together.

I'll be glad to have all this poodlefaking over with and be eastbound. Its 9.30 now and still black as pitch.

It was unanimous that we attempt M'Clure Strait but it was done the wrong way -- the 3 captains got the ship too far over to the Banks Island side to begin with and then Roger rammed her into the biggest flow in the area and got stuck about as near the centre as it was possible to get. An uneasy period and we were on the point of getting a tow line up to see if the MAC could pull us out backwards through the track we'd come. Eventually broke out ahead. But without the MAC we'd be there for the winter. Without the MAC we'd never have made the NWP but neither would the NAC without us -- its like a bike - the front wheel needs the back wheel as much as the back needs the front or something like that!

Of course the yanks try and play down the MAC's role, understandably, but her presence has been so necessary and obvious that it speaks for itself. She rescued their downed helo too which was a feat. I forebore to tell Tony the Pilot who flew him in to Prudhoe yesterday was the pilot who'd been responsible for the prang.

Later: Dense fog and we're groping our way west 30 miles off the Laskan coast with the MAC astern but invisible. If this persists we're going to have a problem getting everybody to & fro. But for once I don't have to worry about that. This has got to be the dullest part of the voyage and I suppose I should be grateful for an opportunity to get caught up with writing and so forth but it's an effort.

Don Graham says he has one stamp so this will be able to get on its way to you as #5 with the next probably at Sachs Hbr and Resolute Bay after that. Stan keeps saying 5 weeks in M'Clure Strait but I think M'Clure has news for him.

Monday, 22 September - Day Twenty-six

Weighed at midnight (ten shackles had been veered) and by 0030, after some difficulty in breaking the anchor loose from the bottom we got under

way east-bound, with *Macdonald* astern and *Staten Island* acting independently some distance away.

Up at 0730 to find us steaming at nine knots through widely scattered floes. Conditions are such that a higher speed would seem to be in order. First indication of the Aurora Borealis as we walked aft along the catwalk for breakfast. Colder, temperatures 24 degrees F., with grease ice forming over the sea.

The squealing from our port shaft, which has been noticeable over a very narrow range, now occurs over a wider range of revolutions. I understand there was some problem with misalignment when the shafts were installed earlier this year.

The Bludworth echo sounder out of action. The D/F gear, having been taken apart and re-assembled, is reported by Roger to be completely unreliable. The satellite navigation system, including the speed measuring doppler sonar, also out of action. Ho hum. It seems our navigator is in fact one mile astern in the *Macdonald* as she continues to pass hourly fixes.

There is no means of working at a chart on the bridge of this ship during darkness. There is a need, so obvious as not to require emphasis, for a covered chart table with lighting designed not to interfere with the night vision of watchkeepers.

At lunch Stan asked me if I would like to move down from our present quarters one deck below the bridge to more spacious ones in cabin 303. After Beef and I inspected these we accepted the offer with alacrity and spent the afternoon shifting our gear. We now possess a large sitting room, a sleeping cabin for two twice the size of the one which has been accommodating four, and a large bathroom with tub and shower. The view from the sleeping cabin is aft through a large window and that from the day cabin is to starboard.

The story is that when the Greek shipowner Niarchos was the owner he wished to show his shipping rival, Aristotle Onassis, what travel in such a large ship could be like and so it was that Onassis, accompanied by Maria Callas, took passage through the Mediterranean. The quarters occupied by the temperamental opera star are those where Goettel and Pullen are now comfortably ensconced. The story must have validity for the bathroom facilities also include a bidet.

The ship driving eastward now at twelve knots in open water with only widespread floes to be seen. Very much cooler with temperatures in the low twenties and a northerly wind. *Staten Island* out of sight 30 miles somewhere ahead and acting very independently. I'm not sure what use she will be if we

get into difficulties by being so stand-offish. Too far by far in my opinion. *Macdonald* boiling along in our wake. Doubtless Fournier is a happier man to be moving once again. No reports to date on ice conditions in Prince of Wales Strait but the situation there with this wind direction could be quite a lot more difficult than when we were westbound.

While on board the American icebreaker last night Beef and I collected the charts covering the coastal route through Amundsen Gulf, Dolphin & Union Strait, Coronation Gulf, Victoria Strait and so on. This with the possibility that consideration might just have to be given to trying this as a last ditch attempt to get the ships out to the east before freeze-up. It would be quite an operation. She would have to be pumped up to a draft of 35 feet or less and there would have to be fancy footwork to negotiate some of those narrow and poorly surveyed waterways.

Tuesday, 23 September - Day Twenty-seven

Still in open water with continued good progress eastward and still black as pitch for that one hundred pace journey aft along that exposed catwalk at 0745 for breakfast.

Incidental intelligence garnered after coffee and toast to the effect that CCGS *Louis S. St. Laurent* has reached Resolute Bay. Plans call for her to continue west for “ice testing in Viscount Melville Sound” which is another way of saying she is on her way to provide additional icebreaker support in case we have difficulty during our eastward passage.

No report yet available on ice conditions in Prince of Wales. At 0800 we passed Barter Island, the loom of the aero-beacon being visible. Open water with only occasional pieces of ice.

Last night arrangements were made to fly Edward Platt (B.P. Director), Ralph Maybourn, Charles Swithinbank (Scott Polar Institute) and myself over to the *Macdonald* for luncheon and a walk-around. I called to see if flying conditions were suitable and true to their word a machine dropped out of the sky at 1100 and shortly after we were being deposited on the icebreaker’s deck.

A pre-luncheon drink and discussion in Paul’s quarters, followed by a good meal and a tour of the ship for the visitors. Delivered a letter to Paul which, like so many others, was an importuning one from a stamp collector in Florida. Persistent requests from philatelists are a time-consuming nuisance.

Fournier is certainly pleased that Stan has lived up to his word to make good time to the east to reach Viscount Melville Sound. He expressed the hope that *Staten Island* might choose to go by way of Victoria Strait meeting us later. I think that may be also what Casey has in mind. I cannot see what value she could be to us in such circumstances as an icebreaker but her helos would be a great help.

Flew back at 1430 and the three visitors seemed to have enjoyed themselves and been quite impressed with the ship.

Stan, on *Manhattan's* bridge, impatient with the timidity shown by the people handling her. This seemed justified when we approached a heavy-looking old floe and the telegraphs were rung to "half speed", and then back to "full" far too late to have any effect and having lost precious headway in the process. As often happens, we found the ice was not all that hard for this floe fragmented on impact. However, her momentum was absorbed to the point she very nearly stopped. Stan is determined to bring this matter up at tonight's staff meeting, the first one we've had for some time.

By "supertime" the ice cover increased until it became nine tenths and, at times, ten tenths. But it is soft and the ship shouldered her way through this stuff without much hesitation. While having my evening meal one or two hard chunks went under the ship and into the propellers, where they were thoroughly worked over and forcibly ejected between the twin rudders into our wake. When this happens the stern jumps and quivers just like an ordinary icebreaker.

Bern Keating and Dan Guravich (respectively writer and photographer) collaborating on a book of the voyage, in for a glass. Chuckles by Bern and Dan over the contractual arrangements made with Humble's Press Relations Dept. Apparently they were prepared for a fixed fee for their work making movies, taking stills, and writing material, but Humble's Houston office insisted on a per diem rate. It works out that their per diem earnings exceeded the original proposed fixed fee before the ship ever left Chester, Pa. By the time this voyage is over in November they will be awash in cash.

At 1900 the ship became stuck and all efforts to move her astern using the engines proved useless. Efforts to get her moving continued but she would not budge. At 1935 *Macdonald* called to see if she could assist off the starboard quarter but was told instead to stand-by. Those on the bridge of this ship still labouring under the impression they could get her moving. The icebreaker must have misunderstood, or ignored, the reply from here for she

moved in and began what was destined to be a long hard session of icebreaking.

Macdonald made some progress and then she too became stuck. There followed a period of inactivity until her heeling system was brought into action and at 2005 she released herself to continue the onslaught off our starboard side.

Time flew by as everyone became involved in this latest “enstuckment”. The snow cover, approximately six to eight inches, was the villain of the piece, turning the ice into soft, sticky slush, grasping the side of our ship and holding her tight.

At 2100 *Staten Island* was asked to come and start working on our port quarter and she at once made a move in that direction.

The heeling system in this ship in partial operation and once the *Macdonald* had worked her way up our starboard side to a point opposite our bridge, the pressure thus reduced enabled this monster to move astern and start again the repetitious ritual of backing and ramming. The trouble with *Manhattan*, of course, is that she has too little astern power to get her out of the difficulties into which her far greater ahead power drives her.

At 2330 we were still hard at it without significant results. The U.S. icebreaker had arrived off our quarter but appeared to be getting athwart our wake. This may cause problems and we hope she won't get into a situation where we have to ask Fournier to make a move, he having expressed himself on this very subject not many days ago.

Roger moved ahead on a ram at 0110 and stopped at 0115. Instead of taking the power off and going astern before the ship lost all headway, he let her carry on pushing deeper into the slush and ice while he worked the rudders in what he thought might be a move to clear the brash from around our stern. Instead, or so it seemed to me, this move was more than offset by getting the ship too firmly wedged into the slush ahead. No matter what he attempted after that, she simply wouldn't respond. Eventually, in the time it would have taken to make several more profitable runs at the ice, she moved back and the process of backing and ramming was resumed. In these circumstances this is the only course open because it is impossible to turn her for she hasn't enough astern horsepower to back down her original track to reach easier going.

At 0200 while Roger was maneuvering I went aft to see what it was like with a view over the stern. The effect of the rudders on the propeller wash is minimal. There is simply too much ice in her wake. There is almost always

an open area immediately under the counter but it does not extend far. Feeling the shaking and shuddering of the ship back there, and seeing large gobbets of ice bursting up from under the ship, makes one wonder how long the machinery can go on working so well. Later, I learned that it was during this period that a gasket or seal blew out on the throttle of the port astern turbine which requir[ed] the plant to be shut down for four hours.

Wednesday, 24 September - Day Twenty-eight

At 0245 the ship made quite a good run but this was exceptional. I feel if Fournier is working his ship in support of our cause I have an obligation to be on tap in case he wants to speak with me and anyway as an obligation to be present in any event. We talked earlier at 0030 and he seemed to be willing to carry on although he indicated he might want to stop at 0700. He handles his ship on his own and I don't suppose there is anyone else over there who can, or would, be permitted to spell him. I asked him about this and then regretted it as obviously it is hardly a subject to be discussed in public over the R/T.

Earlier I indicated to Stan that it might be a good thing to consider stopping when it got dark but this drew the response I expected. 24 hours a day operations must be the rule and he insisted on getting an admission from me if we did stop it would be because of the inability of our icebreaker to operate 24 hours a day and not on account of *Manhattan*. This has a more ominous ring to it than I expected. The upshot was that Paul, stout fellow, didn't say a word but kept piling into the attack on our behalf and very effectively so, for without this activity nothing would have been accomplished here.

At 0440, with the same old process ongoing, I went below to the settee in our cabin and dozed off to awake at 0615 to sense things were different outside. Rushing to look out I could see we were in open water and moving along with ease. Up to the bridge and this impression was confirmed although there still was a good deal of ice about calling for skilful shiphandling to sidestep it. Even better, was the spectacle astern, for there were the two icebreakers trailing us in their accustomed positions. This was all so encouraging that I went below and this time turned in exhausted. An unwise move as it turned out.

In came Beef, at 0925, bellowing my name. I ignored him thinking he couldn't have known how late I had been up but no, he kept on until I

surfaced. Then he broke the bad news. We were stuck fast, the same bloody situation as before. This was confirmed by a quick glance out the port but, worse still, Fournier was asking for me and it was then I knew we were in for fireworks. Dressing as quickly as possible I climbed wearily and apprehensively to the bridge. Still trying to get fully awake I called Fournier and prepared myself for a difficult R/T conversation because they are overheard by people on the bridges of the three ships. One has to be careful. The talk went something like this:

Macdonald, this is *Manhattan* - Over

This is *Macdonald*. Good morning Captain Pullen - Over

This is *Manhattan*. Good morning to you. When I went down things looked pretty good at 0630 this morning and now I see we're back in the same stuff again - Over

Yes, captain, that's why I'm calling you. I don't know what they are trying to do. There was a nice lead there to go to starboard but they take the worst one and now we're in the same thing we were in before. Look, if they want to stay here for the winter its up to them. They can have it but they will have to open their eyes and look ahead - Over

This is *Manhattan*, roger, can we, can I, have a chance to assess the situation and come back to you, Paul - over

Roger, then, Captain, thank you very much. Good morning.

The first thing to do was to stop Don from going any farther ahead and without hesitation this was done in rather blunt fashion by telling him to stop rather than asking. Having arrested the headlong rush into what might have become the ship's winter quarters, it became possible to assess the situation. *Macdonald* lay motionless just abaft our starboard beam, and off our port quarter lay an equally still *Staten Island*. In our wake was the familiar churned up slush and farther back, about half a mile or so, lay the polynya, now covered with a thin layer of snow-covered new ice, in which all of us should have remained while planning the next move. Our track lies east but this is no justification to steer nothing but east. To the north lies heavy pack

and to the south shoal water. A reconnaissance would point the way if only people here would exploit their helicopters for this purpose. Paul is right. The obvious thing to do is go astern into the polynya, quite a large one, together with the icebreakers, send off a helo and get the information we require to choose the best way out of this impasse.

Going astern for any length of time in this ship presents a problem. After 20 to 30 minutes her astern turbines overheat and have to be stopped by going ahead full power for fifteen minutes so a breathless Donald Graham informs me. He seems convinced we have to accept this ridiculous situation which simply means that for every foot of precious stern-way out of the trap into which he had blundered, we shoot ahead two feet. There's no way we can back out of a floe in such a fashion. After a lengthy discussion, and an appeal to the engineers who had no idea of our predicament, it was determined that other arrangements could be made thus resolving that difficulty.

So back to Paul. I told him we would stop, that our plan was to go astern the way we had come, and get into the open area astern, that we would send off a helo to assess the situation and then plan our next move accordingly. His response was immediate. He thanked me very much and, to my surprise, for the first time since I've known him and that is going on five years, called me by my first name.

The struggle to get back into that easy area astern then began and took the best part of two hours. If the engineers had not modified the astern/ahead business we would likely still be there. At 1130 all ships were free and hove to in the polynya awaiting the results of the recce. This confirmed that our best route lay south and then east. Don Graham put the rudders hard over to starboard, engines full ahead, and the ship proceeded to display as nice a piece of maneuvering in tight quarters as I have seen. She virtually spun on her heel turning 60 degrees before moving off, somewhat chastened, through open water and light ice to the south followed by her two consorts.

Stan Haas asked Beef and I to meet with him at 1230 when we review[ed] the latest experience. He asked us if we would become more aggressive in our positions as "ice pilots", a term I detest, and would we also undertake to be on the bridge whenever the ship is in ice. We agreed with some reluctance to this but we can try it for a while.

[It's] been something like 26 years since last I was a watchkeeper and I'm not sure I want to start this sort of routine again. In addition, my terms of reference hardly include this. I'm the Canadian Government's representative

and also icebreaker co-ordinator for the Department of Transport. But I feel that it is something I can do to further this operation and Beef agreed, so off we go. He took over at 1300 while I tried to get some sleep.

The engine room had a total of 59 engine movements during the middle watch (midnight to 0400) while Roger was backing and filling. There were fewer movements (ahead and astern) during the morning (0400 to 0800) but the forenoon (0800 to noon) recorded 58. Little wonder the packing of the port throttle blew out.

I relieved Beef at 1700 while we continued to pick a path through and around the pack - through the light ice and around the old floes. Five tenths of the former, two tenths of the latter. No one thought that we would have any difficulty on the return run to Sachs Harbour from Barrow but this most recent happening may convince some doubters the north is still unpredictable.

Conning *Manhattan* is not easy because there is no gyro repeater for the conning officer to check the ship's head nor with which to take bearings. This means the helmsman must go on and on reading off compass headings or one must hasten to the bridge wing where there are repeaters, a distance of 70 feet.

Romping along in uncharted waters I switched the Simrad echo sounder from fathoms to feet to get a better indication of bottom conditions. Nobody on the bridge seemed particularly interested.

At 1850 Heller took off with Beef and Emil as passengers for a recce and were able to give us a route to avoid heavy ice nearby. I don't think much of the helicopter they used as I was keeping track of it visually partly by the trail of black smoke pouring from its engine. Bill Novick, the pilot looking after communications on the bridge, tells me the engine has a capacity of nine quarts of oil and burns six of these in an hour. Car oil, too, as aircraft oil goes straight through because of its lightness. When I reported this to Beef on his return I thought he was going to swear off flying for good.

By 1910 it was back on deck with another recce planned for 2200. This provided additional information enabling us to go around, rather than through, the pack.

Friday, 26 September - Day Thirty

At 0915 my trusty cabin mate discovered that Emil Stasyshyn and Denny Farmer were meeting with Stan to go over the SLAR data and other ice information. This gives us the distinct impression that little by little we seem

to be in danger of being sidetracked. Without delay Beef went right in and enquired if there was to be a staff meeting. This had the desired effect for before too long Stan was presiding at the head of the table with Hank Rosenthal on his right taking notes. Others included Beef, Emil, Denny, Roger, Don, Bram Mookhoek, and myself.

It turned out to be one of those exhausting sessions where strong-willed people clash. It seems plans are afoot to conduct tests as soon as we leave POW. Both Beef and I pointed out with some emphasis that ever since the meeting with Paul Fournier and DMO in the former's ship the understanding had been that we would return direct from Point Barrow without testing and probing in the Beaufort Sea because of the lateness of the season. The plan agreed was that we would get through POW and cross Viscount Melville Sound so that once on the north side, and with escape to the east assured, we could carry out tests to our heart's content. It now appears as though this is not to be the plan and that testing will be carried out in an area which we consider unsuitable for this time of the year. Stan seems to think it is perfectly alright. Emil briefed us on ice conditions generally and Denny described the ice we would meet in the Strait and to the north thereof.

It is always difficult to recall in detail emotion-packed discussions like this but I did remind Stan that in my capacity I was duty-bound to warn him of the consequences of any further unnecessary delays in crossing the Sound. Having done that, and he chose to disregard my warning, then that is his prerogative. We seem to be on a collision course over this but he clearly is bent on a different plan than that agreed earlier with Paul. There also seems to be an element of intrigue developing. The Test Director, Bram, is contriving to get test data before the agreed time and apparently is being successful in setting this up.

Challenged by Stan as to what other course of action I had in mind. I replied that I felt we could not assess our chances of success until we had sampled the ice conditions in the Strait. If they prove to be substantially more difficult than when we came south, then we could conclude that conditions in the Sound would also have deteriorated. It is too soon to be making decisions. Don alluded to the southern route and I made it clear this had been simply an examination of alternatives and as such a perfectly reasonable exercise. Because we had done this did not in any way lessen our resolve to go the planned route.

I also attempted to explain that non-operational people in the ship seem to be believe that crossing the Sound to the north side is a sure thing and

suggested they might be better advised to make plans on the basis of “if” rather than “when”.

We broke up with the vague notion we might meet again that night to review the latest ice information.

Later Stan called me into his room for a private talk about my views. He seems to think I have changed my tune. I did my best to explain I have not, in fact, done any such thing but that I sense a change in plan since the undertaking given to Fournier and DMO. It should not be assumed there are no difficulties ahead of us. I feel Stan is too flexible and changes his mind too frequently.

While all these maneuverings were taking place inside the ship we were making good progress into the Strait. Overcast skies and grease ice on the sea.

After lunch a helo came for me from the *Macdonald* and I went to see Paul. Denny Farmer accompanied me with his SLAR film and imagery so Paul might know what sort of ice data is at our disposal. He seemed vaguely interested, asked a few questions and then the talk became general. It took me some time to organize Denny out of the cabin so we could discuss other matters.

I was pleased to discover *Staten Island's* performance up to the present has impressed him and that he has no objection to her accompanying us all the way provided she has six engines available.

He also made the following points, that he always stays astern until actually called upon to help, that we avoid big floes, that we take the line of least resistance at all times, and that we stop at night. He pointed out the desirability of cutting corners off floes rather than breaking through at their extremities where there is often heavy ridging. He is definitely “go” for the transit of Viscount Melville Sound and considers the southern (coastal) route via Victoria Strait would end up with the loss of the ship. Possibly, I suppose, but I think he is too pessimistic.

Paul irked at the presence on board of a film crew working for French-Canadian TV. They have been pushing him into the leading role. He said with some asperity that if he had the qualities of an actor he sure as hell wouldn't be driving an icebreaker.

Despite the loss of one propeller blade he reckons his ship is just as effective as ever. Probably almost so. The performance she put on the last time we were stuck certainly indicates this.

Back to the *Manhattan*. I asked Stan and Roger into the chart house and put the suggestion that another watchkeeping captain or equivalent (I actually

suggested Dave Abernathy) be appointed so Roger can be relieved of watchkeeping and therefore available for the next few crucial days. Stan quite upset over this, probably furious, and Roger didn't go much on it either. Seems to be so obvious it doesn't merit emphasis. Not so. I don't know anyone outside Humble who thinks the present arrangement makes sense. Beef and I argued for hours with Humble officials at our Dallas meeting and elsewhere about this and won their grudging agreement to change it. But it is clear now such agreement was simply to get us off their backs because ever since they have done damn-all about it.

Getting up toward ice in the strait. A helo recce completed by 0645 and at 0705 the three ships moving in company into the ice on what could be a tricky operation in heavy going. By 0715 trending up the west side of the channel in open water and some two miles off the beach. It is a matter of some concern that fixing our position occurs infrequently especially in confined waters. But all is calm confidence on the bridge with a casual glance at the echo sounder from time to time and maybe even an occasional fix.

At 0745 we entered sheets of nilas and it was interesting to see how the ice clung to the ship's side and accumulated there. We were moving along with a belt of slush almost six feet out from the ship all of it moving at different speeds - that against the hull very slowly if at all, and the outer portion quite quickly. At the after end of our ice belt the whole mass was breaking off and being swept clear.

At 0750, having skirted the ice edge as far as was prudent, the ship entered the pack with the telegraphs at full power. This was a little tardy for she did not have a chance to gather the necessary momentum when entering heavy stuff. However, in this instance, she kept moving.

I stood at the conning officer's elbow offering advice to the best of my ability, determined we should not get into a bad situation. This involves constant work with binoculars, radar and "eye balling". My advice was accepted without question and between us Don and I made good progress. Shortly after entering the pack we hit two floes, first to port and then to starboard, cutting into each by a small amount so as not to become involved with the ridged snow and ice at their edges yet not far enough into the floe to run any risk of losing headway - as recommended by Fournier.

She chews up great gobbets of ice and spits them out into her wake where the next astern processes them and in turn passes them on to the last in line. Here they are machined again and finally left behind. Course, medium and fine - take your choice.

Between 0815 and 0825, still at full power, the ship was well handled and made steady progress through the ice. At 0900, with a large floe ahead and an area of open water this side of it and around the floe to starboard, Don handled the ship in a maneuver it was a delight to watch for so large a vessel. Around she swung, first to starboard, then to port, staying in the narrow open water area, as Don said, just like a piece of Mississippi navigation.

At 0915 it became necessary to attack a heavy floe dead in the middle, there being no choice because of maneuvering difficulties. Chunks of shattered ice rose vertically at least 20 feet thick on both sides.

By 0930, when well up in the northern part of the strait, we called a halt for the night because of darkness. It was then that our radio came to life with Paul wanting to speak to me. While everyone listened he told me, obviously in a furious temper, that he had a message for me in code, a secret message, from DMO and he didn't like this sort of thing at all and what is it all about and so on. What can one do in such circumstances? I said I would look into it and promised him I would keep him advised. Somewhat mollified he subsided. Earlier, Carl Thenemann had handed me a slip of paper with a coded message passed to him from the *Macdonald*.

I was unable to go below to decode it until some time later. Paul had every right to be irked and all I could hope was that its contents would be such that I could pass them on to him. If it had something to do with him I would have to be quick off the mark to think of some excuse.

In any event everyone on board now knows that I have a means of communicating confidentially with Ottawa and will be extremely curious to know what [it's] all about.

Test personnel working on one of the floes in the vicinity reporting them to be four or five feet thick and that the melt pools are frozen solid within an inch of the bottom.

Beef reports our ice belt now has that look welded ships get when their plates are drawn so tight over the frames that each rib stands out. This is probably been caused by the impact and pressure of ice over the past few weeks.

After parking for the night Stan came up to see me and said he was buying so he, Roger, Don, Arthur, Beef, and I repaired below to his conference room and had a drink to celebrate good progress. Stan is obviously delighted at the way the ship is being handled through and around the ice, and this is his way of telling us. We had a game of liar's dice until midnight with shouts of laughter all round. A good opportunity to study faces and expressions of my

colleagues as they fibbed their way through the game. Arthur Smith had to leave which was a pity as I would have relished scrutinizing him. Turned in very weary after a long day. At least that was my hope until I remembered the coded message waiting for my attention.

It was 0115 before it was finished, scraps of paper covered with figures. The process of looking up the actual words gave me a start for the first two, "much regret", raised my anxiety level considerably. It turned out to relate to the matter of a BP photographer in the *Macdonald* and would I explain to Stan why he was there and so forth. At least I'll be able to satisfy Paul there isn't a dirty great conspiracy against him in the works - and so to bed.

Saturday, 27 September - Day Thirty-one

This morning it is reported, and later confirmed, that we have salt water in the boilers. This means a delay of some hours while the system is flushed out and put to rights.

Called Paul and he sent his helo for me. Accompanied by Bill Smith (N.Y. Times) I took over the decoded message, a copy of Slater's Telegraphic Code (1901!), together with the changes I had made to it, so the whole thing might be explained. Paul is satisfied. Indeed, it turns out he has a copy of that code so I handed him the key number to demonstrate we do have confidence in him. He has letters telling him he was to get secret one-time pads I had arranged months back but they never arrived.

Flew back bringing Moira Dunbar to spend the day. Turned her over to Charles Swithinbank and off they went on a tour of the ship.

It seems the Ice Testers have upstaged the Ship Operators because we are now committed to work on a large floe somewhere ahead. Rod Edwards conferring with Beef when I got back and the situation as he sees it is one of total disillusionment felt by test personnel on board. They don't know what the plans are, little work is being accomplished, and what is attempted is either poorly planned, interrupted, or both. Now it appears we are heading back towards Peel Point on the eastern side of the entrance to the strait, where there is a giant floe.

I don't know what became of the undertaking to get the ships across Viscount Melville Sound before embarking on tests. Edwards made it clear there is no point in testing unless the ship is put through selected test areas. What is really disturbing is that plans are being formulated without prior consultation, certainly insofar as Beef and I are concerned, and so we are out

of touch. This is possibly the consequence of the hard-nosed attitude taken by us the other day on the need to cross the Sound without further delay after which they could test to their heart's content. This will surely get Paul all worked up again.

Not only are they suspiciously busy planning (or is it plotting?) tests, an announcement just made that henceforth this ship's helo will be used only for test purposes, i.e. flying ice test personnel hither and yon with their gear.

This puts an extra burden on the *Macdonald* for she has only one of her two choppers in service. The replacement canopy cover for the other one never did arrive. Fortunately, *Staten Island* has two serviceable machines.

Finally, at 1210, we got moving altering to 080 deg. Roger being anxious to make a move across the strait. 1215 and swinging the ship 90 deg to the desired heading when Stan and Bram appear on the bridge full of questions about "ice test parties this" and "ice test parties that". We certainly seem to have a divergence of aims.

1218 - telegraphs full ahead and at 1235 the ship in another floe. This partly attributable to the determination by merchant marine officers to steer a straight course willy-nilly, a tactic which in ice has nothing to commend it.

Stan sidled up to me and after a few remarks about the current situation, surprised me by asking if I would be prepared to work for Humble as a consultant and write a report, not only on what we have experienced here and learned in the process, but also a document that might serve as a guide for the future use of big ship operating personnel. This took me by surprise but I said I would be pleased to do it and we shook hands on it, Stan saying we have a deal. In talking to Beef later he suggested this could be a cunning move on Stan's part to lure me into the company camp so I won't throw any more obstructions in his path. I wonder?

Still working in the entrance to Prince of Wales Strait. At 1310 the ships astern were coping with the ice although *Macdonald* was rather far back. Entered a long lead at this time and remained there picking up speed for fifteen minutes and in the process successfully avoiding a big floe on our port side.

Charles Swithinbank brought Moira to the bridge to meet Roger. He asked me if I had seen the ice island fragment we had passed earlier. I had not. He reckoned it stood six feet proud of the water, a draft of 50 feet or more, and extended half a mile, snow-covered including heavy drifts concealing its true nature from the casual observer. September in the Arctic is the time for the greatest snow fall and when it comes everything receives a

uniform dusting making identification of the different ice types lurking below very difficult.

At 1345 I overheard talk of stopping for tests which annoys me because I have not been informed what the plans are and it is my duty to keep *Macdonald* informed. If I have to tell Paul about this it will be with some reluctance. 1350 saw us making steady progress through a heavy floe with thicknesses varying between six and ten feet - base course 060 deg. Ahead of us on our starboard bow an ice test party visible as black dots on the floe, the large one and the one we the operators hoped to avoid.

At 1400 the ship crunching steadily through the ice in the general direction of the larger floe most of which is off to starboard, Roger standing near me being encouraged to keep edging left to leave it all to starboard. Stan appeared and Roger told him what he was doing at which point Stan burst out: "Oh, for God's sake - that's what we're here for." This was Roger's moment of truth - to continue tracking clear of the floe shaping a course across the Sound or alter to starboard to commit the ship to it with the possibility of becoming stuck and all the problems that involves. Roger knuckled under and gave the order to the man at the wheel: "Come right to 080 deg and steer for that floe." At any moment I expected an outburst from the red icebreaker astern of us.

At 1420 we stopped. Felt badly at the way things were developing. At 1430, because I couldn't stand by and watch without remonstrating, explained to Stan the risk involved. Fifteen minutes later we triumphed over the small floe and entered the bigger one at its extremity. The ship picked up speed and made easy work of it to everyone's surprise including my own. The heeling system working at this time. Members of the ice party running across the floe towards the ship. Our point of entry was not where it had been wanted but when Roger was seeking direction and advice from Bram or Stan or anyone the bridge had been deserted. At 1455, ten deg. left rudder was ordered to come to 013 deg to leave the floe. Roger said to me he found the pressure on him intolerable and that he was ready to puke. He looked miserable.

I acknowledged to Stan that I was wrong about the thickness of the floe although it had been reported to be old and one to avoid. Humble pie.

At this time the uproar on the bridge was very nearly unbearable. The clang of the engine room telegraphs, the buzz of the ship's telephones, the constant roar from the radio loudspeakers as ships and aircraft talked to us and we talked back. Add to this the coming and going of people and general

bridge conversation. There is the Quartermaster on the wheel calling out the ship's heading because there is no compass repeat for the conning officer, there is Roger rushing about in his "Mad Monk of the *Manhattan*" garb (tartan beret & rumpled duffel coat), John Heller, senior helo pilot, manning the radio circuits, and Al Scara, Mate of the Watch, running and shouting between telephones and telegraphs. Beef and I add our bit to the general confusion when working the icebreakers, plus assorted spectators. Finally, the enigmatic Stan, in his baby blue windbreaker and shocking pink fur hat, standing at the back taking it all in. This performance, repeated whenever we are in the ice, is one reason we are so weary by the end of the day.

At 1510 *Manhattan* passed through an open area coming to rest embedded in the ice at the far side for more tests and it takes some time to stop this colossal beast. The icebreakers were advised to wait in the polynya until we were ready to continue. While this was going on word came that three men were missing from the ice party. Dr Frankenstein, Dr Rise and a German photographer. I believe they were the people who ran from the main party towards the ship. Shortly after they were in sight with our helo off to collect them.

At 1600 a complaint from Paul that we have been stopped since morning. What is the trouble? When are we going to move ahead? Acknowledged his message promising to try and get an answer. This was rather more difficult than I expected, what with Mr Silcox shouting orders, the radio blaring about men on the ice, Roger explaining his plan of action while Bram stood smirking in the background. Finally Roger suggested we tell Paul it would be about five minutes. Paul came right back asking whether it would be with full power and I assured him this would be the case.

I recall Paul calling again at 1628 asking to speak with Roger and when he got on the line he told him that all he is getting from us is the fact that we are testing. He wants to know what the problem is and whether we are going to go ahead or not. The time has come, he said, to make a move, the time has come to call the *St Laurent* over to escort us out or else *Manhattan* will stay where she is. Roger replied that we would be moving in five minutes, that we were still running tests on the engines. Paul, of course, thinks this has to do with the salt water problem, being unaware of the instrumentation testing which is the reason for our prolonged stop.

Back came Paul with some heat saying he is becoming tired of those tests, that all we do is testing, and the time has come for action. Roger turned to me after this blast with a "what do you say to that" look on his face. He went

back to Paul assuring him we were doing our best. A pause and then a curt "OK, no comment". In poor taste I thought.

At 1630 the tests were finished, a long "fifteen minutes", and we were backing to charge the ice. At this point Stan remarked to me that "Fournier is becoming impossible". All this time *Macdonald* has been charging about in an obvious display of impatience. No sooner were we under way than she became involved in a heavy floe, as did the American icebreaker, and both of them dropped astern.

At 1650 I asked if we might slow a little to give the other ships a chance to extricate themselves and catch up. Five minutes later we were stopping. They finally made it but it took some time, especially the *Staten Island* for she had a bigger floe with which to contend and farther to travel.

We passed them our heading and Arthur Smith, bustling about the bridge as usual, announced they should be instructed to take station three cables astern. I demurred, suggesting it is properly their business, something to which he took exception. In any event, and to his considerable annoyance, I did not pass this on. Part of my reason for this is simply because he is too officious.

At 1715 I went aft for some food only to be recalled to the bridge by Beef who came all the back himself to tell me Fournier was on the line. I quailed at the prospect of what was coming.

Paul came on the line saying we didn't seem to be getting anywhere and what did I think? I explained we were ready to roll but were waiting for *Staten Island* to overtake. It wasn't until later we learned she had only been working on four engines so it was little wonder her progress was so slow. Paul then went on to emphasize that the ice is loose and wanted to know if there was any trouble on the tanker. Not the sort he is thinking about but we certainly do have difficulty here passing the word as to what is meant to be happening but I could hardly spell that out to him en clair.

I did my best to convince him there is nothing wrong with our engines and so forth ... our conversation dragging on rather when Paul unexpectedly questioned the usefulness of the American icebreaker and then just as quickly dropped it. I replied enquiring if he really meant that just the two of us should go ahead at this time leaving the other ship. It really is a hopeless situation and I prayed he would shut up, get off my back, and get off the air. Obviously he'd had too much to drink and was saying things we would all regret.

Again he asked why the tanker wasn't going full power and I repeated we were waiting for *Staten Island* with six engines on the line. Back he came, "Look ... I'm not going to look after the *Staten Island* or the *Northwind* ... tell the *Manhattan* to go ahead and we'll help her." I said to stand-by for a moment. What is one expected to do? In retrospect obviously nothing and that is how it was played but at the time I felt an obligation to go back with a response of some sort. I was out of ideas and certainly out of patience.

At 1800 we finally went full ahead just as *Macdonald* was athwart our track and I warned her to move ahead and get clear. The other ship was coming up well astern. Then Arthur Smith put his oar in by ordering (suggesting in firm tones would be more accurate) that both icebreakers take station three cables astern of the ship ahead (whatever that may mean). Predictably, Paul came back into action saying he'd decide how far astern of us he'd station his ship and that would be two cables. Arthur acknowledged this. Then Fournier decided to pass astern and let *Staten Island* follow us while he fell in behind the American. This infuriated Arthur who seemed to think Paul was giving orders and generally taking charge. I had to be at my firmest to stop him from calling up Paul and telling him all this and so forth. I really think Arthur is suffering from delusions of grandeur. I have quite enough on my plate with Paul as it is without contributions from outsiders.

Went below to see Roger and explain that dealing with any Canadian icebreaker, other than on routine matters, is my responsibility. Found him in a very emotional state, upset over the day's happenings, in particular the fact that he had caved in to Stan Haas. He was having a tot, and explained how bloody awful it is to be in his position. With this I heartily agreed and gave him what support and sympathy I could muster. In the circumstances I did not broach my problem.

And so the day wore on. At 1950 Moira Dunbar returned to the *Macdonald* without giving me a chance to talk to her about the Fournier problem. At 1900 the USCG *Hercules* dropped the SLAR container which was recovered by our helo.

At 1920 we became stuck. Full astern ineffective. After all my cautions I feel a little better that conditions aren't that easy. Heavy ridging, thick ice and no openings - now they can test until the cows come home - maybe for six months or so. This shows how tired we must be getting to be entertaining such sentiments. Anyway it promises a good night's sleep and maybe Paul will sober up and behave himself.

1935 backing again for the second time and then charging, gaining about ten feet. Again at 1945. Then suddenly clouds of black smoke from the structure amidships on the main deck housing the machinery for the heeling system. Shortly after an agitated Chief Engineer, clearly very angry, emerged and ran forward along the catwalk. Somebody had boobed at the bridge controls, in fact one of Chief's pumpmen, and had done something wrong. The system was soon back in action but at one stage it appeared if the system had been damaged beyond repair.

2010 moving ahead, 2035 stopped and backing. Ahead again at 2038. Don Graham directing affairs from his chair in the center of the bridge but there is a need for whoever is handling the ship to get out of his seat and check the radar, use his glasses, even venture into the fresh air occasionally to look astern and see how our icebreakers are making out. Don says he has so many different orders and instructions he treats them like a menu, selecting the one he likes best to follow. I suppose [it's] one way to run a forty million dollar tanker test.

At 2130 we stopped for the night. Beef and I had a whisky and soda and turned in thoroughly weary and fed up. A final note to a day worth forgetting - no fresh water.

Sunday, 28 September - Day Thirty-two

Grey dawn, snowing, freezing drizzle and raw. Air temperature 27 deg F. Sea temperatures 29.4 deg F at the surface, 30 deg at 50 feet, 29 deg from 200 to 600 feet - according to Ralph Maybourn who handles the bathymetric gear. Still no fresh water out of the taps.

Apparently Paul Fournier and Wilf Dufour were chattering six to the dozen in Quebecois over the R/T earlier this morning. I would enjoy being able to translate that lot.

Macdonald nattering at us since 0700 as to when we will be moving off. It was 0830 before we started moving astern to obtain sea room, to charge the ice ahead. The forenoon's session, typical of all our icebreaking activities, went as follows:

0830	Full astern
0840	Full ahead - no progress
0844	Full astern, try again
0845	Full ahead

- 0850 Stop. More tests related to drag readings to be complete in 15 minutes
- 0920 *Macdonald* busting ice very effectively up our starboard side to release the pressure permitting us to move, provided the testers are done. *Staten Island* working off our port quarter
- 0925 Full astern - getting ready to charge once again
- 0930 Full ahead. The U.S. icebreaker really very close under our stern compelling us to put the engines ahead rather sooner than was wanted. By this time *Macdonald* had carved a path all the way up to the bow.
- 0940 Moving ahead with *Macdonald* paralleling us and breaking a path through the ice with little difficulty
- 0942 Stopped by ice. Full astern. Snowing with visibility cut to five cables. *Macdonald* working up our starboard side again
- 0955 Full ahead. Snowing quite heavily
- 1000 Stopped again by ice. Full astern
- 1003 Full ahead
- 1005 Full astern
- 1010 Full ahead - ship barely maintaining headway
- 1040 Moving along at this time quite well & *Macdonald* coming in to take station astern after a prodigious feat of icebreaking. We are 23 1/2 miles N.E of Russell Point
- 1045 Discussion with Don Graham as to the best course to steer.
- 1055 Stopped by ice. Full astern
- 1100 Full ahead. Don quoted Emil Stasyshyn as recommending trending to the east. Emil, when tackled on this said: "I don't recommend nothin"
- 1104 Full astern. It takes only 27 seconds for our engine room to get the shafts turning from one direction to another - but then they are getting plenty of practise
- 1115 Full ahead
- 1120 Adjusting course to 080 deg. or hope to
- 1122 Full astern. Registered a mild protest with Stan at the long delay in getting under way this morning because of the drag tests. He had indicated this work would be carried out during the dark hours just so this would not happen
- 1128 No headway - full astern

- 1131 Full ahead. Don announces we have come 2 1/2 miles since 0630 but actually we've only been attacking the ice since 0930 so it works out to a speed of advance of one knot
- 1139 Full astern
- 1142 Full ahead. *Macdonald* back on our starboard beam
- 1152 Full astern. Wind now northwest & clearing to the west
- 1200 Bang! Sounded like an explosion and stirred quite a lot of interest. Determined later it had indeed been just that from seismographic activities being carried out in the *Macdonald* by Palliser & Associates of Calgary
- 1201 Full ahead

And so it goes, to and fro, backing down seeking sufficient run-up to get the ship really moving. Once *Manhattan* has good headway she is almost unbeatable. Slow her, or stop, and she is helpless.

Stan grumbling that it costs \$600,000 a day to operate this ship and we have got to get some data and so forth. This lends weight to the buzz going the rounds about certain people coming up to see why there has been so little test activity.

Lieut Commander Stolee and Lieut Nethercott over from the *Macdonald* to spend the afternoon watching activities from this end. Stolee telling me how embarrassed everyone had been in the icebreaker over Paul's performance yesterday, how they had hoped he'd just jump over the side. The ship was being handled all this morning by her officers while he sulked in his cabin feeling badly over the previous day's events.

Weary of the bridge scene I went aft to see if Roger's technique of washing the stern clear of ice while keeping the engines going full ahead is effective. It seems to me he gets the area immediately astern of the ship nice and clear but keeps the power on too long and it fills up again with more ice from somewhere. Then, when he does go astern, the ship is so firmly jammed into the ice ahead she cannot drag herself free. Tangled with one large floe five to six feet thick but with portions nine feet thick. Melt pools now frozen solid.

The Bell helo from *Macdonald* landed two figures on a large floe ahead of us who were later identified as Messrs Dupont and Gosselin of the National Film Board. No sooner had they set up their equipment than we found the going much easier. The great ship picked up speed and it soon became clear they were dangerously exposed almost directly in our grain. Roger blew the whistle which prompted the sound man to point his microphone towards us

the better to get this interesting new sound effect. Finally, our helo swooped down and removed them while they protested mightily they were all right. Roger told us he was almost in the position of entering in the ship's log that he had run down two pedestrians.

By 1600 progress was good and at 1620 the ship entered a lead running at right angles across our intended path. Arthur Smith bungled the turn into it and followed this by directing some unwarranted advice to the icebreakers.

This the evening we were meant to have drinks with Roger, dinner at a special table, and then a movie "The Captain's Table". The seven captains, Roger, Arthur, Don, Beef, Ralph, Lou, and myself plus Stan. Beef came to the bridge to take me down and it was then that Paul called wanting to know why we are heading east and southeast just because there is open water in that direction. Don Graham has some sort of fixation about conditions being easier in that direction which is quite the wrong way. I juggled that one as best I could by which time Arthur was bustling about taking charge. Finally, he very sensibly reduced speed to five knots and told the ships we in *Manhattan* were in conference.

However, the conference was simply an excuse to go below with a reasonably clear conscience for the get-together in Roger's cabin. I was all steamed up because Paul deserved an answer but all I got was a needling from Arthur who seemed to be spoiling for an argument, or to provoke me. Not me, not this time. Don was doing his little bit too. I kept my mouth shut but never did get an answer for Paul although I believe Roger finally sent some word back. What a way to run a group of ships.

Dinner featured klieg lights while Dan Guravich and Bern Keating took pictures. It was a good meal. The film was entertaining except that Stan dragged me out for a discussion about test parties and *Macdonald's* contribution to-morrow. When I got back my seat had been taken.

Monday, 29 September - Day Thirty-three

Thick fog at 0730. Air temperature 13 deg. F, sea 29.7 deg. F, visibility less than half a mile. By 0845 conditions began to improve but not sufficiently for helo operations. Our position is 27 miles southeast of the Dundas Peninsula and about 55 miles from Winter Harbour.

Roger explained to us on the bridge how the ship's heeling system may now only be used in an emergency because of a long list of defects.

With some trepidation I called Paul to establish communications, telling him we intended to remain in this area carrying out tests while awaiting clear weather at which time we would head for Cape Clarendon. Stan informed me a message had been sent to Atlas Aviation (Weldy Phipps) in Resolute requesting time and place for a rendezvous.

Most of the day stopped while test personnel scamper about on the ice laying out markers, taking samples. The ski-do hoisted out to haul sleds and move people about. At 1515 we got under way to test the ship's performance against the ice and it went very well causing the test experts to smile for the first time for longer than we care to recall. By 1545 it was over, the ship having advanced without hesitation through the big floe to emerge at the other side still moving. A success all round.

With the two ships following in our wake, course shaped to the east, then northeast, making up towards Winter Harbour on Melville Island to rendezvous with Phipps.

There is a rumour we are to be boarded by some company VIP's coming to find out why we haven't done any tests. This may explain the crotchety mood of some people in recent days and why there is unremitting insistence to do testing before getting across the Sound. It is clear, too, why the testers involved are so relieved and elated after to-day's achievements.

A story going the rounds that last night Stan, having had a bit more than usual to drink and waxing loquacious, was reported to have said that he would be glad to "get rid of that Frenchman" - meaning Fournier. It is a pity matters have deteriorated to this level for it was not too long ago that Stan was wondering how he should go about recommending him for some sort of award.

At 200 I went onto the bridge to check on developments to discover *St Laurent* in sight on the horizon. She had been there since 1900. I would have appreciated it if someone, anyone, had taken the trouble to inform me.

Stan and Beef by helo over to *Staten Island* for dinner.

As darkness fell the ship was moving through some very hummocked floes and making quite a meal of it. One piece of ice, which really staggered her, eventually shattered and passed down both sides. A broken piece of this stood six feet out of the water and must have been 20 to 25 feet thick. Ahead we could see more of these tough old things and I advised Don Graham, as usual comfortably ensconced in his chair, that we should adjust our course as appropriate. As we crashed along the two ships astern were having a tough time coping with all the heavy fragments we leave in our wake and began to

fall behind. When this was pointed out to Don he slowed and eventually stopped. It was here, in a polynya, that we remained for the night. The icebreakers eventually extricated themselves and joined us.

Rumour circulating that Hank Rosenthal has had some sort of falling out with Stan and has been mooning about in his cabin all day. Bill Smith, N.Y. Times, came in late in the evening to interview Beef and me which went off smoothly. He is under orders to leave us at Winter Harbour despite being under the impression he was to make the whole passage.

Tuesday, 30 September - Day Thirty-four

By 0730 it is now quite light and by 0830 conditions good enough to start moving through the ice with a fair chance of seeing where one is heading. This ship's only available helo has but one more flight for which there is just sufficient de-icing fluid, following which we must wait for more from shore, possibly via Atlas Aviation from Resolute.

This morning it took a bit of probing to determine what is to happen today. We sense indifference or coolness towards us in recent days, something I find is disturbing. Composed a note to Tony Storrs, outlining some of the more exhilarating developments of recent times for his information.

At 0800 our position approximately 30 miles southwest of Winter Harbour and getting under way but by 0830 we were stopped by heavy ice and backing to charge. This was repeated at 0850 and again at 0855. By 0910 the ship was opening cracks in the floe and forcing her way ahead. At 1015 we parked the ship at the edge of a large and heavily hummocked floe so that test parties might get off and set up for another trial. This specimen looked especially tough. Ralph Maybourn reported one weathered hummock to be twelve feet high measured from the level of the frozen melt pools.

At 1020 our helo, unwisely in my view, took off to attempt a flight to Winter Harbour in very marginal flying conditions. It was airborne for only five minutes and returned.

St Laurent clearly in sight this morning so I called Captain Dufour for a brief conversation, telling him how pleased we are to see his ship and so forth. He responded appropriately though I don't think he enjoys talking in English over the R/T. I also spoke with Paul telling him I have a package for him from Stan and hoping to see him before too long. He sounded rather cool though I don't know why. Stan has very kindly put together a box full of cigarette lighters one for every member of the *Macdonald's* crew. They make

a good memento of the voyage having a bas relief map of North America and the ship's route through the Northwest Passage.

After all the work of coring, sampling, erecting markers etc., there is great interest in seeing whether *Manhattan* can fight her way through this floe.

At 1645 the ship went astern to prepare for her icebreaking test but the distance available was restricted by the presence in our wake of *Macdonald* unable to move back on account of ice. *St Laurent* moving over to get into the procession. I have no idea what is going on in her for there has been no exchange of plans nor any invitation to go over.

1655 full ahead but only 80 revolutions. Five minutes later we stopped and went full astern. Engine room changing burner tips to give us more power. 1708 full ahead at 90 revs and the ship picking up good headway. The large floe we have set up for this test has a smaller hummocked floe frozen in it and it is the ridging or hummocking at the edge of the latter floe we are attempting to sunder. Cracks developed and one piece of blue ice easily 22 feet thick reared up out of the water on the port bow. 1718 full ahead. It took 85 seconds from the time the engine room acknowledged the order until the ship was gathering headway in the opposite direction.

For the next little while *Manhattan* probably broke thicker and heavier ice than ever before. Giant blue floes of the hardest ice, 15 to 22 feet thick, tilted slowly up under our assault, the angles getting steeper and steeper. Great chunks of ice broke loose from their surface cascading into the sea with a roar. With sufficient open water in our vicinity she was able to continue on her way thrusting these broken fragments aside. Some tilted on edge passing slowly along the ship's side regaining their normal equilibrium once they cleared the stern. There was one particularly big floe on the port side measuring 60 feet from the point where it was under the ship to its outer extremity. When it forced its way up and clear it did so to the accompaniment of a mighty cascade of water.

So massive were the broken pieces of ice in our wake the *Staten Island* chose to go round the floe to the north and wait for us there. *St Laurent* preceded her to lend a hand. *Macdonald* chose to come after us managing it without difficulty.

As the sun set, fog moved in to envelop us all cutting visibility right down to a few hundred yards. By 1900 we were looking for a parking spot and shortly after stopped for the night with the other ships nearby. Before settling down for the night *St Laurent* made a couple of icebreaking sweeps around us which impressed those here who were watching.

Arthur Smith asked Mr Mate if he might have a fresh cup of coffee but Mr Mate reckoned he would comply just as soon as he found out where we were. This was at 1655 and the last fix on the chart was, as near as I could determine, taken at noon. He called *Staten Island* to get an Omega fix from them but they regretted one wasn't available as they are fixing by radar. It might be an idea here for radar fixing to be used too instead of leaning on others to do our navigating.

Spoke with Fournier to enquire what *St Laurent's* plans are and get the impression she is to remain with us for the time being. There has been some helo traffic between the two red ships. I have not been included but hope to be before long.

Wednesday, 1 October - Day Thirty-five

A call at 0700 to Beef from Roger asking him to set up *Staten Island's* divers to come and inspect our propellers and rudders. Apparently there is a strange new sound emanating from the area of the port shaft.

Stan asked me if I would like to take a flight in the ship's helo to Winter Harbour. The weather did not look too encouraging but nonetheless I accepted rather against my better judgment. Went below and took the trouble to get into some thermal underwear, put on my Greb boots, collected my rigging set (knife, spike and pliers), mirror, flares and launcher, camera and binoculars. Hastened aft to find there would be a delay so forward again to get my heavy parka, toque and gloves.

Aft again to join Bill Novick, our pilot plus fellow passengers Silcox and Hahn. In we climbed with hoar frost evident on all fittings and antennae in the ship, and de-icing fluid dripping from the more important parts helo "Zero five-nine". On my last visit to the bridge I established that our ship's head was 359 deg. and that our destination lay about five degrees to the right of that. I took only a glance at the chart. Later I was to wish I had studied it minutely.

Started up at 0905 after I failed to get a satisfactory answer to my query as to the purpose of the flight. The general opinion was that we were to inspect the landing strip reporting its condition to Phipps in Resolute. On my way aft earlier I noticed Charles Swithinbank leaning on the rail. Asked him, in the event I did not return, would he take note of the fact I had never signed a release exonerating Humble Oil from potential negligence and so forth. He promised me he'd take the necessary steps.

Airborne at 0940 and it was obvious conditions were marginal for this sort of a caper. The view from the back of the aircraft is not good and Charlie Hahn occupied the left front seat. So away we went into the murk with the ships quickly lost to view in the mist astern.

Good progress towards the beach fifteen miles ahead. Heavy ice floes gave way to young ice and then patches of open water as we progressed. We were low and with all the mist and white ice it was tricky work. All of a sudden the aircraft began shaking quite violently and I promptly left my position standing between and abaft the pilot and Hahn, to see where we were heading, and secured my seat belt. It felt like an icing problem but I discovered later our tail wheel had struck the ice because we were so low.

We flew over the beach area seeking familiar landmarks. At one point we flashed over something which I took to be Parry Rock. At 0950 without being able to fix our location, we landed, shut down, to await improved conditions. Silence enveloped us when the engine was cut and the rotor blades slowly came to a stop. We hopped out and I walked off about 300 yards to photograph the dismal scene - one helo and fog. Fresh wolf tracks in the vicinity.

There we were, out of radio touch, no map worthy of the name, no survival rations, no gun, no sleeping bags, no heat. There was the possibility too that icing might prevent us from flying even if it did clear. Bill Novick indicated he would have to start up the engine after 40 minutes before it cooled off too much.

I kicked myself for not having got a map, some food, and checking on the equipment which should have been on board - which must be on board any aircraft flying in the unforgiving arctic. At least I had taken the trouble to equip myself with proper clothing and other gear but to be caught in such circumstances with my experience is galling. We clambered back into the machine, closing the door to retain what warmth there was. We sat there talking about polar bears, wrist watches, what we might be missing for lunch, and assorted other topics. At 1035 we got set and Novick started her up. Clearing was evident to the west but with no internal communications one must either point or shout, usually both. Airborne at 1039 keeping a sharp lookout. For this part of the journey I took over the left front seat. Dirty windows added to my difficulties in spotting objects through the mist.

Six minutes later we sighted the large cross atop the high land to the north of the harbour and sat down beside it. Silcox and Hahn jumped out to examine it more closely while we up front took pictures through the windows.

Airborne again at 1050 and after flying over the abandoned oil rig headed out to sea.

The next stage was rather confusing. I got the impression we flew halfway out to the ship, or in that general direction, turned back, then turned 90 degrees to the left. Bill Novick busy talking on the radio and fiddling with frequencies. We flew on and on and about all I could do was to keep an eye open for suitable floes should we need to land in a hurry.

At 1108 he pointed ahead and there through the murk was *Manhattan's* re-assuring bulk. About this time we passed over some fresh polar bear tracks in the snow and then at 1115 we touched down, thank God, safely back from a tricky situation of our own making.

Returned to find that conditions at Resolute are as bad as they are here so flying continues to be out of the question. On board the engineers are repacking a gland somewhere while the divers report all is well below except for minor damage.

Bern Keating in to [question] us for his forthcoming articles. Beef described SLAR to him -- and me. It is a stabilized radar set scanning out the side of the aircraft. In the horizontal plane the beam is very narrow while in the vertical it is like a fan. The results are photographed on 70 mm film and the coverage is ten miles in width no matter what height the aircraft flies up to. 8,000 feet. Denny Farmer is here under Coast Guard auspices from the U.S. Navy. Laser profilometer and infrared, both of which are also installed in KAE, the DOT ice recce machine, are defeated whenever there is fog but, of course, Slar is unaffected.

The ships fiddling about looking for a suitable floe for testing purposes yet close enough to Winter Harbour to permit helo operations. Finally, at 2030, parked for the night with the two icebreakers still with us. *St Laurent* off in the distance.

Talking with Stan. It looks as though our arrival date of November 10 in New York is immutable preceded by a visit to Halifax on 7/8th to honour *Macdonald's* work.

Friday, 3 October - Day Thirty-seven

We remain locked in that heavy ridge just as firmly as we were last night. At 0820 full astern and the ritual of backing and filling gets under way and continues for nearly an hour when, to my astonishment, she actually moves astern and frees herself.

Paul on the radio talking with Dufour in French and to *Staten Island* in English, setting up lunch in Dufour's ship for Stan, Beef, Casey and myself.

At 0927 we stop and there is some delay while instrumentation is squared away. The heeling system working after a fashion while being personally supervised by the Chief Engineer.

At 0933 full astern and at 0935 full ahead giving her everything she's got. We picked up some headway but all the heavy brash in our track is too much and five minutes later she was stopped cold. A minute after that the engines going full astern. Nothing happened. 0955 full ahead and so on but she didn't budge. I haven't any intention of thrusting the services of the *Macdonald* onto them so went below. People quite cocky hereabouts and maybe it is time they re-learn the lesson that quite often they do need outside help to get out of heavy ice. At 1025 the word came: "Would I call the John A *Macdonald* and ask her to loosen the ice on our starboard side?" Certainly.

Within five minutes, with white smoke pouring from her funnel as the diesels burned off fuel which always accumulates when idling, she gathered headway and began chewing her way through the pack in our direction. Arriving off our stern she had difficulty with our wash and asked to have the engines stopped. They were put astern so as to keep the plant up to power but because of the general turbulence *Macdonald* took a sheer ending up working instead on our port side.

At this time, 1100, Paul's helo came for us and with Stan we flew over to the *Louis St Laurent* where Wilf Dufour met us escorting us to the Officials Lounge. In due course we were joined by Casey Walsh from *Staten Island*, Doctors Herman of the *Macdonald* and Robertson of *St Laurent*, Paul himself who, having done his stuff, turned the ship over to his officers. Ed Briscoe, Dufour's Chief Engineer, came in later. He is an old friend when he was Chief in the *Macdonald* on our Milne Inlet surveys a few years back.

A pleasant change to sit in novel surroundings and meeting new people. Just like old times in *d'Iberville* [Dufour was] trotting out his nasal "nahs" all the while gesticulating wildly. He has a good sense of humour and made a favourable impression.

He is agreeable to staying with us, until the end if necessary, but would like fuel some time soon. This can be arranged, Stan having 30,000 barrels of Bunker C and Navy Special available for the purpose. Having him alongside will give everyone in *Manhattan* interested in seeing his new ship ample opportunity.

Lunch was good if rather more than we needed. Afterwards we toured the bridge and nearby compartments. Some familiar faces to be seen from my earlier days in *d'Iberville* and *Macdonald*. There are 82 men in the crew plus ten supernumeraries. In addition she has accommodations for 75 passengers which is quite a capability. The helicopter arrangements are rather strange, there being a lift to take machines from the flight deck down two or three decks to the hangar. Wilf Dufour thinks this a waste of valuable space. He is also unable to explain the need for two cranes aft each with a 45 ton lift.

Back to our ship where we met with Casey to discuss the role of his ship's helos which is the major contribution she can make to this party. He rightly suggested they could search for suitable test floes instead of having this great thing blundering about looking for them. The organization to do this was set up with special emphasis to the east of us which suits Beef and me. With winter approaching we want as much easting as good testing will permit. I also offered the services of the *Macdonald* to take the helo, passengers, et al, from here to Winter Harbour to effect the transfer which has been so long delayed. This was accepted.

Carl Thenneman delivered a coded message from DMO which took me some time to unwrap. The result reads: "Reference Haas message giving programme is *Louis St Laurent* attendance considered important?" followed by two corrupt groups which defied decryption but his meaning seems clear. Called Paul to say I will be over to discuss the ... message before he starts nattering.

Saturday, 4 October - Day Thirty-eight

Yet another overcast day with little promise of sunshine. The "Brute" and her "Brood" still sitting in the ice. More tests with men piling out onto the floe to continue the business of drilling holes and gathering data.

Talked with Paul and set up a helo to take me for lunch so that I can clear up my coded reply to DMO. After breakfast I encoded the answer after making several alterations. My version, which I hope will get Paul's agreement, reads:

"U.S. Coast Guard icebreaker marginal capability *Louis St Laurent* continued presence consider desirable will advise should situation change fuel for her being arranged please repeat last two words"

Quite by chance I spoke with Roger Steward about the message which went out the other day, my desire being to see if he feels the continued presence of an extra icebreaker is a good thing. He certainly does. What he did not know is the existence of such a message. I gave him a copy feeling I should have checked with him before this but really it is Stan's job to consult with the Master of this ship. Another example of a breakdown in internal communications. Roger fed up with these shenanigans. As Beef says, what we have here is Stan as captain and the three captains as watchkeepers.

Stan came into the cabin to report that someone had referred to this ship over the radio as the S.S. Mushroom, and when queried what was meant said something about being "kept in the dark and being fed nothing but horse..." This rocked me because we have tried to keep the ships informed. The ship where this originated is the *Macdonald*. I said I would make a thorough investigation and I did. Donald Graham gave me a different version. It did not come over the air (thank the Lord) and that Bern Keating knew something about it. Bern tells me he heard it from young Jimmie James, the University of Alaska representative in *Macdonald* for ice testing purposes, and that he told the story for laughs on one of his visits. This makes it rather less serious and I quickly informed Stan accordingly. Things quickly get out of hand around here.

My luncheon date fell through because of helo problems. I asked Paul if he would agree to taking our helo, old "Zero Five Nine", plus three drums of JP fuel, some thirteen passengers and mail over to Winter Harbour. Atlas Aviation apparently have said from Resolute they would fly. Paul agreed and so it was set up. Shortly after, however, to the disappointment of a lot of people who have been waiting for days to get off the ship, this plan was cancelled because of poor weather in Resolute.

At dinner time (1715) Bern Keating in for a drink which can be a signal for a tough session. I went aft for food while Beef and Bern attacked a succession of martinis. On my return I retired to the sleeping cabin to type and then lay down, not wanting to become involved.

Later Stan came in to show me a draft proclamation he and Hank had drawn up, the purpose of which is to record Humble's thanks to Fournier and the *Macdonald*. I promised to look it over which kept me busy for the remainder of the evening.

[Missing diary entries for 5-14 October]

Wednesday, 15 October - Day Forty-nine

The wind this morning gusting to 30 knots, temperature 3 deg F. at 0800, a chill factor of 40 below according to the chart prepared for this purpose. The morning journey aft along the catwalk to breakfast one of the coldest to date. One of our daily rituals is Arthur Smith's entry into the saloon for breakfast. The door bursts open and a booming voice distracts us from our bacon and eggs with “good morning, gentlemen”. We are not quite sure whether this boisterous bonhomie is addressed to his colleagues at the officer's table or everybody present. Arthur's beard is becoming quite full and lends additional emphasis to the swashbuckling role he pictures for himself.

Paul called twice with reports from Dufour. The last one tells us that he has his evaporator back in action, is expecting spare parts on the Friday flight and would then be able to assist us. I wonder? Called Tony and gave him the latest information plus the fact that this ship has plenty of water should *St Laurent* need it, that Stan is prepared to go to Resolute at any time to supply it, and that we would be prepared also to escort her south when the time comes for us to depart. Tony seems pleased to have this for planning purposes.

At 0845 under way heading southeast to get around some heavy ice floes thence easterly towards Cape Cockburn. Getting under way in this ship is more than a mite different than a similar operation in the navy. In the latter case there is much formal reporting, the Engineer Officer personally reports to the captain, the established ritual of ringing on main engines, special sea duty-men closed up, ready to proceed, both steering motors on, and so forth. On the other hand here, in this ship, Al Scara just grabs the telephone to the engine room and shouts “everything all right down there, Larry?” A muffled reply followed by “OK” from the bridge and that's it - we're ready to roll.

A report there has been some damage aft on the port side, below where the lifeboat is located, a dent in the ship's shell plating 24 feet up from the turn of the bilge. This must have happened, according to the ship's people, two or three days ago.

The ship's position placed her in unsounded waters and the Bludworth Marine echo sounder produced either nothing at all or a variety of soundings from which one could take one's choice if the eye is quick enough to spot the reading. The Simrad recorder and warning device both switched off.

This day was one of the poorest ones I have had in this ship. I went onto the bridge late in the forenoon watch to find us approaching heavy ice and

both Don and Roger bantering about this wondering what to do. Don chose a course and pressed on getting into a formidable floe. I was completely unaware of what had been going on up to that stage of the proceedings. At 1120 we were stopped and backing in an attempt to go around the offending piece of ice instead of through it. Stan, at this stage, opined that a big mistake had been made, that we should have gone to the north to get around the ice, a statement with which I had no reason to disagree. By 1150 we were going full astern and the ship was stuck. I suggested that maybe a helo recce might reveal the best course to take rather than wandering about without a plan. This was agreed to but by then the visibility was deteriorating and the winds gusting to 30 knots so that suggestion went by the board.

At 1400 Roger asked me to get *Macdonald* to come and break ice off our port quarter to enable us to turn. He wanted to retreat the way we had come and then seek another way to get to the east. At this time the ship came unstuck and began moving astern. Wind blowing at 40 knots, temperature 0 deg F. giving a wind chill of minus 55 deg. Bloody cold.

The three ships continued churning and chewing up the ice and then we started backing and charging in an attempt to turn the ship. From 1445 until 1500 this continued until it was possible to break out of the corner of the floe, the ice relieving off to the left in the loose area there, enabling her to move clear. Stan making audible remarks about Roger not using the radar to plan ahead. My efforts to get him to study it more frequently just do not work. A discussion ensued as to what our next move should be and having been asked I checked with Beef who agreed that we should attempt to go south around the big floe. In my opinion an even larger floe was appearing on the radar to the north of us and Ice Central have reported heavy ice in that direction. So we went west in our own track and then south with the icebreakers following astern.

At 1600 we stopped in young ice while six men took measurements and collect samples. It was ten inches thick. They drilled six holes in succession when one would have hoped they might have drilled as many as they could simultaneously.

At this time Arthur Smith took over the watch and instead of heading south and east around the floe he charged into it at the corner and seemed to be able to make steady progress through it. Also at his time yet another floe was showing up on the radar and I was having doubts about the wisdom of continuing. Told Arthur I felt we had made enough southing in unsounded

waters and that we should be making some easting and preferably some northing too.

Around we came to retrace our steps. Roger had spent hours heading south and now with another captain we were retreating. Every watch a different captain and therefore every watch a different plan, is the thought that passes through my mind. What did shake me was overhearing Stan comment to the smirking Bram “so much for the experts”. I felt this is an implied criticism of Beef and me though neither of us are, or claim to be, experts nor do we have any responsibility let alone authority. In any event we made good headway to the north and east, passing the original floe

the source of all our trouble. At 1930 in blowing snow, with the wind now gusting to 50 knots, we parked for the night. I congratulated Arthur on a good piece of work - and it was. What spoiled the day was the unpleasant inference I drew from Stan’s comment but maybe he meant us collectively not me personally.

Thursday, 16 October - Day Fifty

Partly overcast, cold - temperature 8 deg F., the wind still northwest at 20. A satellite fix put us in position 74 deg 32 min North, 101 deg 34 min West, but with what reliability I cannot say.

Up to the bridge at 0830 to find the door locked in my face. Now what the hell? The obvious inference is that too many people have been on the bridge, with which I have to agree, but surely this is a strange way to solve the problem. There are so many with legitimate business there that just barring the entrance is not the best way to deal with it. Why not just tell those who aren't welcome and leave it at that? I returned to our cabin in a filthy mood and stormed up and down.

By 0845 the ship was moving and shortly after I went up for the second time. I did not like to make a scene but if I am not able to get on the bridge whenever I want to then I might as well get out of the ship. Encountered Stan on my third trip up and asked him about the door. He expressed surprise I would think that a locked door was meant in any way to exclude me. What is one to think? Anyway, I got there just in time to handle a conversation with Paul who wanted to know what the plan was, were we testing or making easting? I gathered that *Staten Island* was having difficulty keeping up and to assist her we stopped and the opportunity was being taken to set up a test of some sort.

Donald Graham had the watch and I told him I didn't know what was up but that I had been unable to get to the bridge. He was full of apologies and assurances that this was never, never, meant to apply to me and that I of all people had access and what would they do without me there and so forth and so on. Sometimes I find it truly hard to hold my tongue. As Beef said later Donald always tells you what he thinks you want to hear while Stanley tells you what he'd like you to hear if it will further his plan of the moment. The more I see of him (Stan) the more I wonder if he isn't just another Murdoch!

Casey Walsh got his ship up to us and we did a test run at dead slow speed through ten inches of ice using the Raydist gear in *Staten Island*. The morning also saw us send off "059" on an ice recce with Emil Stasyshyn and Beef. Every time that damn helicopter goes off on one of these flights I worry because if it should have to set down for any reason we wouldn't know where to look. It took off at 1015 and we were out of radio contact 15 minutes later. I watched through binoculars until he was out of sight and then hoped for the best. Nobody paid the slightest heed by using radar or their own glasses except Bill Novick who tried to keep radio touch. We sighted the contrail of a high-flying jet at 1030 and then the plane itself, apparently flying from Thule, Greenland, to Alaska, though that is surmise. By 1050 "059" was safely back on deck.

At 1120 *Macdonald* closed to enable three National Film Board types to get pictures. Roger, when he saw her working up our starboard side, shouted "My God, we're not stuck again, surely?" He was speedily assured this was not the case and he left the bridge soon after.

At noon we awaited the arrival of *Staten Island* in our midst and then turned in a frozen polynya, if there is such a thing, and the three of us marched together in an easterly direction. This progress lasted until 1315 when we entered what Roger swore was an easy looking floe. But, alas, not so. It was hummocked, albeit with deceptively low ones, the spaces between having been filled with snow and there was a hefty ridge. We stopped and once more the engines were put from full ahead to full astern to full ahead. Absolutely no sternway was achieved and at this point the icebreakers were dropping back. This was because *Staten Island* was immediately astern of us and would not, or could not, stay close up. As she fell back so, of course, did the *Macdonald* until there was too much separation for them to be of any use to us. At this stage there was some talk about telling them to go around the floe and meet us later on but wisely we all agreed to "leave 'em be" - they know what they are doing.

At 1345, for the first time to my knowledge that she has done this, *Manhattan* advanced through the heavy stuff blocking our progress without first having to back at all. Actually she couldn't get any movement astern because of the ice packing in around the after end of the ice belt. The ice cracked and relieved to starboard time after time as we moved along. At 1355 she broke through the ridge that had been the major cause of our difficulty, estimated to be 30 feet thick.

All this time the two 'breakers were having their problems and had dropped one and a half miles astern. At 1400 I talked with Paul who confirmed they were in heavy ice and a difficult situation with pressure. Beef had been urging Roger to stop before getting too far away from the other ships but this was not well received until 1405 when we finally slowed and then stopped to await developments.

There followed much pacing about the bridge, peering at radar displays, squinting out of windows, and so forth. At 1440 I spoke with Paul who reported no progress. Casey then chipped in with the suggestion that we simply await an improvement in conditions. On our bridge at this time were Roger, Stan, Beef, Mr Scara and myself, and with the exception of the mate we all fell to discussing courses of action. Stan said, and I agreed, that the present wind conditions would continue until to-morrow night, indeed I pointed out that a northwesterly wind could blow for days on end. It seemed prudent to wait for a change in direction or a drop in force to ease or change the pressure conditions.

We could move, we had the initiative still, and break out the other ships. This was obviously something Stan wanted to do. There was a risk we too might get stuck and be unable to move or expect help from the ice-breakers, but it seemed worthwhile to try something. It was decided that we should move ahead, alter course turning to starboard where the easier conditions lay, then run back through the easier ice there and breakout the ships. I determined to get unanimity on this before we started so there would be no bitching in the corner later if things did not work out. Good thing, too, because the version Stan, Beef and I agreed upon was different to what Roger, by this time munching his way through a steady stream of Roluids, had in mind. This was cleared up and off we went.

At 1523 full ahead and 15 degrees right rudder. *Manhattan* to the rescue was Stan's triumphant cry as we moved off. The ship started on her way with ease and swung nicely. I was pleased to note Roger watching her stern as it swung hard over into the ice. Orders like "ease your wheel" and "check her"

grate for they are imprecise and leave the Quartermaster to decide how much she is going to be "eased" or "checked". Our speed increased and we pranced gaily on, swinging all the way around until the two icebreakers were in sight through the mist ahead. At 1542 Roger ordered "half ahead". That was a mistake and so was his decision to steer the ship into heavy, very heavy, brash.

Full of confidence a message was passed to the others to be ready to maneuver. I kept asking Roger what he planned but one cannot insist on getting an answer. A plaintive signal from the *Macdonald* as we bore down on her, surely a frightening sight, on which side we intended to pass her as she lay helpless in our grain. Roger replied that we would cross her bows - or so he hoped. He was wrong. At half speed on the telegraphs we slowed and slowed until at 1532, still some four or five cables from *Macdonald*, we stopped dead in that jumbled mass of brash under pressure, the same that had ensnared the icebreakers. We could have directed our course more to port through a floe, or at least through the end of the floe, which might have enabled us to continue. Roger had told them, once we had passed by, to turn and follow us westward into the frozen area where we had maneuvered so easily in the forenoon.

Our ship's heading was 308 degrees when we staggered to a halt and once more began the business of full ahead and full astern and this continued for hours without the slightest effect. We were truly stuck. At the change of watch, Roger turned over to a rather disgruntled Arthur Smith with the remark "OK Captain Smith, happy motoring, its not often I leave anyone beset" and stomped off the bridge. In such circumstances does a captain turn over command of his ship and walk off as though he were a mate? Its hard to comprehend.

The icebreakers continued their activities, backing, charging and heeling. *Staten Island* was almost invisible but *Macdonald* was making fairly good progress. She eventually succeeded in turning and backing towards us, until prevented from getting really close by a heavy polar floe. Arthur tried until 1830 without success to get us moving and then we packed it in for the night. Our position approximately 74 deg 21 min North, 101 deg 11 min West. We'll certainly drift some in this wind, probably almost back to where we were when we started north last night. This is what could be called a true besetment for the three of us. On the radio I told Paul that at least we were all together. This, I think, was received as though I had said we were all in this together. Other occasions when we became stuck bothered me but none

as much as this because of the date, the location, and the change in the weather. Hmmm.

Friday, 17 October - Day Fifty-one

Temperature 4 deg F. Clear, wind now northerly at 15 knots but dropping to 10 by 0900.

Not much inter-ship talk on the radio as daylight came but all ships with smoke and steam issuing from their funnels, sure evidence of a combined determination to get moving. Paul called to say he was coming over at 0900 and Stan wanted to know what he would be talking about while he, Roger and I were discussing various possibilities in Roger's cabin. How could I possibly know what is in Paul's mind? Stan added that I had icebreaker experience up here and therefore must surely have some idea. How does one field questions like that? If I had some authority I would not be in the position we're in. If I had command of an icebreaker I sure as hell would be a long way from here. If I had command of *Macdonald*, which I have not, I would have made the point that we should be east of this location. Paul has tried but the test director and his people still seem to influence the conduct of operations. If we hadn't wasted time yesterday we would by now probably be under the lee of Bathurst Island. Paul duly arrived and we had a relaxed talk about things. His opinion is that it is simply a question of waiting until the pressure comes off at which time we will all be able to advance. Our course should be north, then northeast, to get under Cape Cockburn.

Manhattan continued to wash her stern with movements of full ahead and full astern. This certainly has produced quite an area of open water under both quarters and may eventually be enough to get the ship moving back. KAE flying about in our vicinity on an ice recce and plans afoot to send "059" off to get the local picture of ice conditions.

All day this business of going full ahead and astern went on with scant success. Shortly after 1400, with Roger on the bridge, arrangements were put in hand to wash the ship's side with water. It seems this did the trick for at 1430 the ship advanced and burst her bonds leaving great chunks of blue ice twelve feet thick passing along the sides. Ten minutes later *Macdonald*, who saw us marching off, asked us to wait as she was still stuck. Roger replied we would once we got clear and into easier conditions.

Our triumphant advance was stopped, however, at 1510 by more heavy ice and for 35 minutes we pounded away before breaking into easier conditions.

The ship pushed some very big pieces of multi-year ice, 12 to 16 feet thick and very great in extent. This stuff was on edge as it moved slowly aft along the side, one heavy chunk slowly rotating and cascading debris and water as it went.

Things are looking up. *Staten Island* turned and started in our direction at a goodly clip while *Macdonald* reported she had succeeded in getting herself into our old track. By 1645 we were bound northeast with *Staten Island* astern and dropping farther back to permit the other 'breaker to move in between the two of us. We were free once again and on our way to the considerable relief of all in this ship, and doubtless also the others. We certainly have churned up a lot of ice, the area looks as though it has been worked over by a giant eggbeater.

Discussed with Stan the possibility sometime of doing an experiment in a floe to determine if indeed it was the lubricating effect of water which ultimately released the ship.

At 1700 our course northeast in easy going and we made good time. Cape Cockburn detected by radar at 1819 bearing 042 deg. distant 27 miles and a minute later course was altered to the east.

By 1945, though we were still not under the lee of the cape, we headed southeast and parked in a floe which was considered a candidate for testing. Daylight will tell us. So ended a rather trying 24 hours during which we all learned something about ice under pressure. I was considerably relieved that we were able to extricate ourselves so quickly and it was entirely appropriate that it was Roger who had done it, for it was he who had got us stuck exactly 24 hours earlier. I congratulated him and he was obviously pleased.

A relief also to me that *Macdonald* was able to get out of that heavy ice on her own. *Staten Island* offered to help here earlier in the day, she having wriggled herself free and getting into easier conditions. Casey, I suspect, rather relished the opportunity. Stan, I feel sure, was also relishing the role of rescuer but was denied that for a second straight day. Well done that man Fournier!

By stopping short of the lee of Bathurst Island, Stan demonstrates again an inability to live up to the undertakings he repeatedly gives Paul.

Saturday, 18 October - Day Fifty-two

Another clear day, wind from the north 10/15 knots, temperature 6 deg. F.

There were 70 engine movements (bells as they call them) yesterday for each engine, which is a record, in the struggle to break loose. Mr Hahn, third mate, says the most for any watch to date is 62 per engine.

At 0820 it was full ahead, full astern, and so on. Last night we glided easily to a stop and this morning here we are stuck. There seems to be a certain amount of pressure apparent which was not there last night. It is ten tenths, a mixture of young and first year ice, with considerable snow cover. Near the ship it had become a slushy mess. To save time I suggested we ask *Macdonald* to come and ease the squeeze as it were. This she did, starting at 0900 and by 0922 *Manhattan* began to slide backwards leaving behind a dirty trench of heavily packed snow and slush with a perfect imprint of the ship's hull therein.

While this was afoot, Casey was busy "cutting a Dido" astern of us in the easy ice there. Had to explain to Roger that this expression dates from the time 50 years ago when a particularly smart R.N. cruiser of that name would parade around the fleet before coming to an anchor in order to display her extraordinarily smart appearance. For his part Roger replied that Dido, in mythology, fell on a sword and perished. This, he added, was just to show that he had in fact once read a book.

At 0935, having failed to cast the ship's head far enough to port to avoid the heavy ice in our grain, we became stuck. Without further ado *Macdonald* moved up our port side cracking the ice between us and also releasing a great quantity of ice and slush from under the ice belt and thus releasing us.

While steering north to end-run the big floe which barred our eastward course an excited Mr Hahn shouted "Look - polar bear." Sure enough and very close too. He was shambling along on our starboard side quite close. As we neared he increased speed to get across our bows rather than take to the water in the other direction. He jumped from one old floe to another, only making it halfway and falling on his belly across the floe edge. It looked painful and likely was but he scrambled up and hurried on. Disappearing under the overhanging bow we caught a glimpse of him on our close circuit television camera and shortly after he emerged safely on the other side still going flat out. On the bridge there was much rushing about with cameras and binoculars but scant heed to things like the ship's course, speed and soundings. *Macdonald's* helicopter then took after the animal and I finally sent a message to leave the beast alone. Enough is enough and anyway it is illegal to harass game from the air.

Every day seems to have a feature which makes it memorable in some way. To-day's occurred at 1600 when we were steaming through what we thought were easy conditions. It was true pancake ice defined as "pieces of new ice usually approximately circular, about 30 cm to 3 m across, and with raised rims due to the pieces striking against each other. Formed from the freezing together of grease ice, slush or shuga, or the breaking up of ice rind or nilas." It quickly became apparent that we were dragging a growing mass of this stuff around the bows and along both sides and as it grew larger so did our speed diminish. At 1600 we were motionless and embedded in a huge mess of this porridge all around. Full astern had no effect. This pancake ice was in windrows at right angles to the northwesterly winds experienced over the past few days. *Staten Island* came up our starboard side and *Macdonald* the port side. With their help *Manhattan* soon began to move and together we decamped to the north to clear the area where this ice occurred.

Garrett Island reported in radar contact, distant 27 miles, by the other ships but not here. It could also be seen visually. This incident, and others, make me wonder about our Decca 3 cm radar. Maybe it isn't properly tuned, after all Garret Is. is 342 feet high.

Making good easting and now well under the lee of Bathurst Island some twelve miles south of Dyke Acland Bay. Sunset at 1710 and the sky still clear - CAVU conditions (ceiling & visibility unlimited). By 1840 it was almost dark which is when we separated to select suitable parking billets for the night.

At 2100, while Walter Devine, a naval architect with Humble, was lecturing on the alterations made to this ship to prepare her for her icebreaking role, Roger interrupted him: "I don't want to break in here, Walter, but you all may be interested to know there are two polar bears just off the starboard side of the ship." What a way to wreck a lecture! Everybody rushed out to see and there they were, rambling about on the ice 100 yards away. They were curious but soon became bored and wandered off into the night. The searchlight on the flying bridge came on and those two magnificent animals were caught in a white circle of brilliant blue light as though they were on stage but it didn't bother them.

So ends another day. Beef tells me Stan advised him that our New York visit has received approval and our arrival there will be November 12. I suppose testing can continue but one wonders if we are testing to keep ourselves busy until it is time to make that date. Boredom in the offing.

Casey Walsh has created the following for our edification:

For the Tiger in our tanks
To Humble we give thanks
From the Super *Manhattan's* hose
A good gulp to warrant this prose.
Sail on you icebreaking brute
The *Staten Island* follows your route.
We contribute, alas, the little things
Your tests, success, to the future brings.
Aye! Capt. Smith, Graham and Steward too,
Three masters Humble true.
Goettel, Pullen and Director Haas
With this talent, success, alas.
John A *Macdonald*, its Capt. rare,
All three ships assume the dare.
Give thanks, methinks, to this combine
It couldn't be done better, if we had nine.

Sunday, 19 October - Day Fifty-three

Promise of another good day. Clear, little wind, temp. 14 Deg. F.

Our two bears re-appeared prowling around on our starboard beam. In the improving light it is my opinion they are adults, male and female. Tiring of us as a point of interest they hunkered down together, facing away from us, on the edge of a frozen polynya.

Under way at 0945 to investigate an ice island fragment preparatory to ramming it. "059" landed and reported the piece to be 435 feet long, 223 feet wide, and 14 feet above the surface. Speculation as to what will happen, it being estimated its displacement must be somewhere between 250,000 and 300,000 tons - likely more. We noted from the bridge that the pilot (Bill Novick) of "059" got out with his passengers onto the ice leaving his machine running unattended. It is a matter of opinion, according to Chief Pilot John Heller, whether this is or isn't a wise move with an S-62.

The greater part of the day spent sniffing around this piece of ice. The first run at 1030 was made at dead slow speed with the intention of touching but not striking. At 1100 we made the second run, still at a knot or less, and it was more a matter of nuzzling than hitting. However, there was still sufficient force or momentum to cause both it and us to meet and retreat. The next run was at one and a half knots or possibly a little more and this

produced another "V" type mark in the ice. The last run, at something like three or four knots, was more impressive. The bow rose about five feet, there was a great deal of noise, large slivers of hard blue ice broke away as the floe sank several feet, and then once again both it and we re-coiled.

That was enough - no more runs. Stan is not impressed with any need to pursue the matter and so we steam east leaving our hapless icebreakers to get their engines on the line and overtake us. This they managed to do but not before there was some difficulty with *Staten Island* involving Arthur Smith and Beef in a shouting match the cause of which in my opinion was the former's fault. He shouted and pranced about the bridge to a captive audience. An exercise in self-justification. *Staten Island* having caught up with us came to our port side for 250,000 gallons (6,000 barrels) of fuel. Casey came over on a similar errand. We had a pleasant evening over a tot or two explaining to him why we, Beef and I, have been unable to tell the icebreakers more.

We are so close to Resolute Bay I called Paul and asked him if he would consider going there next day to take and collect the mail. He had been on the verge of making the same suggestion to me and so it is arranged. This will give me a day away from the tanker which I'll enjoy. We are all getting stale and a bit edgy.

To-day's main event was the assault on the ice island fragment, likely the first time two such heavy objects have deliberately collided - 155,000 tons versus 300,000 tons and with no damage - surely something of a record.

--oo0oo--

S. S. M A N H A T T A N

Beechey Island,
27 October 1969

The night is neither bright nor short
 The singing breeze is cold
The ice is not so strong as hope
 The heart of man is bold
Bright summer goes, dark winter comes
 We cannot rule the year
But long ere summer's sun goes down
 On yonder sea we'll steer

(Boker 1823-1890)

* * * *

On this day Humble Oil & Refining Company's giant icebreaking tanker, MANHATTAN (Roger Steward, Master), arrived at this most famous of all Arctic meeting places.

She came to add her name to an illustrious list of renowned polar ships, which, over the years, preceded her. But she is not the first ship to fly the Stars and Stripes in these waters for one hundred and nineteen years ago, on August 25th, 1850, Lieutenant EDWIN DE HAVEN, U.S.N. commanding the United States ships ADVANCE and RESCUE, arrived at BEECHEY ISLAND to represent the United States in the Franklin search.

Because of her great size (1,009 feet overall), draft (52 feet) and loaded displacement (in excess of 150,000 tons) MANHATTAN was obliged to lie off the entrance to EREBUS BAY.

She sailed from CHESTER, PENNSYLVANIA, August 23rd, arriving off POINT BARROW, ALASKA, twenty-nine days later. Departing there September 22nd, for the eastward leg of her voyage, she carried out extensive ice tests in VISCOUNT MELVILLE SOUND. On leaving BEECHEY ISLAND she will make for BAFFIN BAY thence southward toward HALIFAX, NOVA SCOTIA, to arrive there November 8th, and to enter NEW YORK on November 12th.

By so doing she became the largest ship by far ever to accomplish the NORTHWEST PASSAGE. She is the first commercial vessel to achieve the feat, in proof of which she bears on her deck a symbolic golden drum containing one barrel of North Slope crude taken on board at PRUDHOE BAY, ALASKA, for delivery at NEW YORK. In this fashion was marine transportation of oil through the Arctic initiated. MANHATTAN is also one of four ships to have made the Passage in both directions and one of three to have done so in a single season.

So far as is known the first ships to visit BEECHEY ISLAND were Lieutenant W.E. Parry's HECLA and GRIPER on August 19th, 1819. The discovery of this island was made by

Lieutenant Beechey, Royal Navy, who was sent ashore to explore the area. The list of men who followed Parry to this spot is a veritable Who's Who of Arctic exploration--- Franklin, Austin, Penny, Ross, Forsyth, Inglefield, Belcher, Kellett, Pullen, M'Clure, M'Clintock, Amundsen, Low, Bernier, Larsen and Robertson.

Most ventured here in the hope of sailing through the fabled NORTHWEST PASSAGE, a prize which, until Amundsen, eluded them. Some came in search of the ill-fated Franklin expedition. Since 1954, however, navigation of at least part of the Passage has become progressively more and more a matter of routine for specially built vessels. But now, with the appearance of the MANHATTAN, truly a commercial vessel with no other pretensions, the long-sought ideal has at last been realized after four centuries of unremitting endeavour.

Thanks to MANHATTAN's achievement the dream of a commercial trade route has now taken an enormous stride towards ultimate fulfillment. It has been demonstrated clearly that monster icebreaking ships are capable of operating in the high Arctic.

It is, therefore, singularly appropriate for this recent success in Arctic navigation to be recorded and deposited here as further testimony of man's conquest of his north polar environment. History will testify that Humble Oil's MANHATTAN played a major role in breaking down the barrier of ice to commercial shipping in the Arctic. She is undoubtedly a pioneer and the forerunner of other ships, yet even mightier, that will ply these storied waters.

Be it also noted that she was accompanied throughout her epic voyage by the Canadian Coast Guard Ship JOHN A. MACDONALD (Paul M. Fournier, Master) and an unbeatable pair they proved to be.

For a portion of the western leg, the United States Coast Guard Cutter NORTHWIND (Captain Donald J. McCann) was a member of the group. For that portion of the voyage eastward from POINT BARROW, the United States Coast Guard Cutter STATEN ISLAND (Captain Eugene F. Walsh) provided support. For the latter half of the eastward leg, the

new Canadian Coast Guard Ship LOUIS S. ST. LAURENT (Wilfred Dufour, Master) also lent support to the project.

To date twelve ships have completed the NORTHWEST PASSAGE, eight of which were United States vessels of one type or another including two submarines.

BEECHEY ISLAND, which evokes memories of so many brave and patient men, has never seen a sight like this. MANHATTAN's presence here this day is the ultimate justification of their doughty endeavours under miserable conditions. The spirit of those heroic officers and men is alive today --- of that this ship is reassuring evidence.

The name MANHATTAN will forever occupy a special niche in Arctic history. All who sailed in her, and in her indomitable icebreaker escort, draw satisfaction from having taken part in a magnificent achievement.

Roger A. Steward
Master
S.S. MANHATTAN

Stanley B. Haas
Mission Director
S.S. MANHATTAN

Arthur W. Smith
Staff Captain
S.S. MANHATTAN

Abraham D. Mookhoek
Director of Testing
S.S. MANHATTAN

Donald E. Graham
Staff Captain
S.S. MANHATTAN

Frederick A. Goettel
Captain U.S.C.G.
American Representative

Colos J. Bennett
Chief Engineer
S.S. MANHATTAN

Thomas C. Pullen
Captain R.C.N. (ret.)
Canadian Representative

* * *

Down sank the baleful crimson sun
The northern light came out
And glared upon the ice-bound ships
And shook its spears about

* * *

--oo0oo--

[Missing diary entries for 20-28 October]

Wednesday, 29 October - Day Sixty-three

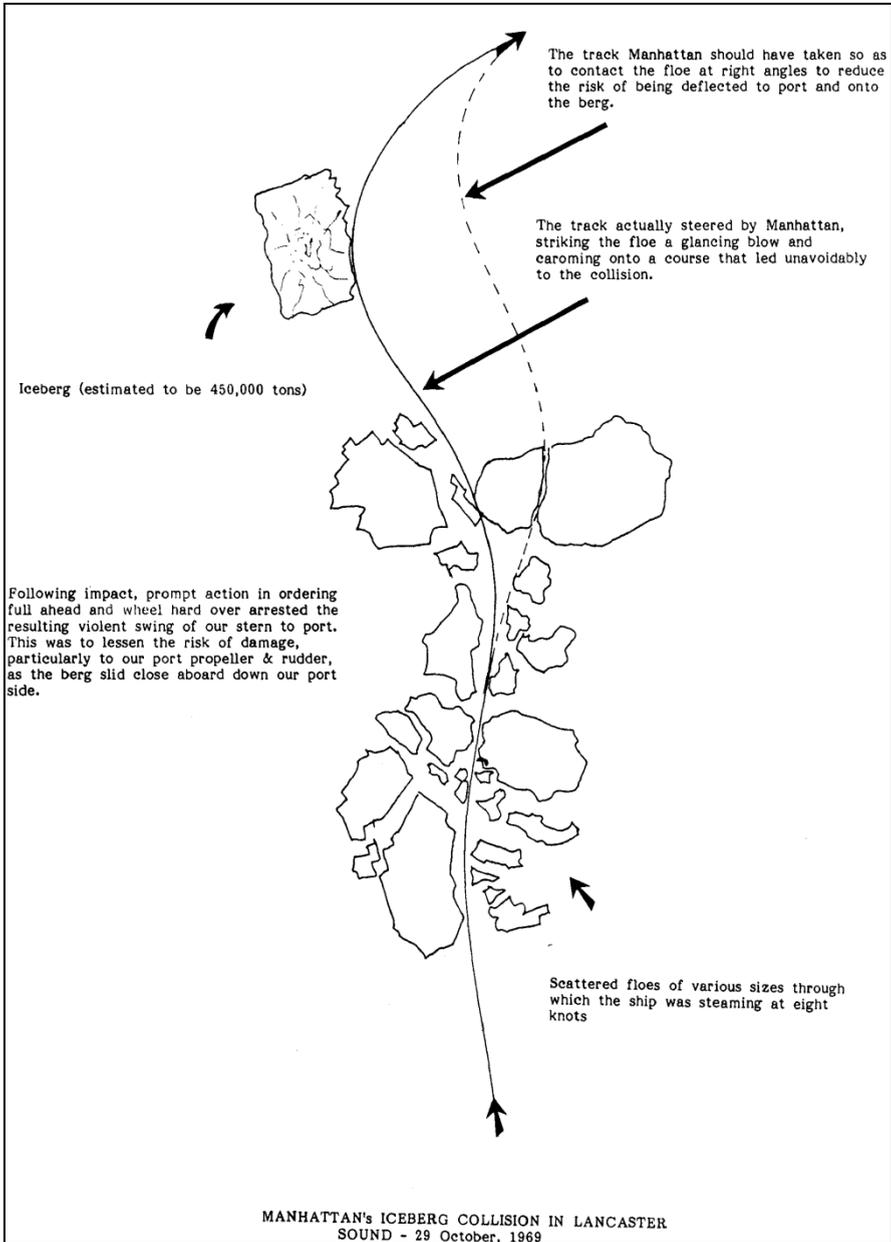
Temperature 10 deg - wind northwest at 4 knots having shifted from east-northeast at 0400.

At 0630 Cape Bullen lay eight and a half miles on our port beam. Steady progress during the night, an average of ten to twelve knots but conditions changeable and by 0740 we were stopped in a heavy floe with more heavy ice in sight ahead as approaching daylight improved the visibility. Numerous icebergs, bergy bits, ice island fragments, and heavy chunks of rafted sea ice plus some weathered old floes thrown to complete the picture.

Waited for daylight so that a helo recce could be flown. No future in blundering on into more difficult conditions. This is when running at night can be a losing proposition. Don Graham kept himself occupied backing and filling to get out of the floe and turn the ship in preparation for a lunge in a new and better direction. The ship behaving quite differently with the ballast pumped out. In addition, there is a noticeable list to port, something to do with number six and seven port wing tanks having leaking valves.

After breakfast I had a word with Roger about Eskimo carvings in general and whales in particular. He seems surprised to learn I hold a receipt for them but tells me he had not seen any whales when the carvings came on board. Fair enough but he says he'll make some gentle enquiries on the subject.

During the forenoon watch, with Roger at the conn, we wended our way across Lancaster Sound from Cape Bullen southeastward in the direction of the Wollaston Islands at the entrance to Navy Board Inlet. It was quite a slug and slow going. Very heavy ice and we managed to work our way around the heaviest, toughest old floe we have seen to date on this voyage. It was so thick it stood many more feet higher out of the water than any others and in addition the hummocking on it stood as high as twelve feet. It looked so heavy and hard that I don't think this ship could have got far enough into it to get into trouble. When the other ships passed along its edge they seemed small beside it. If the light was sufficient and I have solved the intricacies of that Nikon camera I should have some pictures.



But that was not all. Twisting and turning to avoid the worst ice, Don Graham, who had taken over at noon, was endeavouring to avoid an iceberg on our port bow, a flat heavy chunk of blue ice, by steering into a floe to starboard. Unfortunately he misjudged it because he managed only to strike

it a glancing blow, caromed off towards the berg and by that time it was too late to do anything. As he said, the inevitability of an accident in slow motion. I was convinced our bow would be a write-off as we swung onto the berg. There was a crash and crumbling ice cascaded over the port bow onto the foc'sle. We bounced violently back to starboard having taken the blow, a glancing one, on the port bow while our stern swung towards the berg as it was passing close aboard down the port side. Full ahead and hard left rudder served to arrest that swing just in time. A man aft could have leaned out and touched that berg so close did it pass to the ship. What a session that was. I took as many pictures as I could in the time available running out of film in the process. But I got sufficient. The interesting thing was the manner in which that ice splintered and fell in shards onto the deck.

Shortly thereafter we stopped while Bram went over the side onto a floe to inspect the bow, check the drafts fore and aft, and also to try and examine the starboard bow. Apparently we struck very hard on some ice there during the morning watch although I never felt it. No damage reported though whether this is for public consumption is hard to tell.

Conditions eased somewhat during the afternoon though we hit some fine examples of hard blue ice. Some specimens, when they rose ponderously clear of the water as the ship thrust them aside, revealed themselves to be as much as eighteen feet thick. We flew an ice recce between 1500 and 1600 towards Navy Board Inlet and continued on our way in that direction. By dark it became more difficult to see and there were many icebergs about plus bergy bits frozen into the floes. As Arthur says, a person really earns his pay during a four hour watch in the ice. The wind picked up at 1900 and was soon gusting over 30 knots. The temperature down to 10 deg F made it cold outside on the wings of the bridge for the lookout.

I had a discussion earlier with Stan about radar interpretation of ice. Those areas which are jagged in appearance can safely be assumed to be polynyas or areas of new or young ice - flat and undisturbed. Old floes appear with rounded edges because of the shoving and bumping they undergo smoothing the corners.

By 2030 the two icebreakers were having problems, obviously because of the pressure coming on from the wind. Much commenting by Don and Arthur about them simply not being able to cope, that *Manhattan* is able to hack it but not the breakers and so on. Anyway, we went to the bridge and passed the word to pack it in for the night. At 2230, after the movie, our drift

was more than two miles - more comments about the breaker's problems. The atmosphere becomes less and less pleasant.

Thursday, 30 October - Day Sixty-four

Turned in at midnight still curious as to how things will shape up during the night and debating whether I ought to turn up during the middle watch to check our drift. I needn't have bothered. Shortly after 0200 my phone buzzed and it was Mr Scara asking me to go to the bridge.

The rate of drift had been very swift, in the order of two knots, and in a southeasterly direction putting us four miles from the beach to leeward. All ships were struggling to get free and move northwards to establish more offing. *Manhattan* was moving back and forth a matter of only a few feet. *Staten Island*, for reasons which were obscure, was romping ahead without any difficulty. As for the *Macdonald*, she was asking the American icebreaker for assistance - a new twist. Roger seemed concerned about the state of play but the situation was by no means critical.

We finally got this ship moving a goodly distance ahead and astern and shortly after we broke out and made off to the north at a good clip. After covering only a few miles, during which we were discussing the dangers of navigating in ice at night when it is difficult to recognize old floes, we steamed into one and became stuck.

Again we resorted to backing and charging, getting the ship to move farther and farther with every assault. But this floe was heavy and we had nearly a mile to go to break out. There was also a massive ridge which we had to defeat. By this time *Macdonald* had wriggled free and with *Staten Island* approached and were advised by us to remain in the frozen polynya just astern of our floe. All was accomplished by 0330 or so and Roger agreed to leave it at that until the morning when daylight may permit a helo recce. I went below and lay down.

My phone buzzed again shortly after 0530 and on getting to the bridge I found we could wait no longer because of the speed of our drift - again to the southeast. Actually, there was no danger as it became easterly and parallel to the coast once we got within three miles or so of the land. Paul came on the radio to explain that his difficulty earlier had been because of his being caught between the fast ice and the moving pack grinding past it. When we started moving to and fro to get ramming room we discovered the pressure had slackened and that cracks were appearing ahead of us. Nonetheless, because

of the heavy hummock in the center of the floe, it took repeated attempts to break through in which we were ultimately successful. Once again we glided into an area of thin ice there to remain awaiting better light conditions.

Feeling pooped I went below to shave, shower, and breakfast. Back on the bridge I noted conspiratorial whispering in corners on the part of Stan, Bram plus various other character actors. Don Graham busy being all things to all men. At 0915 it was announced that we were returning to go by way of Navy Board Inlet because that is what Stan wants. Don was driving and having a tricky time trying to decide how to go about it. There was a heavy ice barrier between us and our destination - this we knew because we'd just expended hours of effort to get through it. Our original track was what Don was looking for but it had closed up - tight. I sense trouble.

Being concerned about the icebreakers and the situation they are being put in, plus the fact that I had not been asked for my opinion, I went up to Stan and told him I wished to discuss his plan to return via Navy Board Inlet. I made it clear that in my view the Inlet will be choked with heavy ice and that there might be difficulty in getting through, indeed we might not get through at all. We have had a tough battle to get out to where we were now and to turn back might be inviting trouble for the icebreakers. I appealed to him, before the ships became inextricably involved, to send up a helo recce to give us the facts on ice conditions there. This he agreed to do, though reluctantly. I cannot help but get the impression he wants to be told all the things he likes to hear rather than the unpleasant things he should know.

Off went Emil on his recce after I had a word with him beforehand to the effect that I wanted a damn good assessment of the ice there in Navy Board. Meanwhile *Manhattan* was turned in preparation. At 1015 Emil was back to report seven tenths multi-year floes, three tenths new and medium winter ice and two tenths ridging. His report was what I expected. By continuing east to pass north about Bylot Island we would have two knots of eastward set to urge us along and much more elbow room. But no, we turned, south about that heavy floe to see for ourselves what conditions are like - a face-saving device maybe?

What is particularly disturbing is that decisions affecting the safety of the ship are made by Haas and a cabal of two staff captains plus Mookhoek thrown in for good measure. Roger, meanwhile, was below in his quarters. The whole set-up makes one sick to the stomach. It was about that time I had explained to me the reason for this Navy Board business. It has to be investigated as an alternative route through the Northwest Passage for the big

tankers. Such a prospect may cause a mild flutter among people like Bud Orange, MP.

I am growing concerned at being deliberately excluded from any discussion on operational matters and with my responsibility for the icebreakers I'm bloody well not going to be ignored.

About 1100 the visibility closed in at which time we were well back towards Navy Board Inlet having gone south around the floe. It became impossible to see where we were heading and Arthur Smith was outspoken about his disinclination to continue with the plan. So, at 1120, we altered around to the east to go north about Bylot Island. No doubt about it, the other two ships were pleased. Paul, on the radio, said he has no choice but to follow us whether he likes it or not because he cannot hack it alone, nor can Casey Walsh. For this reason Stan should recognize that his operational decisions involve all ships not just *Manhattan*.

Paul has heard from Dufour, who is not very far ahead of us, reporting heavy ice in Baffin Bay and recommending that we go by way of Navy Board Inlet. Not a timely suggestion. Thereafter, we made quite good ground to the east, stopping only once in the afternoon when *Macdonald* got into difficulties and we lost an hour or more.

Making good progress during the first watch, standing out into Baffin Bay on an easterly course. By 2300 the ice becoming much easier. Quite soon we shall be in really easy conditions and able to haul around and start the long descent of the "latitude ladder". A message in from *St Laurent* giving us his position, about 220 miles ahead, in light ice and steaming at 13 knots. I understand he will wait for us in the vicinity of Belle Isle.

We have been lightened by 20,000 tons of ballast and it has had a marked effect on our icebreaking performance. It was very noticeable early this morning when we were ramming that heavy floe. She lost headway much too soon and the noise of ice striking the hull sounds like thunder. Our draft now 45 ft 3 in forward and 50 ft 7 in aft.

[Missing diary entries for 31 October – 2 November]

Monday, 3 November - Day sixty-eight

At midnight the wind had backed from SSW at Force 5 (17 -21 knots) to South and increased to Force 6 (22-27 knots). By 0400 Force 7 and at 0800

Force 9 (41-47 knots) and still southerly. A grey day, poor visibility with blowing snow. We are in for a dusting.

Ho-hum - one's thoughts turn to the Raydist equipment sitting abandoned on Danish territory. As I walked aft for breakfast I passed Bram Mookhoek sheltering in a corner looking rather glum. If it had been essential to recover it we could have waited for days for the weather to moderate. Warnings were given about the bad weather encountered in this area but management made its own decision on that without seeking advice. Siting it on shore was a blunder.

After breakfast we learned the Raydist has indeed been abandoned and that we are southbound. I can't really believe it to be as valuable as Bram makes out. Someone was heard to suggest we might ask the Danish authorities to collect it - that really would indicate whether or not the ship had approval from them in the first place to land it.

During the forenoon the wind picked up more strength, the anemometer registering gusts to 60 knots but this, of course, includes our own speed of 10 knots. Traffic along the catwalk became a wild wet business. Its not cold, however, the temperature at 32 deg F which helps. We have had all manner of experiences on this voyage except for a bloody good blow and this looks like it will fill the bill. The seas were 20-25 feet high though this ship is so large it is difficult to judge accurately but even from the bridge they looked extremely impressive sweeping down upon us.

This storm continued unabated during the afternoon. Lost in the maelstrom of white water were occasional chunks of thick heavy ice (growlers) so low in the water as to escape radar detection. By 1430 it was quite dark adding to the difficulties of those on the bridge keeping a lookout. Memories of the ice-strengthened Hans Hedoft, lost with all hands on her maiden voyage in 1959 in just such conditions but then it is to be hoped *Manhattan* is too big to suffer fatal damage from such conditions.

[Missing diary entries for 4-5 November]

Thursday, 6 November - Day Seventy-one

At 0445 *Manhattan* was passing Belle Isle abeam to port though I must admit I did not leave my bunk to mark the event. The 0800 temperature a balmy 48 deg with virtually no wind. Land in sight, and ships, and even a whale.

Our friend, Mr Brooks, the reporter who came on board from Resolute representing a Bangor, Maine, paper also brought with him a cold germ which has hit a lot of people including me. It takes just one outsider to introduce a bug to a group which has been cut off from civilization for a period and it spreads like wildfire.

Macdonald in sight ahead and I talked with her captain. He had a message from Gordon Stead, Assistant Deputy Minister of Transport, in Ottawa, that had the times all fouled up. We can't figure out how they have latched onto an afternoon arrival.

Stan invited me in for drinks before dinner and we discussed a variety of topics. He said he hoped I'd be willing to say what he cannot, that commercial ship operations in the Arctic are feasible. He has to wait for top management to give the green light on this before he can speak for them and he indicates they are involved with other projects. He read me his proposed speech when he makes the presentation to Paul which sounds fine. He then shook me by asking me if I would let him have a copy of this, my personal journal, so that he can have a record of what has happened. Bram, who by then had joined us, agreed and they both said it would take no time to Xerox it! As carefully and tactfully as I could I tried to indicate that it is hardly the sort of thing that would suit their purposes and so forth but that failed to convince. If anything they will surely have to get a censored version.

There was an accident of some sort in the after pump room last night, they got a lot of water in there and also put the doppler sonar electronics out of action for good.

We watched a CBC TV show, an hour on the Northwest Passage, by Norman DePoe, which had a mixed reaction. It was pro-Canadian and some extravagant statements were made. Stan's name was misspelled and also he was misquoted by Norman, which did not help matters.

My cold gave me a hard time this night. What with it and the blasting of our fog horn every two minutes it was difficult to sleep.

--oo0oo--

Esso

HUMBLE OIL & REFINING COMPANY

Media Relations

30 Rockefeller Plaza, N.Y.C. 10020

WR4-3620 (Bleu Beathard)

November 10, 1969

VOYAGE OF THE MANHATTAN

The climax of one of the biggest oil industry stories of the year occurred in the late evening of Sunday, Sept. 14. It was then that the SS *Manhattan* broke through the fog and ice of Prince of Wales Strait into the Amundsen Gulf, becoming the first commercial ship in history to traverse the famed Northwest Passage.

On Wednesday of this week (Nov. 12), the giant ship will arrive at the Port of New York, completing one of the most adventurous and expensive voyages in history.

Motivation for the venture was born in 1968 when Humble Oil & Refining Company and Atlantic Richfield Company, in partnership, discovered on Alaska's North Slope what is probably the world's most inaccessible oil field.

As subsequent wells more clearly defined the reservoir and its great potential, the inevitable question arose:

How best can this petroleum be moved to market, particularly to the East Coast of the U.S. and its population centers?

From a study of transportation alternatives--including various potential pipeline and shipping routes--came the reconsideration of a 500-year dream: Using modern technology, could the famed Northwest Passage be opened as a commercial year-round trade route? Was it possible for giant tankers to move oil from the Prudhoe Bay area of Alaska through the Arctic ice to the Atlantic?

After examining all available information, Humble felt it was feasible to think in terms of a large, powerful ship operating in the Arctic on a year-round basis. Humble subsequently decided to launch the approximately \$40 million tanker test. Atlantic Richfield and BP Oil Corp. agreed to contribute \$2 million each in return for access to the test results.

The first step was to find a suitable ship. Humble surveyed the world tanker fleet and selected the SS *Manhattan* as the best equipped Arctic test vehicle available.

Built in 1962, the *Manhattan* is the largest merchant ship ever to fly the American flag. Her 43,000 shaft horsepower plant is nearly one and a half times more powerful than those on ships twice her size. The *Manhattan* also has twin propellers, making her more maneuverable and safer. Because of these and other design features, Humble chartered the ship from Seatrain Lines, Inc., for refitting as the world's largest icebreaking tanker.

No single shipyard in the country could complete all of the modifications in time for a 1969 sailing, so the *Manhattan* was sent to a yard in Chester, Pa., and sliced neatly into four segments. The stern and bow remained in Pennsylvania, the midship section--which includes the navigating bridge--was towed to Mobile, Ala., and the forward section moved to Newport News, Va. Construction also began on an entirely new icebreaking bow at Bath, Maine. Some Humble task force members pointed out that the *Manhattan* was the longest ship in the world--stretching from Maine to Alabama.

Modifications proved extensive, resulting in a shipbuilding effort that had not been seen since World War II. More than 4,000 shipyard personnel strengthened the ship internally with steel braces and added a second "insurance" hull around the engine room. They toughened the outside of the vessel with an ice belt and added extra strong propellers and propeller shafts and ice deflectors for the twin rudders.

Designers utilized model test data in developing the new icebreaking bow. It operates on the downbreaking principle, moving the ship onto the ice at an 18-degree angle and increasing to a maximum of 30 degrees. The weight of the ship finally forces the ice down until it breaks.

To overcome the notorious Arctic radio blackouts, a communications network was installed that is effectively 500 times more powerful than that normally found on commercial ships. The *Manhattan's* navigation system uses radio signals from four earth satellites placed in polar orbit as part of the U.S. Navy's Navigation Satellite System program. When a satellite drops below the horizon, sonar takes over.

As segments of the *Manhattan* returned to the Pennsylvania shipyard, Humble's marine staff began assembling supplies.

The *Manhattan's* fuel order of 184,000 barrels of bunker oil went into the record books as the largest in commercial marine history.

A partial list of provisions for the voyage included 5,600 quarts of fresh milk, 51,000 pounds of meat, 70,000 pounds of canned and dried food, 40,000 pounds of fresh fruits and vegetables, and 51,000 fresh eggs. They even loaded 300 watermelons on board. Stores include 4,800 bars of soap,

1,500 light bulbs, jogging machines, a putting green, a portable X-ray machine, 100 full length movies, and three ice makers. All told, 8,000 different store items were loaded.

As the *Manhattan* steamed down the Delaware River, through Chesapeake Bay, and into the Atlantic on Aug. 26, her voyage plan was clear. At a maximum speed of 16 knots, Captain Roger Steward set course toward Newfoundland with a scheduled stop in Halifax, Nova Scotia, Aug. 28.

After a few hours visit, the *Manhattan* weighed anchor, steamed into the Gulf of St. Lawrence, and through the Strait of Belle Isle into the frigid Labrador Sea.

Moving along the west coast of Greenland, lookouts kept a watchful eye, for this was iceberg country.

As the *Manhattan* continued north, she was joined by the U.S. and Canadian icebreakers, *Northwind* and *Sir John A. Macdonald*. The *Macdonald* accompanied the *Manhattan* on all of her voyage, doing research work of its own.

The world's largest icebreaker began the job she was designed for as she pointed her bow into an extensive ice pack in Baffin Bay. At Thule, Greenland, the *Manhattan* dropped anchor, completing the first leg of her planned 8,800-mile, round-trip voyage.

In Lancaster Sound, historic entrance to the Northwest Passage, the going was easy, and crew members watched schools of Beluga whales frolicking in the icy waters.

The huge tanker stopped in the ice in Viscount Melville Sound to allow research parties to go out on the frozen waterway to bore for ice samples and take depth soundings. The most difficult part of the voyage lay ahead in McClure Strait where the *Manhattan* moved through nearly solid coverage of extremely hard 6 to 14 feet thick ice.

After becoming stuck several times in a huge ice floe, the project leaders decided to turn back into Viscount Melville Sound, and take the more southerly route through the passage via Prince of Wales Strait.

On the night of Sept. 14, the *Manhattan* slipped quietly into the frigid waters of Amundsen Gulf. From there, it was easy sailing to Pt. Barrow, Alaska, final destination on the east-to-west segment of the two and one-half month round-trip.

Although the great dream of a new trade route has moved closer to reality with the return of the *Manhattan*, the \$40 million gamble has yet to prove itself. The voyage showed that moving commerce through the Northwest

Passage is possible, but the economic feasibility of doing it--the dollar and cents practicality--will not be known until after the mass of technical data obtained during the voyage is analyzed. This will be done sometime in early 1970.

Should the *Manhattan* prove the practicality of this Arctic trade route, the ultimate effects may be almost unlimited. Humble hopes to be able to use the passage to open up the East Coast market of the United States for Arctic oil.

Not the least of the beneficiaries from such a development would be the U.S. shipbuilding industry. If the passage is opened, larger and more sophisticated ships will be built using the data gathered on this project. Ships of about the 250,000 deadweight ton class could make the round trip in approximately 35 days. The industry would need one ship for every 50,000 barrels per day it decided to transport to the East Coast by way of the Northwest Passage.

Turning to the broader implications of Arctic oil, one essential fact is that the Alaskan finds will have a beneficial impact on the national security of the United States, because it could provide a greater independence from foreign oil if this became necessary.

But there is more to the project than oil. An open Northwest Passage means not merely an oil route, but an international trade route that would have a profound influence on the rate of Arctic development and the patterns of worldwide trade. It would mean the fulfillment of the need felt centuries ago for a shorter and more direct route from Europe to the Far East.

There is a point on the north shore of Banks Island, some 500 miles east of Prudhoe Bay, which is roughly equidistant from the cities of New York, London and Tokyo. With this central position, the Northwest Passage could become the catalyst which opens up the resources of far northern Alaska and Canada to the world.

The mining industries of the Arctic are still in the infancy stage, primarily due to the transportation problems. But there is great mineral wealth there--so great that it is called the "waiting wealth." It awaits--so to speak--the breaking of the ice.

Seldom has the initiative and enterprise of the petroleum industry been more clearly defined than in this great plan to overcome a bitterly hostile Arctic environment, travel across the top of the world and create a new trade route between East and West. The risky scientific venture is yet another example of why oil is referred to as one of America's great risk industries.

Much analysis still needs to be done before it can be determined if this risk will resolve itself successfully--if indeed the Northwest Passage is feasible as a year-round trade route.

“Whatever the consequence of her voyage,” a Humble spokesman said, “the *Manhattan*'s findings will add immeasurably to our knowledge of the world in which we live.”

--oo0oo--

T.C. Pullen, Northern Associates Registered Report to the Canadian Hydrographic Service, Marine Sciences Branch, Department of Energy, Mines and Resources, “The Northwest Passage Voyage of the S.S. *Manhattan*, 1969.

NORTHERN ASSOCIATES REGISTERED

Report to

THE CANADIAN HYDROGRAPHIC SERVICE
MARINE SCIENCES BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES

on

THE NORTHWEST PASSAGE VOYAGE OF
THE S.S. MANHATTAN

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C O N T E N T S

Contents
Introduction
Background to the Arctic Tanker Test
The Ship - - S. S. Manhattan
The Westbound Route
The Eastbound Route
Ice Conditions Encountered (with Track Charts & Ice Data)
Very Large Ships Navigating in Ice
Role of Icebreakers
Remarks on Navigation
Navigation Equipment in Manhattan
Charts used during the Voyage
Notes on the Litton Satellite Navigation System
Radar
Echo Sounders
Imagery
Navigational Near-Miss
Chart Notes
Pressure
Damage Sustained by the Manhattan
The Ultimate Ship for the Trade
Traffic Densities
Photographs.

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INTRODUCTION

This report covers the Northwest Passage achievement of Humble Oil and Refining Company's icebreaking tanker the S. S. Manhattan.

The voyage started August 25, 1969, when the ship took her departure from the Delaware Capes, and ended when she entered New York Harbour November 12, 1969, eighty days later. During this period she had steamed as far west as Point Barrow, Alaska, and travelled nearly 12,000 miles in the process.

The following table may help to put the achievement of the Northwest Passage into focus historically:

<u>SHIP</u>	<u>YEAR</u>	<u>ROUTE</u>
<i>Gjoa</i> (Amundsen) Norway	1903-1906	Coastal W
<i>St. Roch</i> (Larsen) Canada	1940	Coastal E
<i>St. Roch</i> (Larsen) Canada	1944	Parry Channel W
<i>Labrador</i> (Robertson) Canada	1954	Parry Channel W
<i>Storis</i> (Wood) U.S.A.	1957	Coastal E
<i>Spar</i> (Crewing) U.S.A.	1957	Coastal E
<i>Bramble</i> (Carter) U.S.A.	1957	Coastal E
<i>Nautilus</i> * (Anderson) U.S.A.	1958	Arctic Ocean
<i>Skate</i> * (Calvert) U.S.A.	1958	Parry Channel
<i>John A. Macdonald</i> (Fournier) Canada		1967 Coastal W
<i>Northwind</i> (McCann) U.S.A.	1969	Coastal E
<i>Northwind</i> (McCann) U.S.A.	1969	Coastal W
<i>Manhattan</i> (Steward) U.S.A.	1969	Parry Channel W
<i>Manhattan</i> (Steward) U.S.A.	1969	Parry Channel E
<i>Staten Island</i> (Walsh) U.S.A.	1969	Parry Channel E
<i>John A. Macdonald</i> (Fournier) Canada		1969 Parry Channel W
<i>John A. Macdonald</i> (Fournier) Canada		1969 Parry Channel E

* - Nuclear submarine.

In all 17 transits by 12 ships. W = Westbound and E = Eastbound. Parry Channel is made up of Lancaster Sound, Barrow Strait, Viscount Melville Sound and Prince of Wales Strait. No Northwest Passage, other than by submarine, has been made through M'Clure Strait. There are variations of

the coastal route, via Peel Sound, Bellot Strait, James Ross Strait or Victoria Passage.

Until 1969 the largest ship to complete the Passage had been the John A. Macdonald, of 8,000 tons. Manhattan's displacement was 155,000 tons. She was the first commercial vessel of significance to achieve the feat. She shared the honour of completing the passage in both directions in a single season with the icebreakers John A. Macdonald and Northwind.

Manhattan demonstrated that:

a) Giant ships can be the means of moving bulk cargoes out of the Arctic. In certain areas, year-round operations would seem assured now, e.g. the Pond Inlet, Milne Inlet access to the Mary River iron ore project.

b) Such vessels, suitably designed and operated for ice navigation, would have to be their own icebreakers. Manhattan demonstrated that giant ships must be capable of proceeding on their own in ice without icebreaker escort.

c) Icebreakers will never break ice in the grain of (ahead of) giant ships for obvious reasons. The role of the former will surely be changed by the appearance on the scene of such big ships, a subject which is dealt with in the body of this report.

d) The bigger the bulk carrier, the better she will be as an icebreaker. Mass and momentum are truly effective in ice. A deadweight tonnage of 225,000 would be more than twice as effective as Manhattan was at half that figure.

e) To succeed, giant ships will require very much more strength and propulsive power (ahead and astern) than their more conventional brethren. They will also require such features as a heeling (rolling) capability, helicopter deck, two radars, two depth finders, ahead-looking sonar if such a device is practicable in ice, plus protection for rudder(s) and strengthened propellers.

f) The further west a ship proceeds in Parry Channel the more difficult become the ice conditions and the greater the risks from uncharted shoals. As far west as Resolute Bay the sea ice is predominantly First-year and the waters, by Arctic standards, are well charted. But to the westward of that location the ice is, for the most part, Multiyear in character and therefore much more difficult to negotiate. The waters there are not well charted, in some areas not at all.

g) Icebreakers much larger and very much more powerful than the Canadian Coast Guard's latest vessel of that type, the Louis S. St-Laurent, will be required. Such vessels would not provide escort, because this is impracticable and unsafe. Instead they will lend assistance to giant ships on those occasions when the latter encounter particularly difficult conditions and another ship is required to loosen the pack ice in their vicinities.

h) Giant ships will probably not escort one another, partly because such a tactic creates scheduling problems at loading terminals - - this is certainly the case with tankers working in and out of the North Slope of Alaska - - and partly because of the very real reluctance of ship's masters to manoeuvre their vessels in ice in the near vicinity of each other.

i) Governments will need to establish requirements for ship design (ice strengthening and power), navigational aids, professional competence of bridge personnel etc. This, hopefully, should lead to co-ordination between regulatory bodies in Canada and the United States in the interests of a common standard.

j) The threat of oil pollution from modern, well manned, ice strengthened tankers of the type envisaged for this trade has been exaggerated. While nobody would cavil at the consequences of such an event, the probability of its happening from ice damage is negligible.

k) The risk of damage to ships in the Arctic comes not from ice but from running aground in uncharted waters. Hopefully a sustained programme of surveying will eventually reduce, if not remove, this risk. The larger the ship the greater the draft. A draft of 85 feet, envisaged for the tankers, does indeed increase the risk. Until the entire passage has been surveyed it may be necessary to route such ships along pre-determined paths.

This is not a technical report but instead contains the observations and opinions of the writer who was on board for the entire operation.

[Signed: T.C. Pullen]
for NORTHERN ASSOCIATES
REGISTERED
T. C. Pullen

Ottawa, Ontario.
March 1970.

BACKGROUND TO THE ARCTIC TANKER TEST

The discovery in 1968 of oil at Prudhoe Bay, on Alaska's North Slope, occurred at a time when it was known that oil production in the United States (lower 48) would reach a peak in the early 70's and then decline. Because of the very timely Prudhoe Bay strike, total U.S. oil resources will now be able to match demands. The problem is to move North Slope crude to market economically and this is especially important when it is realized how high are production costs in that part of the world. For instance, drilling costs in Alaska are \$142.00 per foot compared with \$13.00 a foot in the oil producing states in the lower 48.

When production starts the quantity of oil to be moved will, it is estimated, start out at 400,000 barrels a day rising, by 1980, to two million a day. This latter figure is more than the entire consumption west of the Rockies as of now and most of the oil for that area is already being produced locally, notably in California. So the transportation requirement, then, is to move the bulk of the North Slope oil to the eastern United States.

Numerous alternatives were examined. Ordinary highways were discounted almost at once. Terrain and high volumes made this approach uneconomical. An extension of the Alaskan railroad from Fairbanks to the north could not handle the volume of oil either. The most economical way of getting it to the southern shore of Alaska would be by pipeline. Tankers around Cape Horn were considered but again the costs were prohibitive, even using the largest size tankers. The Panama Canal was considered but the existing canal can only accommodate 50,000 ton tankers and once again this approach was not economical. A new sea level canal across the Isthmus would be more interesting but there were no assurances such a canal would be built nor when. Even so, Panama represents a long slow 9,000 mile journey from Prudhoe Bay to the U.S. East Coast. Pipelines across Panama and Mexico into the southwestward United States were also considered but dismissed as impracticable.

Eventually the choice was narrowed to two basic alternatives, viz., a pipeline 48 inches in diameter across the northern part of North America or tankers through the Northwest Passage. The pipeline route could be direct across Canada or, alternatively, across Alaska to Valdez, thence by tanker to Oregon or Washington, and finally by 48 inch pipeline to the East Coast.

Humble Oil estimated that, if a large volume developed, the cost of moving oil to the U. S. East Coast by trans-continental pipeline system would

be about 60¢ a barrel more than by tankers. Sixty cents a barrel potential savings amounts to a lot of money over the years. Hence the decision to embark on an Arctic Tanker Test to see if such a solution would be feasible.

There have been those who advocate submarine tankers to pass through the Northwest Passage but they would be very much more costly than surface icebreaking tankers even if submarines could operate in the shallow waters of the western Arctic. Icebreaking tankers could be available for service in a couple of years but a very much longer time would be required to develop nuclear-propelled submarine tankers.

If specially-built tankers could operate year-round through the Northwest Passage, it would also be possible for them to work through the Bering Strait and into the Pacific, though possibly not for more than nine months of the year in view of the severe ice congestion there in late winter.

The next step was to locate a suitable tanker for such an ambitious test and convert her into an icebreaker in the time available.

THE SHIP -- S.S. MANHATTAN

It was in July, 1968, that Humble Oil's Task Force started work on the marine solution to the movement of oil from the North Slope through the Northwest Passage.

The search for a suitable vessel included an examination of the Esso Malaysia, 190,000 tons deadweight and 30,000 S.H.P. But she was discarded as a contender because for her size she was underpowered. The Esso Gettysburg was considered, but rejected as too small. MANHATTAN was the final choice and she was chartered from the Manhattan Tanker Corporation, a Pack & Kahn subsidiary. She had a suitable power to beam ratio, something the task force was searching for, one similar to the C.C.G.S. Louis S. St-Laurent. Also she had twin rudders and screws, an essential requirement in the event of ice damage. She was also an exceptionally strong ship having been built in the U.S. when the technique of building giant tankers was still in its early stages.

Built by Bethlehem Steel Corporation at Quincy, Mass., she was launched in December, 1961 and completed the following year. Displacing 115,000 tons deadweight, Manhattan is capable of carrying 36 million gallons of crude oil. Even before her conversion she was stronger, bigger and more powerful than any ship of its type in the world. She was, and is, the largest merchant ship ever to fly the American flag, the largest commercial ship ever

constructed in the U.S. and one of the largest commercial ships in the world. She is 51 feet longer than the Queen Elizabeth 11. Her propulsion plant (43,000 shaft horse power) is more powerful than those installed in ships twice her size. In every way Manhattan appeared to be the ideal ship for the Task Force's purpose.

To meet the deadline of a 1969 Arctic Tanker Test, it became necessary to cut the ship into four sections. This was accomplished at Sun Shipbuilding & Dry Dock Company in Chester, Pennsylvania, the prime contractor. Remaining at the Sun yard was the stern section and the discarded bow. A portion of the new icebreaking bow was also fabricated at Sun. The forward part of the icebreaking bow was built in Bath, Maine. The forward section of the ship, including Number 1 cargo tank, was towed to Newport News, Virginia, to be fitted with a heavy ice belt. The midship body was towed to the Alabama Shipbuilding & Dry Dock Company at Mobile, Alabama where it too was fitted with an ice belt and internal stiffening.

To complete the conversion in the time frame available the ship was cut into sections as already mentioned. When the time came to rejoin these there were some alignment problems. It was reported there was a discontinuity along the bottom where the new icebreaking bow met the forward section of the ship, the one which had been taken to Alabama. If this was so it did not appear to effect the strength of the ship nor her performance.

Principal Characteristics of Manhattan:

	<u>As Built</u>	<u>Icebreaking Tanker</u>
Length Overall	940'-6"	1005'-6"
Breadth	132'	148'
Depth	67'-6"	67'-6"
Draft - Summer Freeboard	50'-4½"	52'-0"
Shaft Horse Power	43,000	43,000
Nominal Speed (Knots)	17.75	16.5
Complement	60	126

The following organizations contributed to the engineering aspect of the ship's conversion:

- Esso International
- Gibbs & Cox, Naval Architects.
- German & Milne, Naval Architects.
- Consultec.

The U.S. Coast Guard.
The U.S. Maritime Commission.
Wartsila of Finland.
J. J. Henry of Philadelphia.
Lloyds Classification Society, London.
Sun Shipbuilding & Dry Dock Company.
Newport News Shipbuilding Company.

Excluding naval dry docks there were only two dry docks in the United States capable of handling the Manhattan, at Newport News and at Chester, Pa. in Sun's yard. It was in the latter that the ship was docked.

The portion of the icebreaking bow built at Bath, Me., required 800 tons of steel and that in Chester, Pa., 1,600 tons. Altogether, something like 11,000 tons of extra steel went into the conversion, enough to build a T-2 tanker. Of interest is the fact that in the original construction of the ship, as much steel went into her as is now used to build 250,000 tonners in Europe.

The following additions and changes were made to the vessel during her conversion:

New Icebreaking Bow. Humble Oil undertook exhaustive tests to determine the most efficient bow design. The result was adoption of the downward breaking White bow, the product of joint research by the U.S. Coast Guard and the Massachusetts Institute of Technology. The actual bow fitted to the ship (see drawing accompanying this Section) was fabricated from high-tensile steel with immensely strong framing and bracing behind it. Despite the battering and abuse to which it was subjected during the voyage in ice it emerged unscathed.

Ice Belt. This, too, was fabricated from high-tensile steel and ran the length of the ship on both sides to protect the hull from ice pressure. At its top it extended outward from the ship's side a distance of 9 feet, tapering inwards at its bottom to a foot and a half. Sixteen feet high, it was so placed as to be 8 feet above and 8 feet below the load waterline.

Machinery Collision Chocks. Considered necessary for a ship destined for ice operations with attendant bumping, pounding and sudden changes of direction. Boiler feet and other major machinery items were so protected. In fact the ship really did not behave as violently as expected because of her tremendous mass and such chocking may not have been necessary.

Ice-strengthened Propellers. Twenty-three feet in diameter, each weighing more than 35 tons, the two propellers were especially made of high quality materials (superstone or better). Five bladed they had thickened roots to provide additional protection against ice damage. Being 5 bladed also helped to prevent ice from becoming entrapped between the blades as can happen more easily with 4 and 3 bladed screws. The space between the hull and the propeller tips at the closest point of travel was 7 feet which also helped to prevent ice jams. See drawing accompanying this section.

Re-inforced Hull in the Engine Room. Manhattan's engine room is an enormous compartment and the risk of her shell plating being ripped open by ice permitting the space to flood could not be accepted. Accordingly, an inner skin was welded to the frames throughout. As matters turned out there was no puncturing of the plating. The void between the inner and outer skins, now completely inaccessible would seem to be a breeding ground for uncontrolled corrosion.

Ice Horns. Fitted above and abaft both rudders to protect them from ice, especially when moving astern. Orders on the bridge forbade moving the rudders at all when backing down. There was even a restriction on the amount they could be moved when steaming ahead in ice which imposed a serious limitation on the ship's ability to manoeuver. This restriction eventually had to be lifted but there were no serious consequences for so doing. See diagram accompanying this section.

Rudders. Twin spade rudders as originally built into the ship. The only change made here was to double the rudder plating. Concern had been felt about the vulnerability of these rudders to ice damage, especially as they were unsupported at their lower extremities. See diagram accompanying this section.

Tail Shafts. It was impossible to enlarge the diameter of these so new material was used to double the strength factor.

Internal Stiffening. To provide added strength against crushing from ice, internal stiffening was fitted in the wing tanks. These members were fashioned from steel nearly one inch thick and the resulting box girders, "K" shaped, provided more resistance to ice pressure than would seem to be required in the Arctic. The ship was really over-engineered for that environment.

Sheer coupling. A steam turbine propulsion plant, with its associated gearing, is susceptible to crippling damage should a propeller stop suddenly on account of an ice jam. Sheer couplings were installed in the tail shafting designed to fail below the yield point of the gearing.

Propeller Struts. The strength of these was increased five fold.

Helicopter Fuel. One of the ship's six settling tanks was converted for use as a fuel tank (JP-5) for the ship's helicopters. The tank was located aft.

Sea Bays. The aftermost wing tanks, port and starboard, (#15) were converted for this use.

Closed Circuit Television. Cameras were installed on brackets, one forward to monitor ice conditions at the stem and one aft to monitor ice passing under the quarter. The display was located in the wheelhouse where either remote camera could be viewed. For a ship the size of the Manhattan such a capability is important.

Helicopter Deck. Located immediately abaft the funnel this large deck could accommodate two S-62 helicopters.

Additional features included:

Increase in accommodation from 52 to 126.

Dark room

Laundry equipment

Two additional lifeboats

Insulation of exposed piping

Automatic telephone equipment

Mercury vapour lights in the bow

Searchlights on the upper bridge

Single Sideband Radio

Additional radar, echo sounder and gyro

Ice Laboratory and Ice Testing Equipment

Extensive instrumentation for test purposes

Machinery Monitoring

De-icing equipment

Satellite Navigational Equipment

Doppler Sonar.

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THE WESTBOUND ROUTE

Cabot Strait and a day later, through the Strait of Belle Isle, when course was altered to the north for the long run up the Labrador Sea. At noon, August 30, the ship's position was 53° 14' North, 55° 21' West and she was making good 16½ knots.

The C.C.G.S. John A. Macdonald (Captain P.M. Fournier) joined at 11.00 p.m. (010400Z) August 31 due east of Frobisher Bay in position 61° 50' North, 57° 45' West. Thereafter she remained in company throughout the voyage and her services were essential to the success of the voyage.

The plan was to favour the Greenland side of Baffin Bay to take advantage of open water there although most of the Bay was by then virtually ice free.

For the balance of the westbound leg of the voyage the appropriate map which forms part of the report should be consulted. Shown thereon are the ice conditions encountered and a daily position of the ship. The notation that the tanker was anchored off Resolute Bay on September 6 is incorrect. In fact she lay stopped while visitors came and went.

Noon on September 7 found Manhattan passing south of Lowther Island and north of Young Island bound for Winter Harbour 240 miles to the westward. At this time the Master asked the writer to indicate where he should become concerned about uncharted waters. He was advised that once west of the meridian of 100° west longitude she would be in uncharted waters if he continued along his present track. Undeterred by this, he proceeded to lay off a course (on Chart #7056) which took his ship from her position north of Young Island direct to Winter Harbour. Most of it put Manhattan in unsounded waters and, in fact, saw her pass close to the southward of the 20 fathom (36m6) sounding on chart #7056 which lies 27 miles south-southeastwards of Cape Gillman on Byam Martin Island. The writer checked the depths recorded onboard at the time the ship was in the vicinity of this particular area but found nothing to indicate shoal water.

It was explained to the Master that he was taking his ship through unsounded waters but by altering course to the north, he could be in soundings. He elected to carry on.

In any event the run across Viscount Melville Sound to Melville Island was accomplished without incident.

Once Manhattan had passed south of Nelson Griffiths Point on Melville Island she encountered increasingly heavier ice conditions and directed her course southwestwards to the entrance to Prince of Wales Strait, off which she

arrived late on September 10. It was on this day that the decision was made to investigate the ice conditions in M'Clure Strait to see if it might be possible to get through and pass westward around Banks Island to Sachs Harbour. This would have represented a 'first' for the ship and there was marked enthusiasm for this. Its more likely that a successful transit of M'Clure Strait would demonstrate the practicability of tankers being able to use that route and thus not be beholden to Canada, as it were, by being obliged to take the Prince of Wales Strait alternative which would put them into waters of unquestioned Canadian ownership.

But this attempt failed, as is reported in greater detail in the Section Ice Conditions Encountered, and the tanker had, after all, to retreat and pass down Prince of Wales Strait to arrive off Sachs Harbour September 15. Because of her draft (55 feet) the ship anchored five miles off the land in 27 fathoms.

From Sachs Harbour course was shaped for Cape Bathurst to the southwest, thence westerly towards Barter Island. On the diagram a slight jink in the ship's track 60 miles northeast of Pullen Island marks the location of the only known navigational near-miss the ship experienced, which is described in more detail elsewhere in this report.

The alteration of course to the north off Herschel Island was to seek ice for test purposes in which the ship stopped while men went out onto the floes in search of data.

The remainder of the passage to Point Barrow with brief stops of Barter Island and Prudhoe Bay was direct and without incident.

THE EASTBOUND ROUTE

Manhattan set forth from Point Barrow September 22 with an additional icebreaker, the U.S.C.G.C. Staten Island (Captain E. Walsh) to join with the John A. Macdonald for the eastbound part of the voyage. That portion of the leg along the Alaskan coast was uneventful, direct and in open water or, at worst, scattered floes. The Summary of Ice Conditions Eastbound which forms part of the report should be consulted for details of the conditions encountered and the route adopted.

The start of this Eastward movement was marked by the first appearance of Aurora Borealis. The temperatures were dropping to the low twenties and grease ice was forming over the open water, clear evidence of the approach of freeze-up.

Digressions in the track of Mackenzie Bay September 24/25 show the area where Manhattan got into difficulties in heavy ice, made more difficult because of six inches of snow. This was a place where the lesson that the longest way round is often the quickest way home was impressed on some of the tanker's watchkeeping officers. This is reported in more detail under ICE CONDITIONS ENCOUNTERED.

Once clear of this heavy ice, course was shaped for Sachs Harbour thence into Prince of Wales Strait and into Viscount Melville Sound for a month's peregrinations by Manhattan in search of test data.

Much of this is shown on the Summary. October 9 and 10 saw the tanker probing south into the unsounded waters of the Sound in the direction of Stefansson Island. Concern at being unable to collect sounding information in this area was offset by the knowledge that the Macdonald, in the vicinity, was fulfilling this important function.

The tracking, and back-tracking, south of Bathurst Island was a combination of activities relating to tests on ice island fragments northwest of Lowther Island and searches for suitable ice floes.

October 28 saw the ship lying off Beechey Island for the purpose of depositing a document, recording the tanker's achievements, in the Franklin Cairn there. Originally it had been announced that the ship would lie to off the entrance to Erebus Bay, in the event she hove to about three miles or more to seaward adding considerably to the flying effort required to get people ashore and back.

The jink in the track off Erebus Bay was to take the ship towards Resolute to hasten recovery of her helicopter sent there for mail and returning in growing darkness.

The eastward track through Lancaster Sound requires no comment except the irregularity off Navy Board Inlet. An attempt was made to enter the Inlet but was prevented by heavy ice plugging the entrance.

Southward in Baffin Bay in open water, the only diversion taking place on November 1 when the ship attempted, without success, to carry out trials using the Raydist equipment by placing it on an iceberg. By this time the ship was clear of sea ice completely.

ICE CONDITIONS ENCOUNTERED

The Meteorological Branch, Department of Transport, had an ice observer on board Manhattan throughout the voyage. His ice observations, together with those compiled by the ice observers in the long range fixed wing ice

reconnaissance aircraft, resulted in a detailed report of ice conditions encountered throughout the voyage. While the data are all shown, the way they are depicted does not make for easy comprehension.

Accordingly, these data have been taken and displayed here in graphic form on two diagrams. The first is for the westbound leg starting on September 2 in Davis Strait and ending off Point Barrow, Alaska, on September 20. The second depicts ice conditions for the eastbound leg starting from Point Barrow on September 21 and ending in Davis Strait on November 2.

Because of her activities in Viscount Melville Sound in October, while conducting ice tests, the ship's mean line of advance has had to be simplified but this should make little difference as the ice conditions shown were the same regardless of the ship's activities. The tanker's position is shown on the track each day so that progress through the Passage can be followed. The observed ice conditions are also shown together with a key to the ice symbols employed.

Delays in completing Manhattan's conversion resulted in her arriving at the entrance to Parry Channel at the easiest time of the year for ice navigation of those waters, viz. September 5. This was precisely what the sponsors of the test had toiled to avoid, hoping for a June/July test period but it could not be achieved because of shipyard delays. As a consequence suitable ice was not encountered until the ship reached the vicinity of Melville Island and M'Clure Strait and even then the ice was multi-year in nature, weathered and hummocked. Because it was impossible to find smooth, level ice, complete ice test data could not be collected and pointed the need for a second test voyage in April, 1970, when level ice could be assured.

The Westbound Chart shows a diversion to the westward northeast of Cape Dyer. This was to locate the remnants of the Baffin Bay pack so that ship's officers could experiment in easy ice conditions before becoming involved in serious icebreaking later on. As the chart shows, the ice that was attacked in that area on September 2 was a mixture of First Year ice 3 to 4½ feet thick, Second Year ice 6 to 8 feet thick and Multi Year ice 8 to 10 feet thick. Maximum ridging was 16 feet with the average height of ridges being 7 feet. All this ice was scattered with plenty of open water and it represented no real challenge to the ship. A few icebergs could also be seen in the vicinity.

The further north the ship steamed in Baffin Bay, making for Thule, Greenland, so did the number of icebergs met along the way increase. In the vicinity of Cape-York they were present in hundreds and at various stages no

point on the horizon was visible for bergs. It had been a matter of concern that manoeuvring a ship of Manhattan's size safely through waters so cluttered would be tricky if not actually dangerous. To assist the great ship in this, the John A. Macdonald was asked to precede the tanker and delineate a track for her to follow. This she did with skill and the larger vessel had no difficulty in following thanks, in very large measure, to her twin rudders. This agility was one of the first lessons learned in the voyage. Visibility conditions were excellent throughout but it would seem that iceberg littered Baffin Bay may not be the problem it had been expected to be even in low visibility.

That portion of the passage from Thule, across northern Baffin Bay, into Lancaster Sound and as far west as Resolute was accomplished in open water with only scattered strings of old ice which were easily avoided. But instead, some of these heavy specimens were attacked at speeds up to 15 knots, raising doubts in the minds of some as to the wisdom of such tactics. Multi-year floes weighing a thousand tons and standing 15 to 20 feet out of the sea were sundered by the ship rushing through the heavy mist in Lancaster Sound on her way to the west. No damage was reported which was proof of sorts that her icebreaking bow was indeed most strongly built.

The tanker's first besetment was not caused by the heaviness of the ice she was working in but because she unwisely attempted to alter course to go back to the assistance of the American Coast Guard icebreaker Northwind (Captain D. McCann) in difficulties some miles astern. Moving at slow speed the act of putting her rudders over robbed her of the power needed to keep moving and she came to a halt. The Macdonald, already having become stuck on the same errand, indicated at that time that she could assist the tanker or the Northwind but not both. This was the reason that the American was detached to return to the east while the Manhattan and the Macdonald continued to the west. The ice at the time was Multi-year moderately hummocked, with numerous melt pools and 6 to 7 feet thick. The tanker would, if she had continued steering a reasonably straight course, have continued to make good progress through this.

Much has been made of her difficulties on September 12 in M'Clure Strait where, after being stuck for 24 hours off Rodd Head on Banks Island, she retraced her steps to the east and continued by way of Prince of Wales Strait. The truth of the matter is that she blundered into a heavy floe nearly five miles in diameter where, after penetrating to its very centre, she stalled halfway through a weathered ridge 15 feet thick. Her situation is clearly

shown in the Sidelooking Airborne Radar (Slar) photograph which forms another part of this report.

It is fair to record that the westbound leg of Manhattan's voyage was largely a benefit for the world's press corps rather than for any serious ice testing. Achievement of the Northwest Passage was uppermost in people's minds and it has been said that Humble officials on board themselves fell under the spell of their own P.R. reports. At the very moment Manhattan was blundering into that floe her Master was below being questioned by the U.S. press as to his reaction at being the first man in history to go through M'Clure Strait westwards. He opined that he was 'underwhelmed' which brought an appreciative titter of approval from his audience.

At this stage of the voyage ship handlers on the tanker's bridge were not using the ship's helicopters for ice reconnaissance ahead of the ship, they were not interpreting the valuable information being offered by the excellent 16" DECCA radar display nor were they using their eyeballs and binoculars. If better use had been made of one or all of these aids the floe might, indeed should, have been skirted and the ship got deeper into the strait. On the other hand, it may have been a blessing in disguise that she got stuck there for ice conditions were reported by long range ice reconnaissance aircraft to be 9/10ths Multiyear floes at the entrance to M'Clure 160 miles to the west. If she had got that far, and into difficulties, her predicament would have been much more severe and the cause of embarrassment, if not danger, to the two ships. This besetment was what was needed to open the eyes of all bridge personnel to the need for alertness to use all available sources of information and to plan ahead. In their defence it has to be remembered that officers in the tanker trade have steamed between points A and B for so many years that it is almost impossible for them to think of the shortest way home not being the quickest or easiest way there. But in time they did hoist in this lesson and the 'Rodd Head incident' was the start.

So heavy was the ice, so thoroughly was Manhattan stuck and so bad were conditions for the Macdonald, that at one stage the latter turned around and preparations were put in hand to tow the tanker out backwards. There did not seem to be any alternative. Such a course of action was more than the Americans could stomach and so special plans were made to divert every available pound of steam pressure into the main engines for one mighty attempt to break out ahead. The open water and easy ice conditions were found to be two miles or so away and the ice in the floe appeared to be thinner if only the ship could get through the ridge which had been her

downfall. But success required the Macdonald to break the ice beside the tanker as far forward as her bridge thus releasing the grip of the floe on the ship's sides and enabling her to back up. In this way she would be able to get sufficient room to gather headway for an attack on the unbroken ice ahead with sufficient momentum to carry her right through and into easier conditions just beyond.

The Master of the Macdonald (Captain P. M. Fournier) had made it clear that his ship was operating beyond the limit of her designed capabilities and he was concerned at the risk of damage, especially to his propellers. A prophetic assessment as subsequent events showed. None the less, success or failure of the whole tanker test seemed to hinge on that little ship's ability to break the ice beside the tanker releasing her to deploy her own power. Here was a typical example of Macdonald's contribution, one which was vital to success. There were, by actual count, 24 more occasions when that ship was needed to release the tanker from the ice. On the other hand, once she was moving, there has never been an icebreaker as impressive as the Manhattan. The two ships worked together as a team, each being essential to the success of the other, a point that seems to have been lost in claims and counter-claims in the press on both sides of the border.

The Macdonald succeeded in her role and the tanker, having deployed all the power she was capable of generating, charged to and fro. After 45 minutes of this backing and ramming the great vessel broke free of the ridge, through the remainder of the imprisoning floe and so into open water.

The easterly leg to the entrance to Prince of Wales Strait was easily negotiated. In the northern part of the strait heavy ice was met with but, after a couple of temporary besetments in ice 8 feet thick, open water was reached in the vicinity of the Princess Royal Islands and thereafter it was plain sailing all the way to Point Barrow.

On September 21 Manhattan, accompanied by the Macdonald and the U.S.C.G.C. Staten Island (Captain F. Walsh), was eastbound in light ice conditions as depicted on the chart showing conditions on the Eastbound portion of the voyage.

Three days later, while pursuing a more southerly route than had been taken when westbound, the ships encountered thicker ice off Mackenzie Bay. Multi-year floes, 6 to 10 feet thick, 2 to 3/10th ridged and rafted with 10/10ths snow cover made for heavy going. Here was a requirement for advance planning and careful conning to avoid the heaviest floes and to seek the easiest, if longest, way around the ice.

On one occasion Manhattan became stuck in a large floe and was released by the Macdonald after nearly 10 hours of unremitting endeavour. No sooner had the bigger ship slid into open water between the floe from which she had just been extricated and another even more formidable one, than her conning officer advanced into the second one. It was possible to stop this headlong dash before it was too late and back the ship once more into the intervening open water. From there she was turned at rest and headed south until easier conditions were located permitting her to make some easting in good conditions. Here was another instance of the A to B syndrome which obsessed the tanker officers. It was during this difficult period, where heavy snow cover turned the ice into a heavy sludgy consistency making it even more difficult to keep the ships moving. To encourage better shiphandling the writer and his U.S. Coast Guard colleague were asked to stand bridge watches instructing the staff captains in the art of ice navigation. An unwelcome task, as such assistance was akin to a vote of non-confidence in their ability on the part of the Mission Director.

The next ice of any note was met at the northern end of Prince of Wales Strait on September 27. This was a prelude to a month's activities in Viscount Melville Sound gathering test data. Attempts to locate ice of uniform thickness were unsuccessful and the Test Director had to settle for hummocked floes.

It was during this period that pancake ice, not more than ten inches in thickness, was encountered which stuck to the ship's side in an ever-increasing belt of sticky slush as the ship advanced into it. Ahead of the Manhattan was an ever-growing blob of this stuff which eventually brought her to a standstill. This gelatinous stuff, 10 feet wide on either side and several hundred feet ahead, held the vessel helpless yet it was seemingly so insignificant. Both the icebreakers had similar problems and it took half an hour before the Staten Island, followed soon after by the Macdonald, worked free and came to the assistance of the tanker. This phenomenon was of local significance for once the ships had struggled half a mile they came upon easier sailing conditions.

Also during this testing time, conclusions were tried with an ice island fragment. This particular piece was estimated to stand out of the sea 14 feet, draw 125 feet, was 250 feet by 430 feet in area and displace something in excess of 350, 000 tons. Manhattan approached on her first run at dead slow speed, a knot or so. The bow slid up onto the ice to the accompaniment of screeching sounds as metal and ice ground against each other. The forward momentum of the tanker was absorbed by the ice island fragment which

broke free from the encircling young ice and began to move away from the ship which, in her turn, came to a stop and gathered sternway. Further runs were made at 3 and 5 knots but with results which were not divulged to the writer. This information is, it is understood, together with all the other test data accumulated by Humble Oil being made available to the Department of Transport.

Sustained easterly winds drove quantities of ice into Lancaster Sound to greet the eastbound ships on October 29 and 30. By the time they were in the vicinity of Bylot Island, hoping to pass down Navy Board Inlet, a 30 knot westerly wind had packed heavy ice into its entrance forcing the ships to steam east into Baffin Bay.

It was during this period that the tanker inadvertently collided with an iceberg, albeit a small one as icebergs go but big enough to dwarf the ship. The conning officer, having spotted the iceberg to port, altered course so as to enter a heavy ice floe on his starboard bow. He misjudged this manoeuvre. Instead of entering it he hit it a glancing blow. Manhattan bounced off to port and, steaming at 8 knots, was inexorably committed to fall on the berg, by then close aboard. It seemed certain that severe damage would be inflicted on the bow of the ship. Impact caused a great roar of sound and a cascade of ice fragments fell onto the forecastle. So great were the forces involved that the tanker bounced back to starboard and the berg, apparently unmoved, passed very close down the port side. It was possible to put the rudders hard over to port to get the stern swinging out of danger before there was any risk to the propeller and rudder on that side. It is a tribute to the design and engineering of the icebreaking bow that it was quite undamaged, indeed there was no evidence at all of the collision, not even to the paintwork.

During this same period the ships passed the heaviest ice floe of the voyage. This must have been a visitor from the Lincoln Sea borne south by currents and west by winds into the Sound. Its surface stood 6 feet out of the water and the hummocks on it stood 10 to 12 feet above that. So formidable was this ice, nearly a square mile in area, that all ships steamed around it as though it were an island.

Once into Baffin Bay no ice of any significance was met and the ships were able to make easting and southing without difficulty.

VERY LARGE SHIPS NAVIGATING IN ICE

Much has been made of the difficulties experienced by Manhattan during her Northwest Passage voyage, in most cases by people who were not present and who were uninformed on the subject of ice navigation.

It is a fact that there were twenty-five occasions when the assistance of her escorting icebreakers was required to free her. While it is true the tanker would never have completed her voyage without icebreaker assistance, it is equally true that icebreakers, especially the John A. Macdonald, would never have made it either without the prodigious icebreaking performance staged by the Manhattan on their behalf. Each was essential to the success of the other.

Whether or not Manhattan became stuck in the ice, insofar as the aim of Arctic Tanker Test programme was concerned, was not particularly significant. Her role was to gather information on the performance of a large ship in Arctic ice. The data thus acquired were to be analyzed in an effort to establish whether giant ships, suitably designed and powered, could operate in that environment on a year-round basis. It was recognized by those familiar with the industry's plans that Manhattan herself was a half-scale model of the ultimate ship. While the world's press concentrated its attention on her difficulties, what really mattered was the relationship between ice types, ice thicknesses, horse power, bow design and performance of a particular test vehicle.

Because Manhattan did not enter the Northwest Passage until September, the easiest time of the year for ice navigation, she was frustrated in her efforts to locate ideal ice conditions for controlled experiments. There was no shortage of ice floes of various thicknesses. But to collect meaningful data it was essential to find a monolithic sheet of ice of uniform thickness. Such conditions do not exist in the Arctic at that time of the year. This, then, is the reason for the April 1970 voyage of the tanker, one which will take her into Eclipse Sound, an area where ideal conditions are known to exist. Humble Oil intends, therefore, to operate in Pond Inlet, Eclipse Sound, Navy Board Inlet and in Lancaster Sound as far west as Resolute Bay in addition to useful experience in negotiating the Baffin Bay pack en route.

The results of this second test will provide information essential to the company in concluding whether year-round navigation is possible and, if so, what size vessel must be built to do it, what type of icebreaking bow is needed and what sort of power is required to achieve success. When this stage has

been reached, Manhattan will have achieved her purpose, she is simply a means to an end.

But a great deal has been learned as a result of Manhattan's achievements in 1969, the impact of which will have a profound influence on the future of Arctic navigation and the ability to move bulk cargoes through the channels of the high Arctic. Not only has Manhattan proved that to date giant ships appear, by virtue of their size and momentum, to be the answer to Arctic ice but the role of icebreakers has been drastically altered, a subject covered elsewhere in this report.

Manhattan demonstrated that mass and momentum are key factors in breaking ice. She also showed that it is feasible to design and build a ship that can break a path through very heavy ice and emerge unscathed. It is possible to have a large vessel which cannot be damaged by ice if one is prepared to pay the price and Governments insist on suitable standards. There are two other factors which will make the difference between success and failure. One is adequate power and the other is the skill, experience, adaptability and professionalism of the men handling such vessels. On numerous occasions Manhattan stalled in ice because of inadequate power. It seemed to observers on her bridge that another 5 or 10,000 shaft horse power would have kept her moving. The ultimate ships for the trade would, of course, have a more favourable power to displacement ratio than she.

As to the second factor, professionalism in all its aspects, this is a matter which tends to be overlooked in the scramble to achieve technological success. No matter how powerful, how strong or how skilfully designed, the way the ship is handled will make the difference between success and failure. This was demonstrated repeatedly in the Manhattan. Earlier it was stated that she had to be broken free on 25 occasions. Many of those besetments were the product of inept shiphandling in that environment. Had better use been made of radars, helicopters and eyeballs, the ship could have avoided the really heavy ice and kept moving.

Manhattan had only 35% of her power, 14,000 SHP, in the astern mode and it seems probable that she got no more than 12,000. The point has already been made that her total power output was inadequate for the purpose. It is clear, therefore, that if a ship is driven into a heavy ice floe with 43,000 SHP and gets into difficulties, 12,000 SHP astern will not get her out. But not only did she have inadequate power ahead and astern, there was a 20 minute limitation on the use of her astern turbines.

After that period, overheating of the turbine blades made it mandatory to shut down, or use the ahead turbines for 45 minutes, before the astern turbines could be used again. This, too, created problems for those handling the ship in ice.

Manhattan as an Icebreaker. Her performance in ice can be assessed in several ways. What follows is an attempt to relate her behaviour in varying types of ice cover as seen from her bridge:

One to five/Tenths Ice Cover. These were the conditions met in Baffin Bay early in September and in the Beaufort Sea en route to Point Barrow. The ship had no difficulty in manoeuvring around this amount of ice, attributable almost entirely to the agility conferred by her twin screws and rudders. It had been a matter of concern that in Baffin Bay, where icebergs abound, she would have difficulty in maintaining speed and yet be certain of avoiding these menacing obstacles. This is of especial concern should there be fog. However, the aforementioned agility in manoeuvring enabled her to follow astern of the John A Macdonald, which was delineating a suitable track, with no difficulty. In low visibility unescorted bulk carriers, if they hope to maintain their schedule, cannot afford to heave-to until conditions improve. If they proceed unescorted under such circumstances they will have to match their ability to manoeuvre with a positive knowledge of what lies ahead. Here, again, is the need for good radars, and radar information properly interpreted and plotted.

Six to Eight Tenths Ice Cover - In these conditions a large ship must force a path no matter how manoeuvrable she may be. Manhattan was so strongly built that this sort of ice, of whatever hardness or thickness, was no obstacle to progress. Negotiating such ice calls for strength rather than power. In Lancaster Sound, at the start of the voyage, the ship steamed at 15 knots and deliberately attacked Multi-year floes weighing a thousand tons. This proved that strength in the bow and shoulders was a quality she had in abundance.

Nine to Ten/Tenths Ice Cover - As with all ships these are the most troublesome conditions. Given adequate strength and sufficient power a ship should find enough elbow room in nine/tenths ice to force a passage. Manhattan was able to advance through this type of

ice provided she did not blunder into a large floe in the process. The difference between the tanker and smaller ships is that she was able to progress through the heaviest ice found in the Northwest Passage, something an icebreaker of the size of the Macdonald could not achieve, certainly not without a monumental amount of backing and ramming. In ten/tenths ice, where strength as a governing factor gives way to power, Manhattan had difficulties. But so would any ship. As the photographs in this report are meant to indicate, she broke floes thicker than have ever been broken before -- ice more than twenty feet thick. But so close was she to maintaining headway through much of this heavy ice it appears that a ship of double the displacement and with triple the power would be successful.

The design of Manhattan's icebreaking bow included, among other features, shoulders which were wider than the remainder of the ship. Thus it was hoped the ice broken by the bow would pass around the shoulders and escape along the side reducing the effect of friction. This was only partially successful for the addition of the ice belt, adding 18 feet to the original beam of the ship, increased the width of the ship sufficiently to offset this hoped-for advantage.

At the point where the forward end of the ice belt met the lower part of the icebreaking bow a pocket was created where ice accumulated. This acted like a barb on a fish hook making it even more difficult for the tanker to back out of a heavy floe especially with inadequate astern power. In the normal course, if time had permitted, this should have had a fairing plate installed by the shipyard to prevent ice from locking the ship in.

In certain circumstances so efficient was Manhattan in breaking ice that much greater quantities than had been expected were driven down under the bow to travel the full length of the ship to emerge in her wake. Once under the ship, because of her square cross section, it was probable that it would behave in this fashion rather than escape up the sides as it does with icebreakers having a more rounded hull cross section. When she became beset and an icebreaker loosened the ice on one side, accumulated ice trapped beside the ship all the way down to the turn of her bilge, and maybe even under the hull, would gush up and move over to occupy the space produced by the icebreaker. It seemed that Manhattan became stuck in a cradle of her own broken ice.

Reference has been made elsewhere to the fact that the ice which passed under the ship damaged the transducers of the doppler sonar equipment. It also damaged the bottom plating of the ship but not to the point where it was actually punctured. Design of the ultimate ship for the trade may see more of a “V” hull cross section to permit such ice to escape.

The writer can attest to the fact that ice enroute to the stern passed through the propellers all too frequently. Violent motion resulted from this and portions of ice surfaced astern with helical cuts on them from the propeller blades. Some of these pieces measured more than twenty feet square and ten feet in thickness. No damage was inflicted on the screws the tips of which, at their highest point of travel, were 33 feet below the waterline.

Manhattan Manoeuvring in Ice. Reference has already been made to the difficulty the ship experienced when altering course in ice. On the occasion when she and the Macdonald endeavoured to help the Northwind the ice was ten/tenths and between six and eight feet thick. Manhattan was making four knots until the rudders went over to alter course to port. No sooner was this done than she stalled.

In a test carried out late in the voyage, a barrel was deposited on an ice floe by helicopter and the ship attempted to manoeuvre alongside it as though she were approaching a terminal. The floe measured several miles in extent and varied in thickness between four and ten feet. The tanker could maintain headway, but only if the wheel was not used. As soon as the rudders went over to alter course she came to a standstill, proof that for her size and shape she was underpowered.

ROLE OF ICEBREAKERS

Manhattan's achievement will influence icebreaker design and tactics to a marked degree. Giant bulk carriers, to succeed in the Arctic, must be designed and built to be their own icebreakers. They must have the strength, power and hull form to break ice unassisted. Only on rare occasions, when conditions become so difficult that such vessels cannot manage on their own, will icebreakers as we know them be required. In this role they would simply break the ice in the vicinity of the unfortunate bulk carrier permitting her to continue.

It was clear, once Manhattan got into the heavy ice of Viscount Melville Sound and M'Clure Strait, that the John A. Macdonald was operating to the limit, and beyond, of her capabilities. That she did so well is in large measure

a tribute to the skill with which she was handled. The U. S. Coast Guard icebreaker Northwind, with only 5 of her 6 engines available, was simply not in the running. The lesson here, of course, is that icebreakers capable of supporting giant bulk carriers must be very much bigger and more powerful than anything that exists afloat to-day. If big tankers and ore carriers are going to be operating in the high Arctic on a year-round basis then so must icebreakers.

To do that they must possess the ability to go anywhere in the Northwest Passage and accordingly must be able to break 8 feet of monolithic ice in the continuous mode, and to deal with ridges in the ramming mode 25 feet high. The Louis S. St-Laurent is Canada's newest and most powerful icebreaker. She develops 24,000 SHP and can handle, in the continuous mode, ice 4 feet thick. The required icebreaker, therefore, will have to be an exceedingly powerful ship, more than twice as powerful as the Lenin, which has 44,000 SHP.

Hitherto the classic role of icebreakers has been the escort of shipping. To do this these ships were required to be beamy so that the track cut in the ice would be wide enough for the ships following astern. They also had to be manoeuvrable and for this their length to beam ratios were of the order of 4 to 1. But now, with the prospect of supporting rather than escorting giant ships, the need for agility is no longer as important and length to beam ratios can be of the order of 5½ to 1. Beam is also not important because icebreakers will never precede a giant ship. In the case of Manhattan, her accompanying icebreakers followed in her wake until required. Strength, endurance, displacement and power will be the critical design factors for the big icebreakers of the future.

The tactics of icebreakers supporting big ships, if experience with Manhattan is any indication, will see two types of activity:

(a) Breaking loose a beset bulk carrier. The icebreaker would approach the beleaguered vessel from astern moving through the easier conditions in the bigger ships' wake until close astern. She would then attack the unbroken ice beside the bulk carrier on whichever side lay the easier conditions. Experience indicates such ice must be loosened two thirds the length of the bigger vessel before she is enabled to move astern to gain room for a further charge at the unbroken ice ahead or, if the situation required it, take another route.

(b) Assisting a bulk carrier to advance. There may be circumstances when it is easier for two ships to proceed in company when the ice conditions are such that, individually, they would be stopped. One icebreaker, in this case,

would break ice up the side of the bigger ship. By the time she attained a position off the bow the ice would be loose enough to permit the larger vessel to start moving. In this fashion both ships could continue, the ice cracking and relieving between them.

An alteration of course could also be accomplished with the two ships working in echelon formation. With two icebreakers the second one would take up a position on the opposite quarter and, still in echelon, the three ships would advance, the ice cracking and relieving between them as they progressed.

An intriguing possibility for helping a giant bulk carrier, temporarily beset, would be for an icebreaker to place her stem against the former's stern and use the combined power of the two ships to start them moving. The bollard power of the icebreaker is considerable and might make the difference between moving and staying. This tactic would be more effective, and safer, because it would inhibit any tendency on the part of the icebreaker to jackknife, were the bigger ship to have a notch in her stern similar to the ones built into icebreakers for towing ships at short stay.

GENERAL REMARKS ON NAVIGATION

Davis Strait & Baffin Bay. There is Loran coverage (2S6) of this area to satisfy the needs of ships making for Lancaster Sound. Ice behaviour is such that ships should always favour the easier route up the west Greenland coast to the latitude of Parry Channel. Once there they can cut across the top of Baffin Bay to avoid the worst of the Baffin Bay pack.

Davis Strait and Baffin Bay are deep and well sounded. Chart coverage is good. The coastal topography on both sides is ideal for radar navigation should ships for any reason have occasion to close the land. Additional navigational aids are not required.

Lancaster Sound. The entrance to the sound, which is 50 miles wide, is distinguished by high land on both sides and ships entering from Baffin Bay can, and should, rely mainly on their radars for fixing. The sound is about 180 miles long and bordered throughout on both sides by high land providing excellent radar cover. By Arctic standards the Sound is well sounded and there are no dangers. Manhattan favoured the north side and fixed exclusively by means of radar ranges and bearings. There is no requirement for navigational aids along this section of the route.

[Missing page] ... not present any difficulties apart from prevailing ice conditions. In general terms this area marks the boundary between the First-year ice of Lancaster Sound and the Multi-year ice of Viscount Melville Sound. Conditions can be difficult for ordinary icebreakers but there is a choice of routes between the islands depending upon conditions.

The exception referred to above, concerning radar response, is Young Island. It is only 65 feet at its highest point and heavy pack ice can make recognition difficult. Consideration might be given to the establishment on Young Island of a radar reflector.

Viscount Melville Sound. Manhattan steamed many miles in this Sound in areas where there are no charted depths. She probed further south than any other ship in the direction of Stefansson Island (see track chart) without incident. Charted soundings are virtually non-existent in its southern portions. In the northern section there is a requirement to expand the work already done and to confirm the existence of such anomalies as the 20 fathom sounding lying 27 miles south-southeastward of Cape Gillman on Byam Martin Island. With the advent of ships big enough and powerful enough to select a route regardless of all but the worst ice conditions, they will be able to select a course diagonally across Viscount Melville Sound from the vicinity of Resolute to the entrance to Prince of Wales Strait.

In addition to hydrography to make such direct routing possible and safe, there is a requirement for radar reflectors along the north shore of the Sound. Ships relying on radar for fixing, and which favour the northern route to take advantage of better ice conditions there, have difficulty in identifying, indeed even locating, the low-lying land on Bathurst and Byam Martin Islands. Radar reflectors placed there, probably on Cape Cockburn (Bathurst) and Cape Gillman (Byam Martin) would be best.

The Dundas Peninsula on Melville Island is high and steep and perfectly suitable for radar ranging.

The only other location where low-lying land makes difficulties for the navigator is Peel Point on Victoria Island at the entrance to Prince of Wales Strait. Here it is difficult to tell where the sea ice ends and the low shelving beach begins. A radar reflector here is considered essential.

For accurate navigation there is a requirement for some form of electronic fixing system to provide coverage for the large area of Viscount Melville Sound. This is one area where ships cannot maintain an up-to-date accurate position using radar.

Prince of Wales Strait. Once past Peel Point a ship should have no difficulty fixing her position using radar. While much useful hydrographic work has been done in this area, more is required. In the northern part of the Strait Manhattan was compelled, by heavy ice, to favour the western side. Indeed, she got so far over towards the Banks Island shore that she got herself into unsounded waters. There was growing concern on the bridge by some that she was seeking ice-free conditions at the expense of safe navigation.

The ship was being manoeuvred by eye and there were no fixes on the chart despite the fact that there were seven captains on the bridge plus three mates clutching their master's papers. The echo sounder (Simrad) indicated first 20 fathoms under the keel, shoaling to 19, then 18. At this point the U.S. Coast Guard representative began to plot fixes on the ozalid print provided by the Hydrographic Service of Canada. From these it was clear the ship was being hazarded. When the situation was explained to the Master he at once ordered the Staff Captain to direct the ship's course back towards the centre of the channel.

Amundsen Gulf. Here again the coast of Banks Island provides good radar response for a ship transiting the area southwestward past DeSalis Bay and Cape Lambton thence westward into the Beaufort Sea. Radar navigation techniques would serve here perfectly adequately.

Beaufort Sea. Once clear of the land, a ship westbound for Prudhoe Bay would require assistance from some form of electronic navigation system (Decca, Omega, etc.) The Manhattan had no reliable means of fixing her position and had to rely on information from the Macdonald. The coasts of the Yukon and Alaska are generally low lying with few prominent features to aid fixing, either by radar or visually, even if ships could safely get close enough for the purpose.

Comment. There is a requirement for a very accurate fixing system throughout the passage, not for navigational purposes but to ensure that ships, helicopters and fixed wing long range ice reconnaissance aircraft are always referring to the same location on the chart. If the best use is to be made of ice data from various sources then an accuracy of one mile or less is needed. Failing this ships will blunder into the heavy ice they have been warned to avoid.

The lack of topographical information on Canadian Arctic charts was remarked upon. A full set of 1/250,000 Topographical maps covering the Arctic was taken by the writer and was in constant use on the bridge for getting spot heights and other information to assist in radar navigation.

REPORT ON THE ARCTIC TANKER TEST (S.S. MANHATTAN) AUGUST-NOVEMBER, 1969, compiled by the Canadian Representative [T.C. Pullen], 13 January 1970

Submitted to the Director, Marine Operations, Department of Transport, Ottawa.

HBC Archives

Report on the Arctic Tanker Test
(S.S. Manhattan)
August - November, 1969.
compiled by the Canadian Representative.

Enclosure: (a) U.S. Coast Guard Replacement Icebreaker Characteristics.

- References:
- (a) Letter of Instruction to Captain T.C. Pullen dated July 11, 1969.
 - (b) Memorandum to the Regional Director, Marine Services, Maritimes, dated February 28, 1969. File 9106-23 (DMO).
 - (c) JOHN A MACDONALD - Sailing Orders, dated June 30, 1969.
 - (d) United States Coast Guard OP ORDER COMEASTAREA No. 14-69 dated July 16, 1969. Copy attached.
 - (e) United States Coast Guard Outline Operation Plan, Arctic Tanker Evaluation, Icebreaker Support, dated 1 July, 1969. Copy attached.
 - (f) Ice Conditions encountered - prepared by DOT Meteorological Branch, Toronto, and submitted separately.
 - (g) Interim Comments on Manhattan Trials, AHGS/ea 9106-23 (DMO) November 7, 1969.

Introduction

Submitted in accordance with Reference (a) is this report on the Arctic Tanker Test by the Canadian Representative on board the Manhattan, Captain T.C. Pullen.

This is not a technical report but contains the observations and opinions of the writer who was onboard for the entire operation in three capacities, viz., Government Representative, D.O.T. Co-ordinator for Canadian icebreaker operations in support of the tanker and, as it turned out, Ice Navigator (so-called Ice Pilot) to Humble Oil & Refining Company. This last-named activity was undertaken on a purely voluntary basis but it grew into a non-stop commitment, especially when matters were not going well and the ship was in difficulties. To be held accountable as an adviser when one has no authority to translate one's recommendations into action is a poor arrangement.

Humble Oil, having paid the major share of the cost of the test, was determined to safeguard all test data and to this end went to elaborate lengths to cloak test activities with secrecy. Because of this it became at times extremely difficult to ascertain what was going on, what ice tests were being planned and what the ship's general movements were to be. Even if the writer had possessed the necessary technical qualifications, and had had the time after discharging his other duties, his efforts to collect technical data would have been frustrated because of this policy of secrecy.

As the participating oil companies, viz., Atlantic-Richfield (ARCO) and British Petroleum (BP) had put up a relatively small share of the total cost, two millions each, as compared to Humble's 36 millions, there was ill-disguised dissatisfaction on the part of the onboard ARCO and BP representatives because virtually all sources of information were denied them and access to instrumentation spaces was prohibited. In every phase of the operation they could only act as spectators.

The frustration experienced by the ARCO and BP representatives spread, as the voyage progressed, to other observers, representatives and, indeed, to members of the crew including, strange as it may seem, the Master of the vessel and his Staff Captains. The word was not passed. Blame for this must fall on the Mission Director for not appreciating the necessity of generating trust and co-operation by keeping people informed of his plans, and on the Master of the ship for not insisting on the planning and execution of operations being carried out in accordance with long-established principles of command which need no emphasis here.

Also contributing to the confusion was the extraordinary command structure created for this operation whereby the Master of the vessel voluntarily abrogated many of his responsibilities by becoming bogged down in a watchkeeping system with his two Staff Captains. Inevitably the role of Master, by default, fell to the Mission Director who was neither qualified nor capable of fulfilling it.

Humble Oil is considering a further test into the eastern Arctic during March/April of this year. What is desired in the way of ice conditions is a uniform sheet of hard, level ice five to seven feet thick which has not yet started the process of decay. Only in such conditions can meaningful data on the performance of a particular hull form, at a given horsepower working in ice of known thickness and strength, be obtained. Such conditions can, for example, be found at that time of the year in Eclipse Sound. Such a foray is, in the view of the writer, essential if the company is going to be able to make a good decision. If such a test is not attempted then this could be taken as pretty conclusive evidence that the marine solution is off.

At the time of writing the Manhattan is still in Chester, Pa., awaiting repairs by Sun Shipyard. It had been planned for her to carry 60,000 tons of grain to Pakistan but because of the delay in repairs and the need to prepare for the forthcoming test, the ship will be kept in coastal trade instead. It has been indicated by Humble Oil that the spring test would see only one captain onboard instead of three.

In accordance with the instructions contained in Reference (a) the writer joined S.S. Manhattan on August 28, 1969, but in Halifax, N.S., rather than Chester, Pa., at the request of Humble Oil officials because of crowding onboard for the leg of the voyage to Halifax. Mr. Emil Stasyshyn, an Ice Observer with the Department's Meteorological Branch in Toronto, also joined in Halifax.

A detailed report on the ice conditions encountered during the entire voyage has been prepared by the Meteorological Branch and submitted under separate cover - Reference (f).

Fortunately, the possibility of a disaster befalling the tanker, envisaged in Reference (a), did not occur although there were a number of occasions when the Manhattan got into difficulties and it appeared as though emergency measures might be needed.

Reference (a) also charged the writer to ensure that Canadian laws governing the harassment of game, traffic with the Eskimos, pumping of bilges etc. were scrupulously observed. There was one minor oil spill

observed by the writer and drawn to the Master's attention. It was caused by improper valving and remedial action was taken with great alacrity. There were a few minor cases of polar bears being bothered by helicopters for the benefit of photographers but this was stopped.

A count was made of all polar bears sighted in and the special forms provided for this, supplied by the Canadian Wildlife Service, have been duly completed and returned.

Everybody onboard the Manhattan made the writer, as Canada's official representative, feel thoroughly welcome. He was given the run of the ship, the bridge was invariably available and he was invited to attend every planning session, every social function and his advice was continuously sought on any matter that might involve Canadian interests and endless ones that did not.

During a substantial portion of the westbound passage, viz, from Resolute Bay to Prudhoe Bay, the Director of Marine Operations was embarked in the JOHN A MACDONALD and his presence there materially assisted the writer in co-ordinating operations between the two vessels, especially during the difficult period when the Manhattan was - beset in M'Clure Strait.

Summary

Manhattan's Northwest Passage voyage last year demonstrated that:

- a. Giant ships can be the means of moving bulk cargoes out of the Arctic economically, safely and ultimately on a scheduled basis year-round.
- b. Such ships, suitably designed and strengthened for ice navigation, will have to be their own icebreakers. Manhattan demonstrated that this was feasible and that such ships are capable of proceeding on their own without escort.
- c. The bigger the ship the better the icebreaker. A dead weight tonnage of 225,000 would be much more than twice as effective than Manhattan was, at half that figure.
- d. To succeed, giant ships will require extra power (ahead and astern) plus special features such as a heeling capability, helicopter

platform, two radar sets, two depth finders, protection for stern gear, side stiffening, and so forth.

- e. At the risk of over simplification the further west one goes the more difficult become the ice conditions and the greater the risk of uncharted shoals and rocks being encountered. As far west as Resolute Bay the ice is predominantly first-year and the waters well charted. West of that location the ice is mostly multi-year and much more difficult to pass through while the waters are not well charted and,
- f. Year-round traffic by ships with a loaded displacement of 165,000 tons or more is possible now from the open water of Baffin Bay and Davis Strait as far west as Resolute Bay.
- g. Year-round traffic from Baffin Bay west to Amundsen Gulf by ships with a loaded displacement of 250,000 + tons by way of Parry Channel and Prince of Wales Strait appears practical but further tests would be necessary. Certainly a seven to eight month season is within reach.
- h. Year-round operations in the Beaufort Sea from Point Barrow, Alaska eastward to Herschel Island remain uncertain because of the peculiarly heavy ice conditions that exist there but it should be possible for the really big ships, which are compelled by their enormous drafts to navigate many miles off-shore, to operate there for six months of the year.
- i. Icebreakers larger than the ST. LAURENT type will be required. These vessels would not provide escort, because this is impracticable, but rather to assist giant ships on those occasions when they encounter special conditions and an additional ship is needed to loosen the pack in their vicinity and provide mutual support, ie. the search and rescue function.
- j. Giant ships will probably not be able to escort each other because such a tactic creates scheduling problems at the loading terminal

and because of the very real inbred reluctance of ship's officer's to [manoeuvre] in the vicinity of another large vessel.

- k. There is a need to establish standards of ship design, construction, ice strengthening, licensing of personnel, ice reconnaissance, navigational aids etc., leading ultimately to a degree of co-ordination between Canada and the United States.
- l. The threat of oil pollution has been exaggerated. While nobody would cavil at the consequences of such a thing, the possibility of it happening from ice damage is negligible.
This topic is enlarged upon in the body of the report.
- m. The risk of damage to giant ships drawing 85 feet of water comes not from ice but from striking a rock or shoal, either from professional incompetence or because they were not charted.
- n. There is a requirement for extensive hydrographic work, especially in Viscount Melville Sound, off the Mackenzie Delta and in Prince of Wales Strait in the vicinity of the Princess Royal Islands.
- o. The appearance of the giant bulk carrier has upstaged the nuclear-propelled cargo carrying submarine for the movement of bulk cargoes in Arctic waters because of:
 - i. The greater cost of such submarine vehicles.
 - ii. The larger (and more highly trained) crew requirement with its extra cost.
 - iii. The greater draft which exacerbates the terminal problem in shoal water areas.

GENERAL

The real purpose of the Arctic Tanker Test was to collect data with which to calculate the feasibility of much larger vessels operating year-round through the Northwest Passage. It was never intended that Manhattan should demonstrate her own ability to transit the Passage. The east to west leg of the voyage was, as it turned out, easier than expected except for the heavy ice encountered in M'Clure Strait where the ship got into difficulties and was compelled to turn back and continue by way of Prince of Wales Strait. No ice

testing, which was the prime object, was accomplished until Point Barrow had been reached, and as much publicity as possible milked from this significant but secondary achievement. At Barrow the press disembarked and very little was heard of the Manhattan in the press thereafter.

The failure to negotiate M'Clure Strait was probably a blessing in disguise for at the outset the ship was committed to a large floe which could have been easily avoided had bridge personnel made better use of the various aids at their disposal. But aerial ice reconnaissance reported much heavier ice conditions further west and it is possible that had she skirted that first floe which was her undoing she might have got into really serious difficulties from which it would have been even more difficult to extricate her. This incident in M'Clure Strait was the first rude shock of the voyage which up to then had seen the ship make rapid headway through easy conditions in Viscount Melville Sound which had always been touted as a difficult area. There was also a tendency in the tanker to overlook the fact that they were operating during the period of the year when ice conditions are the easiest. The details of Manhattan's difficulties in M'Clure Strait and, to a somewhat lesser degree, later in Prince of Wales Strait were described in some detail in Reference (g) and will not be repeated here. Once these difficulties had been overcome it became plain sailing westward as far as Point Barrow, Alaska, where the ships arrived September 20.

The return leg of the voyage, which began on September 21, was marked by a minimum of publicity, to the considerable relief of all on board, permitting for the first time an intensive program of ice testing in Viscount Melville Sound. The original plan had envisaged a two to three week probe north from Alaska into the heavy pack in the Beaufort Sea. But this plan, because of the lateness of the season and the concern felt by Captain Fournier for his ships reduced effectiveness with her damaged propeller, was cancelled in favour of a speedy return to an area which would ensure that the ships could retreat eastward to Resolute Bay and beyond before freeze-up. By September 21 there was a noticeable increase in the amount of snow cover in Alaskan and Yukon waters which added to the difficulties of the tanker in ice, because this stuff turned to slush, became extremely sticky and clung to the ship's sides, holding her back. This was a significant development, one that had not been anticipated. At the moment there is little that can be done about it, let alone forecast its existence.

The tendency of ship's officers, including at least one of the staff captains, to pursue the straight line theory of getting from A to B, rather than taking

the easier but longer way round heavy floes, repeatedly got their ship into difficulties. So much so that at one stage the writer, and his U.S. Coast Guard colleague, were asked by the mission director to stand watch and watch to help ensure the ship was better handled and not put into situations which were becoming increasingly difficult for the JOHN A MACDONALD to retrieve. For the period September 27 - October 28 ice testing was the order of the day. During most of the time the ship operated in Viscount Melville Sound seeking suitable ice floes. How much really useful data was collected is difficult to tell because of the secrecy which enveloped everything and the fact that quite obviously the ice was not suitable for test purposes. All the floes were weathered, hummocked and of such an uneven nature that it was impossible to establish a mean thickness. The ideal ice would have been an ice sheet of uniform thickness, something which exists in areas like Eclipse Sound in July/August but nowhere in the Arctic in October.

Much of the time was spent operating in the southern part of Viscount Melville Sound where the waters are uncharted but this was of little or no concern to Manhattan's officers. This light-hearted approach to navigation in unsounded waters in a ship drawing 55 feet was a ceaseless cause for concern among those onboard who had some experience of the surprises that can exist underwater in the arctic. In the writer's view Manhattan was extremely fortunate not to have touched bottom.

Tests to determine the effect of such stresses on the ship's structure, especially the bow section, were carried out on an ice island fragment measuring 430 ft. by 250 ft. encountered south of Bathurst Island. This stood 14 feet above the surface of the surrounding young ice and extended 120 feet into the depths. The particular piece attacked by the ship was reckoned to displace some 300,000 tons. The ship made several runs at it at slow speeds, 1½ knots, 3 knots etc. Her stem would ride up three or four feet at which point the fragment would pick up the momentum imparted to it by the ship which, in turn, would stop and gather stern way.

On another occasion Manhattan, and her two icebreakers, MACDONALD and STATEN ISLAND, got into some pancake ice which was at its stickiest stage of development. This ice was only inches thick but it stuck to the ships in ever-growing quantities until there was so much of it the three vessels became completely bogged down. Putting the engines astern achieved nothing and it required vigorous backing and filling by the two breakers before they got clear and were able to assist the Manhattan. The

stuff that was left behind after the ships departed the area was like white quicksand or gelatinous porridge.

Extremely heavy ice was encountered in Lancaster Sound when the ships were homeward bound late in October. This had been driven in from Baffin Bay by strong easterly winds which had been blowing there for some days before the ships appeared. Equally strong north westerly winds then put the ice under pressure and all three became stuck off Bylot Island and an attempt to enter Navy Board Inlet was frustrated because of 9/10 multi-year floes plugging its entrance. The largest sea ice floe this observer has seen was skirted in the same area. About a square mile in area its surface was seven ft. out of the water and hummocks on it rose a further twelve feet. This particular specimen could have originated in the Lincoln Sea but whenever it came from all ships steamed around it with the respect normally accorded an iceberg.

Also, in the same area, Manhattan collided with an iceberg because of inept ship-handling. To avoid the berg which was to port, the ship was aimed at a heavy floe to starboard but the angle of attack was too fine. Instead of cutting into the floe the ship caromed off it and was [inexorably] committed to strike the berg. The blow, when it came, caused Manhattan to rebound to starboard, the edge of the berg shattered and deposited tons of ice fragments on the forecabin after which it passed close aboard down the ship's side. It speaks well for the strength built into the icebreaking bow that it was not even scratched by the shock of impact nor otherwise damaged in any way.

C.C.G.S. JOHN A MACDONALD

The CCGS JOHN A MACDONALD (Captain P.M. Fournier) was assigned to accompany Manhattan throughout her voyage in accordance with Reference (b). She sailed from Halifax late in June but because the tanker was further delayed she was kept waiting for a longer period than had been planned. It was not until August 31 that she finally kept her rendezvous with Manhattan east of Frobisher Bay. Thereafter the two ships remained in company until their return to Halifax on November 8.

Reference (b) stressed the importance of compiling records of the operation including ice conditions encountered together with the Master's narrative of events made at the time and so forth. It is presumed that such a report will be forthcoming from the ship.

In Reference (c) more specific instructions were issued to the Master which, in retrospect, were perfectly adequate and provided him with sufficient direction.

The MACDONALD quickly established a reputation for professional competence with the efficient way she made her rendezvous right on time on the night of August 31. Her skilful escort of the giant tanker through the icebergs of northern Baffin Bay, the recovery and return of the damaged helicopter to the Manhattan, her expert icebreaking technique and the fact that she cut the tanker loose on at least two dozen occasions during the voyage demonstrated that she was indispensable. A friendly rapport built up between the two ships and, certainly in the eyes of the Manhattanites, they were 'chummy ships.' What the smaller ship felt about this is not known.

The writer served as the link between the two ships and endeavoured to represent the views and concerns of each to the other. Captain Fournier invariably dealt with the writer in all his dealings with the Manhattan which made the task of the latter much easier. He did a first class job and enhanced the reputation of Canada in icebreaking matters to a very high degree. It is entirely appropriate that such outstanding ability should have been recognized with the recent award to him of the Canada Medal of Service.

The MACDONALD was operating a great deal of the time at the extreme limit of her capabilities. That she did so well is a further tribute to the skill with which she was handled. It is known that she suffered the loss of a blade from her starboard propeller and that, as her subsequent drydocking revealed, she had damage to her forward plating.

A word should be said for the helicopter detachment in the MACDONALD. The demands for flights were frequent and varied and in every case, weather conditions permitting, they were laid on. A number of these were at the request of the writer to ferry him to and fro, others were on behalf of personnel in the tanker who, for one reason or another, asked for flights and were obliged.

C.C.G.S. LOUIS ST. LAURENT

The CCGS LOUIS S. ST. LAURENT (Captain W. Dufour) appeared on the scene in Viscount Melville Sound during the period when Manhattan was engaged in her ice testing program. On two occasions the big icebreaker assisted the tanker in breaking out of heavy ice, both occasions at the request of the Master of the MACDONALD who, in turn, was encouraged to do so by the writer.

On the first occasion, when both Canadian icebreakers worked as a team, the demonstration put on by them was so obviously the work of experts that the bridge personnel in the tanker were awed. It was a pleasant experience for me to bathe in the reflected glory of Captains Dufour and Fournier.

Great interest was shown in the ST. LAURENT by everyone in the tanker and the U.S. Coast Guard officers were extremely impressed with her power, performance, cleanliness and the skill with which she was handled. Unfortunately, she developed engineering problems of various sorts and it was decided that it would be prudent for her to withdraw to Resolute Bay where repairs could be more easily effected and where she could provide distant support.

The U.S. Coast Guard is still trying to determine how to build an equivalent icebreaker for a similar price but without much success. Their cost hovers around \$55 millions because of the conflicting and varied demands for ‘extras.’

Fuel

Manhattan carried a total of 185,000 barrels of fuel (Navy Special, Bunker C, JP 5 and Diesel). Canadian icebreakers were refuelled as follows:

JOHN A MACDONALD	12,630 bbls Diesel
LOUIS S ST. LAURENT	9,320 bbls Bunker C

United States Coast Guard Icebreaker Support

The U.S. Coast Guard’s original plan (References (d) and (e)) was to have the WESTWIND accompany the Manhattan but she lost two engines long before the tanker appeared on the scene and had to be withdrawn. The SOUTHWIND had run aground in Greenland waters earlier in the summer and was not available. Hence the NORTHWIND was sailed from Alaskan waters on July 15 to transit the Northwest Passage reaching Baffin Bay and ultimately rendezvousing with the Manhattan and the MACDONALD off Resolute Bay on September 6.

But NORTHWIND’s stay was short-lived. She had only 5 of her 6 engines in service and the heavy ice in Viscount Melville Sound was more than she could handle. The load on the MACDONALD, breaking out first the tanker and then the NORTHWIND, could not be sustained and so the American was detached on September 9 to return to Resolute Bay to make her own way west via the coastal route to Alaskan waters.

And so until the Manhattan reached Point Barrow her only escort was the MACDONALD, probably a good thing for Canada but a humiliating experience for the U.S. Coast Guard. For the return passage the STATEN ISLAND provided support although she was suffering from cracked plates in the stem which inhibited her icebreaking activities. For the most part she simply trailed along astern of the bigger ships providing helicopter services.

While it must have been a difficult time for the U.S. Coast Guard it is probable that in the long run their difficulty with icebreakers may provide sufficient justification to get their long deferred icebreaker replacement programme approved.

Icebreakers - General

As a result of this year's tanker test it is clear that WIND-Class icebreakers (including the LABRADOR) are simply too small and under-powered to cope with the heavy ice conditions to be encountered in such areas as Viscount Melville Sound, M'Clure Strait and, in all probability, the heavy pack which can descend on the Alaskan coast. The WIND-Class also suffer from the disadvantage of having twin screws and a centre-line rudder which renders them less handy than triple screw vessels and more vulnerable to propeller damage.

As to skill and ice seamanship it appeared that men like Captain Fournier and Captain Dufour, who have years of experience in command of icebreakers, are far better in some respects than their American counterparts who do a spell in command of an icebreaker for 2 or 3 years having come from, & eventually returning to, something else which in most cases has nothing to do with ice.

The JOHN A MACDONALD was working to the limit, and beyond, of her capabilities, especially in the central and western Arctic. The loss of a propeller blade didn't seem to have too great an effect on her performance, certainly to observers in the tanker, something which Captain Fournier confirmed. Being a triple screw ship she seems to derive most of her thrust from her centre screw.

The ST. LAURENT, albeit from the rather limited contribution she made, performed remarkably well in breaking ice which was holding the Manhattan. With a displacement of approximately 14,000 tons and developing 24,000 Shaft H.P. (but capable of a maximum output of 27,000) she represents the minimum size icebreaker capable of providing the sort of support and assistance such as will be needed by giant bulk carriers operating

in the high Arctic. Ideally one would prefer a true polar icebreaker of 25,000 tons or so capable of turning up 50,000 H.P. Triple screw, a heeling and trimming capability, plus a notch and a powerful towing winch to mention a few features.

Icebreakers will always be required to provide assistance on those occasions, hopefully rare, when even the largest and most powerful icebreaking bulk carrier experiences temporary difficulty in heavy ice or in areas notorious for especially difficult ice conditions including giant floes, pressure ice and, as was discovered this year, sticky slush ice.

Efficient night illumination ahead of the ship is important, arranged so there can be no reflection off the ship's own structure to blind or distract her bridge personnel. Helicopters should have all-weather capabilities and be equipped for night flying. Radars designed to exercise positive control and direction of helicopters are also required.

The requirement for an accurate navigation fixing system is just as important for icebreakers as it is for the ice recce aircraft and bulk carriers with whom they will be working. When such units are talking about a position on the chart it must be the same position for an error of a mile or less could be enough to commit a ship in low visibility into giant floe instead of skirting it.

Everybody agreed that the ideal helicopter mix is unquestionably one small machine of the BELL J-2 type for ice recce and a large machine capable of transferring people, freight and so forth.

Assuming that the U.S. Coast Guard icebreakers would probably provide support to tankers from Prudhoe Bay eastward to Amundsen Gulf, it would seem appropriate for Canada to consider stationing her icebreakers at Sachs Harbour and either Winter Harbour or Resolute Bay depending upon the ice conditions then prevailing. There are, of course, no facilities at these places they simply represent strategic locations.

Icebreakers should be equipped with a means for coping with oil spills and, as should be the case with all ships operating in Arctic waters, incinerators for the disposal of burnable waste rather than throwing it overboard. Cans, bottles and plastic containers should be dealt with so that they sink.

A cold water diving capability, plus an underwater cutting capability, is a requirement to depths of 20 fathoms.

The MACDONALD has a number of circulating water overboard discharges evenly distributed along her side. This occasioned frequent

comment from the Manhattan as to whether this was a deliberate design feature for the purpose of lubricating the ship's side to make it easier to escape sticky ice. On the one occasion that the tanker pumped water over her side it worked almost immediately to free the ship and this technique, as already mentioned elsewhere in this report, is worthy of more evaluation.

Manhattan as an Icebreaker

The downward-breaking type of icebreaking bow fitted to the ship, while still less than ideal, worked effectively in ice. The shoulders of the new bow were wider than the original hull on the theory that broken ice would be free to escape around it and along the ship's side without gripping the hull in the process. However, the installation of the ice belt, extending eight feet out from the hull on both sides and running the length of the ship, cancelled out this hoped-for advantage.

Much has been made of the trouble Manhattan had in ice, so much so that there is a tendency to overlook the fact that she is unquestionably the best icebreaker in the world. Her achievements in ice were impressive proving that mass and momentum are indeed the secret to success in Arctic navigation. To see slabs of ice 100 feet across and 24 feet thick rising up on each side of the bow as the ship ploughed along was an impressive witness to her capabilities. Her accompanying icebreakers would never have completed the passage unassisted and they were undoubtedly well advised to follow in the wake of such a ship.

Not only did Manhattan have inadequate astern power for Arctic service, but her astern turbines overheated after 20 minutes use and had either to be shut down or the ahead turbines used for not less than 40 minutes before once again going astern. This was a severe operational limitation making it even more difficult to get the ship out of heavy ice by going astern. There was only one instance when this was done and on that occasion the ship was halted before she had advanced more than half a mile into a heavy floe.

When moving at speed through ice there was insufficient time for broken fragments to escape and quantities of it, including some very heavy chunks, passed along the bottom of the ship to emerge in the wake after passing between the propellers and rudders. It had been thought by some that the great draft of the vessel, 55 feet, would have been enough to prevent much traffic of this sort. On the other hand, however, the box shape of the hull and her beam of 132 feet meant that ice, once it had been driven under the flat bottom, could not escape and it bumped and banged its way along the

bottom damaging the transducers fitted there for the Marquadt doppler-sonar gear.

Men working in the bottom of the ship making repairs to the transducers reported very heavy blows against the plating from the natural buoyancy of this ice as it passed by. Pieces measuring 20 x 20 x 10 feet were seen to surface immediately astern of the Manhattan, with helical cuts on them inflicted by the propellers. It was just such a piece of ice that caused the JOHN A MACDONALD to lose a propeller blade in Prince of Wales Strait.

Docking after the voyage confirmed that no damage had been caused to either of Manhattan's propellers. These were five-bladed, 22 feet in diameter, made of a special material and with thickened roots to provide extra strength. At a loaded draft of 54 feet the tips of the propeller blades, as they travelled through twelve o'clock, were 33 feet below the water line. This fact, plus the clearance of nearly six feet between the blades and the hull, which lessened the possibility of ice becoming jammed there, contributed substantially to propeller safety. While much of the ice that was forced under the ship emerged between the propellers and rudders without touching them, a substantial amount of it was machined by the propellers, producing violent vibration in the hull. All onboard paid tribute to the strength and ruggedness of hull and machinery.

Some concern had been felt that Manhattan's rudders, which are of the spade type, would be vulnerable to heavy fragments of ice moving down the ship's side and striking them as they passed under the stern. To provide protection the rudders themselves were given a double thickness of plating and ice horns were fitted above and immediately abaft the rudder stocks to deflect ice [whenever] the ship moved astern. It was standard operating procedure for the rudders to be placed in the midships position when moving astern to ensure the ice horns would provide the necessary protection. Despite the amount of ice that travelled past the rudders they suffered no damage. Some pipe fractures inside the ship, in the high-pressure hydraulic system associated with the steering gear, occurred because of excessive vibration and because unsuitable material was used.

One feature which created problems was the pocket formed where the forward end of the ice belt joins the new bow. This permitted broken ice and slush to accumulate and to a degree prevented the ship from backing clear when she had become embedded in ice. This pocket acted much like a fish hook, the barb of which prevents it from being withdrawn after once being

thrust into flesh. If time had not been so critical in the ship's conversion this area should have been faired in to prevent this.

Another feature which caused difficulties was the tendency for ice to become trapped under the ice belt. Just how much ice could become trapped there would become apparent when the MACDONALD, called upon to free the beset tanker, would work her way up from astern to a position abeam of the Manhattan's bridge. The relief provided by such tactics would result in a great upwelling of brash ice from under the tanker which moved outwards in the direction of the icebreaker, a phenomenon which would last for nearly a minute. This was proof that she had been cradled and hung-up in a mass of broken ice of her own making.

The after end of the ice belt also was not faired into the original hull creating another spot where ice accumulated preventing the vessel from moving astern.

Manhattan's monumental icebreaking capability filled her wake with so much broken ice that when she had to go astern to ram the unbroken ice ahead there was very little room for her to maneuver. On such occasions it was possible to move back only half a ship's length or less before being stopped by compressed ice which, the instant her propellers stopped turning, would react forcing the ship ahead as though a great spring which having been compressed, was asserting itself. Hence another reason for additional astern power for such vessels. When conditions were particularly difficult it sometimes required the services of an icebreaker to loosen the accumulated ice astern of the ship to give her ramming room.

Manhattan had been fitted with an 'ad hoc' heeling system designed to shift 2,000 tons of ballast from side to side imparting a heel of 1½ degrees either side of the vertical. But the pumping arrangement was not reliable and for the latter part of the voyage the system was out of action. There is a definite requirement for a heeling system providing two or three degrees of heel each side of the vertical. Such a capability often means the difference between being stuck for minutes instead of days.

On one occasion Manhattan had been beset for a number of hours with her engines alternately being put full ahead and full astern to no effect. Because the heeling system was inoperable it was decided to try lubricating the ship's sides with salt water. The ship's pumps produced a rush of water which flooded her decks and poured over the sides. Within 15 minutes of initiating this technique the ship slipped easily out of the ice and was able to proceed. While it would be unwise to attribute too much to such a procedure

it does merit investigation. Certain types of ice, such as sludge ice which is not thick but extremely sticky, might best be defeated by lubrication.

Some of Manhattan's officers, when their ship was stuck, adopted the practise of running her engines full ahead for some minutes to wash the area in the vicinity of the stern clear of loose ice, hopefully to create an area of open water there which would assist in letting the ship move astern. From personal observation this tactic was not successful even when the rudders were used to direct the rush of water from quarter to quarter in addition to the area astern. Indeed, by permitting the propellers to keep turning, there was a tendency to embed the ship even more firmly in the ice ahead making it more difficult, if not impossible, to get her moving.

On two occasions during freeze-up, once when northbound in Prince of Wales Strait and once in Viscount Melville Sound, the ship encountered pancake ice, pieces of new ice circular in shape, about 30 cm to 3 metres across, and with raised rims due to the pieces striking against each other. This sort of ice is formed from the freezing together of grease ice, slush or the breaking up of ice rind or nilas, usually by the wind. At a certain stage in its development it will stick to a ship's side and on these occasions a belt of sticky ice, ten feet in extent, clung to the Manhattan's side and was dragged along by the ship. In Prince of Wales Strait it eventually broke clear and was left behind. In Viscount Melville Sound, however, muck accumulated until the ship was brought to a stop by it. Ahead of her was a mighty blob of icy porridge hundreds of feet in extent and clinging to both sides of the hull a belt of it more than ten feet in width. Not only did the tanker become bogged down, so did her two accompanying icebreakers. It took some time for them to extricate themselves and it required their combined efforts to release Manhattan.

In 1/10 to 5/10ths ice Manhattan, because of her extreme maneuverability, was able to avoid it. 6/10 to 9/10ths ice she could handle with relative ease, breaking, shoving and pushing floes up to 22 feet in thickness, the secret of success being sufficient elbow room or open water to permit the ship to maintain headway. Once her speed dropped to less than two or three knots it was almost certain that she would be stopped. In 10/10ths ice Manhattan could maintain headway if it was not older than one-year ice but the ice conditions encountered on the test were not conducive to meaningful testing because of their general discontinuities. The chief difficulty to Manhattan was caused by old floes which were hummocked, ridged and weathered. Even through these she would make really quite good

progress until, as her speed slowly dropped, she would meet an exceptionally thick hummock some twenty feet thick and she would become beset. Notwithstanding this she demonstrated an awesome icebreaking capability and a larger ship, better designed and with more power (ahead and astern), would be able to achieve even greater feats of icebreaking.

The Ultimate Tanker for the Trade

Should Humble Oil decide to go for the marine solution for the transport of crude from the north slope to the east coast of the U.S. the ship would have the following general characteristics:

Deadweight capacity 280,000 tons

Loaded displacement 325,000 tons

Length 1,200 feet

Beam 150/160 feet

Draft 14/15 fathoms

Very much more propulsion power is required and present thought is 100,000 SHP on three shafts. Probably one third of this on each shaft, 35% of the total in the astern mode, would, it is thought, be sufficient. However, the ideal solution to the problem of generating sufficient astern power would be the use of controllable pitch propellers which, excepting the loss of propeller efficiency in going astern plus the influence of hull **form** on reverse water flow, would give maximum astern power and would remove the need for astern turbines if steam was the form of propulsion plant used.

These ships would swim very much deeper than would normally be the case, in this way the additional deadweight capacity can be built in without adding too much length and breadth. What has not been given any consideration is the increased risk to such ships in waters which are still unsurveyed or inadequately surveyed. The deeper the draft the greater the risk.

Damage Sustained by the Manhattan.

No ship has been driven into heavy ice as violently as was Manhattan. But this was intended as, after all, she was a test vehicle and meant to be roughly used. That she did not suffer extensive structural damage is a credit to those who designed and built the ice-strengthened features of the vessel. But until her docking at Chester, Pa., it was possible to get only a general assessment of the damage done in ice.

The secrecy which shrouded so much of Manhattan's activities was extended to include reports of damage to the ship. However, the writer was given an oral report by the U.S. Coast Guard representative who examined the ship in dock. This is to be followed up by photographic evidence.

The most serious damage was a large hole in Number 4 wing tank, starboard side, where the original mild steel plating of the hull measuring 10 by 16 feet was ripped away by ice. Leading aft from this hole were indentations and a split in the plating extending to Number 5 and 6 wing tank making the three of them free flooding. In the centre of the hole in Number 4 tank was the bearing surface of a "K" strengthening member, a very heavy box-like girder, which had been severely mangled by the impact.

The Coast Guard representative did not discover any other holes and was told there weren't any. He did report, however, on the existence of indentations along the bottom of the hull near the bow. His explanation as to what and how these were caused included theories that they resulted from heavy pieces of ice being forced down as the ship moved forward over them, or that it was the rolling of heavy pieces of ice as the ship moved up over them when a projecting ice spur could have inflicted the damage. A third possibility was that ice may have been forced down under the ship and then, because of its inherent buoyancy, rebounded with such force that the plating was driven in.

One such indentation was discovered on the starboard side of Manhattan's centre-line at the turn of the bilge well forward where the ship is quite fine. It was immediately abaft the point where the new icebreaking bow had been put on, i.e. in the original mild steel plating of the ship. The damaged area was approximately ten feet square with a maximum depth 12 inches. There were numerous other smaller indentations on both sides of the bow, a few of which were in the new bow area but most in the older plating abaft it.

During the voyage the Engineer Officer informed the writer that he had discovered damage to the forefoot which is a very strong point. This, he said, had struck some very hard object and been crumpled but to what extent he could not say without examining it from the outside. The U.S. Coast Guard representative did not mention this in his report.

Also reported during the voyage was a dimple, approximately a square foot in extent, in the shell plating midway between the turn of the bilge and the waterline on the port side just forward of the funnel.

The torn plate, already referred to, was not discovered until divers had been down after the ship's return although it was known there was damage of

some sort when efforts to deballast before entering Halifax harbour proved fruitless.

Manhattan was a test vehicle and as such she was deliberately abused to determine not only how she behaved in ice but how well the various structures could withstand the battering. All of the damage was confined to the old mild steel portion of the ship. But her ice-strengthened features, made of high-tensile steel, took the punishment very well.

It is not possible to pinpoint a particular incident when the plating could have been torn. It could, however, have occurred during one of the following encounters with ice:

- a. The high speed charge through heavy multi-year floes in Baffin Bay when the ship first encountered ice on September 2.
- b. At 15 knots, which was too fast for the ice conditions, then prevailing, when the ship was entering Lancaster Sound and deliberately manoeuvred to hit heavy floes in her track to impress visitors, who had embarked the previous day at Thule, with the ship's icebreaking capabilities. This was on September 5.
- c. Collision with a large old floe on the starboard bow off which the ship caromed into an iceberg on the port bow. This occurred in Lancaster Sound north of Bylot Island on October 29. The blow on the ice floe did not seem particularly hard but collisions with ice can be deceptive.

Note: The impact with the iceberg, albeit a glancing one, inflicted no damage whatsoever on the bow.

- d. Some days before this incident the ship struck a particularly heavy piece of ice low on the starboard bow at 4:30 in the morning when Captain Arthur Smith had the con. The shock from this was felt throughout the ship and this is most probably when the plating could have been torn off.

Pollution

Of Manhattan's 41 fuel tanks, 35 were used for salt water ballast. The remaining six were full of Navy Special fuel, Bunker 'C' or Diesel. They were

all centre-line tanks and right aft. The risk of an oil spill from a holed tank was negligible.

In the ultimate ship for the trade to carry north slope oil through the northwest passage, 280,000 tons DW, the design would require the use of high tensile steel, massive strengthening in the stem and shoulders, where ice impact is most severe, along the bottom where a great deal of ice finds its way and in the vicinity of the machinery spaces aft. Such design features would probably be in response to the requirements of Government regulatory agencies.

With a well designed ice strengthened ship the risk of ice damage is small. Notwithstanding the ice damage suffered by Manhattan the lesson to be learned from her activities is that she was over-engineered for the job and that no matter how roughly she was handled in ice the risk of pollution from ice-inflicted damage was nil. The risk, usually completely overlooked by the anti-pollutionists, is from striking an uncharted rock or shoal.

There are still extensive areas of the Northwest Passage which remain uncharted or inadequately so. Until this shortcoming is overcome, and it will take some years to achieve this, such a risk will always be present and indeed Manhattan had one near miss in the western Arctic 60 miles northeast of Pullen Island when she passed over a submarine esker with only 15 feet clearance under her keel. This was in an area, admittedly unsounded, where for hours she had been steaming in 25 fathoms and where the bottom was consistently flat.

Should a tanker strike a submerged object the amount of oil spilled would be as a consequence of damage inflicted at the time of grounding and no more. Heavy seas cannot build up in the Arctic and the risk of a ship breaking up and losing her entire cargo of oil, as in the case of the Torrey Canyon, is nil.

ENCLOSURE (a)

United States Coast Guard Replacement Icebreaker Characteristics

1. The following information was gathered unofficially during the course of the Arctic Tanker Test and should be treated accordingly and not, on any account, be attributed to the writer.

2. The Coast Guard has, and is, endeavouring to firm up design characteristics of the first replacement icebreaker with a cost limit of 50/55 millions. They are having difficulty agreeing on the sort of vessel they want and in getting budgetary approval to proceed. Great interest was shown in the Canadian icebreakers especially at the low cost, high quality finish and small crews.

3. While subject to change the following is the "Statement of Mission" for the replacement icebreaker.

- a. The development and support of marine commerce and transportation in the polar regions.
- b. Logistics support of remote federal bases and activities in the Polar Arctic.
- c. Scientific research operations in the Polar Arctic in support of the economic development of Arctic Alaska and the Alaskan Continental Shelf.
- d. Logistic support and scientific research in support of the United States scientific effort in the Antarctic.
- e. The vessel will not be committed to Search & Rescue missions except in cases where their peculiar capabilities are required.
- f. No special equipment for combatant military operations will be provided.
- g. There will be no armament or fire control systems incorporated in the design of these vessels.

4. The following are the "Desired Operational Capabilities."

- a. To clear channels and escort ships during the summer season in the Antarctic and Arctic east.
- b. To clear channels and escort ships year-round along the western coast of Alaska as far as Wainwright.
- c. To conduct oceanographic, meteorological, geophysical and biological research in the operational areas included in a. and b. above and in the Weddell Sea.
- d. To provide heli-borne mission support as follows:
 - i. Ice reconnaissance within a radius of 188 miles.
 - ii. Logistic services and personnel transport within a radius of 100 miles.

- iii. Provide direct and indirect support of scientific operations.
 - iv. Provide Search & Rescue services within the capabilities of the assigned aircraft.
 - e. Provide limited logistic support of small detachments and advanced bases in high latitudes that are not accessible to conventional ships.
5. The following are the “Required Operational Features.”
- a. To be capable of breaking at least four feet of first year plate sea ice in a continuous mode and at least 15 feet of sea ice in the ramming mode.
 - b. Maximum reliability of the hull, propulsion and control systems shall be a primary design consideration.
 - c. Minimum endurance shall be 30 days at 100% power. The vessel to have an emergency wintering-in capability.
 - d. Maximum sustained speed in calm open water shall be 17 knots. Normal transit speed to and from the operational areas will be 16 knots.
 - e. A general cargo space for 500 measurement tons shall be provided.
 - f. Cranes capable of handling cargo from the cargo space as well as the deck cargo and small oceanographic buoys shall be provided.
 - g. Facilities shall be provided for receiving and discharging diesel and aviation fuel. The minimum rate for receipt or discharge of diesel fuel shall be 55,000 gallons per hour.
 - h. The design shall provide a high degree of manoeuvrability, a small turning circle and a quick ship/control response to permit close quarters operation with icebound ships.
 - i. An ability to tow and be towed is required. A towing winch and a stern notch shall be provided.
 - j. A helicopter flight deck, hangar and aviation servicing [facilities] will be provided for the extended support of two embarked H-52 type helicopters. Provision for stowage of 30,000 gallons of jet fuel and 200 gallons of aviation lubricating oil.
 - k. Twin 15-ton general purpose cranes aft for aircraft handling from the water or dock to ship and for handling the ship’s boats.
 - l. One permanently installed hydrographic laboratory and one permanently installed multi-purpose scientific laboratory will be

- included in the design. Provision will be made for accepting temporary installation of three special-purpose scientific vans.
- m. Two oceanographic winches and a trawl/dredging winch are required.
 - n. Facilities for collecting and recording meteorological data.
 - o. A data processing capability to analyse scientific data is required.
 - p. The following electronic capabilities are required:-
 - i. High resolution short range (100 miles) surface search radar for ice navigation.
 - ii. Long range (100 slant range) surface search radar with SIF interrogator.
 - iii. Navigation: NAVSAT receiver
 Loran-C Receiver
 Omega receiver
 Fathometer
 RDF 275-510 Kc/2-3.5 Mc.
 - q. Communications:

<u>Emission</u>	<u>Range</u>	<u>Reliability</u>
300-535 KHz A1, A2	500 m	85 %
2-9 MHz A3h, A3y	100 m	85 %
2-3 MHz A1, A3, F4	1,000-25 m	85 %
152-162 MHz F3	25 m	90 %
115-156 MHz A2, A3	50 m	75 %
225-400 MHz A2, A3	25 m	90 %
 - r. Other:
 - Beacon timer, keyer
 - Tacan System transmitter
 - Amateur radio facilities

- 6. The following is the "Concept of Operations".
 - a. Icebreakers will be capable of making Arctic and Antarctic deployments during the same calendar year. Operations away from home may require as many as 270 days/year.
 - b. Minimum manning standards. All personnel to be fully qualified. No training billets.
 - c. The number of civilian scientists and technicians to be minimal.
 - d. Icebreakers will be based in the same home port.

- e. An icebreaker training and support facility will be provided at the home port site.
 - f. Individual members of icebreakers crews should not be deployed away from their home port in excess of 180 days/year. It is envisaged that a rotational crew concept will be developed where two thirds of allowed personnel will be deployed while the remaining third will man the support facility ashore.
7. The following general observations and quotations may be of interest:
- a. The replacement icebreaker to cost no more than 55 millions. To be capable of operating up to 270 days annually, manned by an ‘augmented’ crew of up to 138 officers and men.
 - b. To stay within the price ceiling the ship must be mechanically and electronically simple.
 - c. The ship is (hopefully) in the United States Coast Guard’s FY 1971 budget.
 - d. The crew of 138 included 14 aviators and 1 doctor.
 - e. Four new 270 day ships produce as many ships annually as six new 180 day ships and cost \$95 millions less over 30 years.
 - f. Disposition of icebreakers would see Glacier on the east coast and four new icebreakers on the west. To be used for icebreaking only and not open water scientific projects.
 - g. Capable of 100% full power for 30 days. U.S.C.G. envisage icebreaker needed for North Slope duty will be in the 60,000 SHP power range.
 - h. If this first replacement icebreaker is made too expensive it will never be built and the view was that “it was doubted the traffic would bear a cost of more than \$55 millions.”
 - i. Therefore the cost of the first replacement breaker would be as outlined above, the vessel to be non-combatant, minimum manning, horsepower between 20,000 and 30,000. To replace the Wind-class and would be slightly larger and more capable than Glacier.
 - j. “We are already in a poor third place behind the Russians and the Canadians as concerns icebreaking capability and sliding back further each year, while they continue to build newer, bigger and better icebreakers. Is this in the national interest? Or do we fall back on the argument that we have more social unrest than they

do and that our funds must be diverted to internal problems such as civil disorder, pollution

- k. To operate year-round off the north Alaskan coast requires a capability of breaking polar ice which has an equilibrium thickness of ten feet. The power requirement for this with a normal icebreaking hull equals 170,000 SHP.
- 1. A formula for continuous icebreaking down to zero speed but not stopped or ramming requires the following power:
$$\text{SHP} = (700 + 10B) t^2$$
 where B = Beam in feet
t = Ice thickness in feet
- m. Ramming to break ridges or thick ice:
$$H = 0.123V^{0.5} \Delta^{0.4225}$$
 where H = Ice thickness in feet
V = Impact velocity in knots
Δ = Displacement in long tons

Ref: D

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

16 Jul 1969

Address Reply To:

Commander
Eastern Area
U.S. Coast Guard
Governors Island
New York, N.Y. 10004

Operation Order

COMEASTAREA No. 14-69

- Ref: (a) COMDT (OP) ltr [dated] 1 July 1969
(b) COMDT (OMS-2) ltr 3900.1 dated 6 May 1969
(c) CCGDFIVE OPORDER No. 6-69 dated 20 May 1969

Time Zone: Use Zulu time for operations.

Task Organization:

- a. USCGC WESTWIND (WAGB-281) CAPT J. S. THUMA, 4207, USCG

Supporting Forces:

- a. USCGC NORTHWIND (WAGB-282)
- b. CCGS JOHN A. MACDONALD

1. SITUATION.

The SS MANHATTAN will attempt to transit the Northwest Passage from Baffin Bay to Northern Alaska, into the Arctic Ocean and return this summer. USCGC NORTHWIND (WAGB-282) will proceed from Point Barrow about 15 July, proceed to Baffin Bay join CCGS JOHN A. MACDONALD and SS MANHATTAN and provide escort. NORTHWIND will also provide escort for the return voyage to Baffin Bay in October. In the event NORTHWIND is unable to rendezvous with SS MANHATTAN clear of ice in Baffin Bay, WESTWIND will be directed to provide escort westbound until rendezvous with NORTHWIND is accomplished.

2. MISSION.

To provide escort of SS MANHATTAN from Baffin Bay, through the Northwest Passage until rendezvous is made with CGC NORTHWIND.

3. EXECUTION.

- a. When directed, CHOP to COMEASTAREA and proceed to position of SS MANHATTAN in Baffin Bay. Provide escort of this vessel through the Northwest Passage to rendezvous with CGC NORTHWIND. When rendezvous is made and escort is assumed by NORTHWIND return to Baffin Bay and CHOP back to CTF-SIX for resumption of ARCTIC EAST duties.

- b. Conduct ice tests, helo reconnaissance flights and oceanography as necessary to support this project as directed in Ref (a).

- c. Submit daily SITREPS at 0800 local time in the format directed in Ref (a).

- x. Coordinating Instructions.

- (1) This Operation Order is effective upon receipt for planning and for execution when directed by COMEASTAREA.

(2) Direct liaison is authorized between the Task Organization and Supporting Forces for coordination of matters within the scope of this OORDER.

(3) Commanding Officer CGC WESTWIND is granted authority to transport U.S. and foreign military and civilian personnel as necessary to accomplish this assignment. Obtain release of liability from all foreign personnel carried.

(4) Chief Project Officer, Arctic Tanker Evaluation Project (Coast Guard) will exercise coordinating control over Coast Guard Units engaged in this operation.

(5) This Operations Order is cancelled upon return of WESTWIND to operational control of CTF-SIX after completion of escort duties.

4. ADMINISTRATION AND LOGISTICS.

- a. Administrative control remains with Commander, Fifth Coast Guard District.
- b. Refuel and replenish as necessary.

5. COMMAND AND SIGNAL

a. Communications shall be in accordance with CG-233, CG-233-1, COMEASTAREA OPLAN, NWP-16(c) and appropriate JANAPs, ACPs, and ATPs.

b. Commander, Eastern Area, U.S. Coast Guard Governors Island, New York, N.Y., 10004, Telephone 212-264-4800.

(Sgd.) MARK A. WALEN
Rear Admiral, U.S. Coast Guard
Commander, Eastern Area

Distribution:

COMDT COGARD (4)
USCGC WESTWIND (4)
COMWESTAREA (2)
CCGDFIVE (2)
CCGDTHIRTEEN (2)
CCGDSEVENTEEN (2)
USCGC SOUTHWIND (2)
USCGC NORTHWIND (2)
USCGC STATEN ISLAND (2)

Canadian DOT (CAPT. PULLEN) (2)
CCGS JOHN A. MACDONALD (2)
CTF-SIX (2)
COMSTS (2)
CNO (OP-33) (2)
Chief Project Officer, Arctic Tanker
Evaluation Project (Coast Guard) (4)

Ref: E

July 1, 1969.

From: Commandant

To: Commander, Eastern Area
Commander, Seventeenth Coast Guard District (o)

Subj: Outline Operation Plan; Arctic Tanker Evaluation; Icebreaker support.

1. Pursuant to departmental policies on overall national transportation responsibility and at the request of Humble Oil Company on behalf of the joint industry task force which is evaluating the feasibility of regular tanker traffic through the Northwest Passage, the U.S. Coast Guard will support and assist in the forthcoming test passage of SS MANHATTAN westbound through the Northwest Passage to Northern Alaska, into the Arctic Ocean, and return, in order to advance the development of a transportation system for Arctic Alaska. The Canadian Department of Transportation is supporting this operation as indicated in paragraphs 3(b) and 3(e).

2. Addressees shall sail WAGB's so that one will accompany SS MANHATTAN while she is in polar waters in order to provide the following support and assistance:

- a. Conduct ice tests.
- b. Conduct underwater inspections.
- c. Conduct short range (helo) ice racco.
- d. Conduct an oceanographic program of opportunity to supplement ice tests.
- e. Provide other conventional icebreaker support, as required.

- f. Conduct other scientific/research programs as directed.
 - g. Provide public information coverage and assistance to embarked media representatives.
3. a. SS MANHATTAN is being rebuilt as an icebreaker. She is specially instrumented with numerous strain gages, power meters, accelerometers and recorders. She is scheduled to be RFS on 15 July, but departure from the east coast of the U.S. may be as late as August. ETA at the edge of the Baffin Bay pack at 73°N is estimated for 10 days after departure from CONUS. She will traverse the Parry Channel as far as Viscount Melville Sound, then proceed further west via either M'Clure Strait or Prince of Wales Strait according to a determination then to be made by the industry project manager, thence to the Beaufort Sea off Prudhoe Bay. Further movement will be as necessary to accomplish the principle objective which is to acquire test data. In any case, MANHATTAN is to return to Baffin Bay in time to clear the ice by October.
- b. CCGS John A. MacDonald (Captain Paul FOURNIER) will accompany MANHATTAN with substantially the same orders as are provided herein for the WAGB. Early plans have been for her to arrive at Thule on 19 July to be ready to depart on or about the 23rd.
- c. The industry project manager (Mr. S.B. Mass) embarked in MANHATTAN is the civilian authority who heads up the joint industry task force. He will be advised by a representative of the Commandant (Captain F.A. GOETTEL) and by a representative of the Canadian Department of Transport (Captain T. C. PULLEN, RCN, Ret.). Pursuant to such advice and as necessary to further the objectives of the operation, he will request icebreakers to conduct ice tests, under-water inspections, ice recco and to conduct other conventional icebreaker support.
- d. The U.S. Coast Guard representative to the industry project manager will serve also a Chief Project Officer, Arctic Tanker Evaluation Project (Coast Guard). In that capacity, he will exercise coordinating control over other U.S. Coast Guard personnel and U.S. Coast Guard units engaged in the operation. Technical control over other project officers will be retained by their office chiefs and operational control of the WAGB will be retained by addressees, as appropriate. The Chief Project Officer will provide liaison between Coast Guard units/personnel and the industry and Canadian authorities on the scene. This liaison function does not preclude normal

direct communication between commanding officers of units or between individuals in routine accomplishment of their functions. The Chief Project Officer has authority to assign an officer temporarily from the WAGB to the MANHATTAN as a Coast Guard ice advisor if he should consider [it] necessary.

e. Fixed wing ice [reconnaissance] will be provided to support the mission. A Canadian remote sensor equipped DC-4 will support the entire test. A USCG SLAR equipped C-130 will support the test approximately 15 August to 15 September in conjunction with previously scheduled Coast Guard SLAR sea ice research. The C-130 will be supported by CG Headquarters and be under operational control of the SLAR research project officer. Other U.S. Navy and Coast Guard aircraft may support the mission as required. An Ice Central will be established in Halifax to support the test and ice conditions and forecasts will be transmitted via normal channel. Fleet Weather Facility, Kodisk will provide normal Arctic West support.

[page missing]

... Examples are the possible use of the Coronation Gulf route for the Seventeenth District WAGB on her initial eastbound passage, and the probable use of Pond Inlet for initial ice testing of MANHATTAN. Helo overflight may occur during ice recco and landings for logistics at such places as Resolute and Inuvik may become necessary. Accordingly, operational control authorities are reminded of the need for notification of Canadian Forces pursuant to COMDTINST 3128. IB. A single notification in general terms to cover the entire operation is desirable.

e. Provide the commanding officer WAGB with authority to transport U.S. and foreign military and civilian personnel as necessary to accomplish assigned tasks. Obtain release of liability from all except U.S. military personnel.

f. Details on boarding of WAGB by special PIO and scientific personnel will be developed and disseminated after specific ship assignments and the timing of ship movements becomes known. Anticipated number of people involved are 5 PIO (3 media, 1 JO, 1 PH), 5 Coast Guard research (2 off., 3 civ.) and 2 MANHATTAN research (2 civ.).

5. This document constitutes authority and direction to conduct necessary direct liaison and to issue vessel movement orders to accomplish the U.S. icebreaker support of the 1969 Arctic Tanker Evaluation Project.

R. W. GOEHRING
Chief, Office of Operations

Copy to:
COMW ESTAREA
CCGD-5
CCGD-13
CGC WESTWIND
CGC SOUTHWIND
CGC NORTHWIND
CGC STATEN ISLAND
Canadian DOT (CAPT. PULLEN)
CCGS John A. Mac Donald
CTF SIX
COMSTS
CNO (OP-33)

Appendix A: Captain T.C. Pullen - Record of Service

RECORD OF SERVICE
IN
THE ROYAL CANADIAN NAVY
OF
CAPTAIN THOMAS CHARLES PULLEN, C.D.

Entered the Royal Canadian Navy as Cadet - 28 August 1936; Midshipman - 1 May 1937; Acting Sub-Lieutenant - 1 May 1939; Lieutenant - 15 May 1940; Lieutenant(G) - 16 August 1941; Lieutenant-Commander(G) - 15 November 1948; Commander - 1 July 1951; Captain - 1 July 1955; Honourably Released - 4 April 1966.

DECORATIONS, CAMPAIGN STARS AND MEDALS

1939-1945 Star; Atlantic Star with France and Germany Clasp; Defence Medal; Canadian Volunteer Service Medal with Clasp; War Medal; Queen Elizabeth II's Coronation Medal - 1953; United Nations Service Medal; Canadian Forces' Decoration - 1948; First Clasp to Canadian Forces' Decoration - 1958.

APPOINTMENTS

The appointments in which THOMAS CHARLES PULLEN served between 1936 and 1966 are detailed on the pages which are attached to and form part of this Record of Service.

CHIEF OF PERSONNEL
28 July, 1965

Between 1936 and 1966, THOMAS CHARLES PULLEN served as an Officer of the Royal Canadian Navy in the following appointments:

IN THE RANKS OF CADET, ACTING SUB-LIEUTENANT, SUB-LIEUTENANT, LIEUTENANT AND LIEUTENANT(G)

HMCS STADACONA		28 August 1936
HMS FROBISHER		9 September 1936
HMS SHROPSHIRE		1 May 1937
HMS SUSSEX		14 July 1937
HMS HOTSPUR		2 November 1937
HMS HOSTILE		15 December 1937
HMS SUSSEX		12 February 1938
HMCS STADACONA		3 July 1938
HMS SUSSEX		15 October 1938
HMS DRYAD		14 October 1939
HMCS ASSINIBOINE		23 October 1939
HMS EXCELLENT	for Gunnery Course	20 January 1941
HMCS STADACONA	for Gunnery School	14 October 1941
HMCS NIOBE	as Executive Officer	5 November 1941
HMCS NIOBE	in command	1 February 1942
HMCS OTTAWA	as Executive Officer	17 February 1942
HMCS STADACONA		25 September 1942
HMCS CORNWALLIS		28 October 1942
HMCS CORNWALLIS	in charge of Gunnery School	1 December 1942
HMCS CORNWALLIS	for Gunnery School	13 June 1943
HMCS NIOBE	for CHAUDIERE	3 October 1943
HMCS CHAUDIERE	as Executive Officer	15 November 1943
HMCS SASKATCHEWAN	in command with acting rank of Lieutenant-Commander(G)	25 August 1944
HMCS NIOBE	for Gunnery Courses with acting rank of Lieutenant-Commander(G)	12 October 1945
HMCS STADACONA	as Officer-in-Charge Gunnery School with acting rank of Lieutenant-Commander(G)	26 November 1945

HMCS STADACONA	as Officer-in-Charge Gunnery School and on staff of Commanding Officer Atlantic Coast as Staff Gunnery Officer with acting rank of Lieutenant-Commander(G)	1 April 1946
HMCS NIOBE	for Royal Navy Tactical Course with acting rank of Lieutenant-Commander(G)	19 January 1948
HMS PRESIDENT	for Staff Course at Royal Naval College Greenwich with acting rank of Lieutenant-Commander(G)	30 March 1948
HMCS MAGNIFICENT	with acting rank of Lieutenant-Commander(G)	23 October 1948

IN THE RANKS OF LIEUTENANT-COMMANDER(G) AND COMMANDER

HMCS MAGNIFICENT		15 November 1948
HMCS IROQUOIS	in command	24 June 1949
HMCS MAGNIFICENT		19 October 1949
HMCS STADACONA	on staff of Flag Officer Atlantic Coast	14 November 1949
HMCS HAIDA	for LA HULLOISE	15 February 1950
HMCS HURON	in command	25 March 1950
HMCS HAIDA	for LA HULLOISE	7 April 1950
HMCS LA HULLOISE	in command and on staff of Reserve Training Commander as Sea Training Officer	1 June 1950

IN THE RANKS OF LIEUTENANT-COMMANDER(G) AND
COMMANDER (continued)

HMCS CORNWALLIS	as Executive Officer	12 November 1951
HMCS CORNWALLIS	in command and on staff of Flag Officer Atlantic Coast as Officer-in-Charge New Entry Training	1 June 1952
HMCS CORNWALLIS	as Executive Officer	28 July 1952
HMCS HURON	in command	21 September 1953
HMCS HURON	in command and as Commander Canadian Destroyers Far East with acting rank of Captain	6 November 1953
HMCS HURON	in command	6 February 1954
NAVAL HEADQUARTERS	on staff of Chief Naval Personnel for VENTURE Board, Toronto	28 June 1954
NAVAL HEADQUARTERS	on staff of Director Naval Plans and Operations as Staff Officer Strategy	27 August 1954
NAVAL HEADQUARTERS	on staff of Assistant Chief Naval Staff Warfare as Director Naval Gunnery	3 December 1954

IN THE RANKS OF CAPTAIN

NAVAL HEADQUARTERS	on staff of Assistant Chief Naval Staff Warfare as Director Naval Gunnery	1 July 1955
HMCS LABRADOR	in command	13 February 1956

IN THE RANKS OF CAPTAIN (continued)

HMCS NIOBE	for course at Imperial Defence College	7 January 1958
HMCS NIOBE	as Executive Officer and as Chief of Staff to Naval Member Canadian Joint Staff London and as Canadian Naval Member to Military Agency for Standardization	15 December 1958
HMCS SHEARWATER	in command	25 July 1960
NAVAL HEADQUARTERS	on staff of Vice Chief Naval Staff	29 October 1962
NAVAL HEADQUARTERS	on staff of Assistant Chief Naval Staff Air and Warfare as Director Naval Ship Requirements	25 January 1963
HMCS PROVIDER	in command	28 September 1963
CANADIAN FORCES HEADQUARTERS	on staff of Director General Operations as Director Maritime Operations	14 December 1964
CANADIAN FORCES HEADQUARTERS	for Rehabilitation Leave * * *	10 August 1965
	Honourably Released	4 April 1966

Appendix B: Captain T.C. Pullen, *curriculum vitae* (revised, posthumously, 29 July 1999)

Captain T.C. Pullen

O.C., C.D., Royal Canadian Navy (ret'd),
D.Sc. (Hon), F.A.I.N.A
1306 Chattaway Ave, Ottawa, Canada, K1H 7S4
(613) 733-8352

--ooOoo--

Adviser and consultant on arctic marine operations to governments and industry for 24 years following 30 years naval service.

Ice Master for four successful transits of the Northwest Passage, two as the Government of Canada's official representative on board the 155,000 tonne icebreaking tanker Manhattan. The third, in 1984 aboard the M/S Lindblad Explorer, realized the centuries old dream of using the passage to reach the orient. The ship sailed from St. John's, Newfoundland to Yokohama, Japan.

Additional operational undertakings include icebreaker operations, arctic towing, convoying in ice, arctic hydrography and oceanography. Author of more than 50 studies and papers for clients on arctic matters.

Commanding Officer of the naval icebreaker H.M.C.S. Labrador. Senior officer of United States Navy, U.S. Coast Guard, and Canadian ships, deployed to the Eastern Arctic for construction of the Distant Early Warning Line, 1956-57. US Navy Task Group Commander for "Operation Bellot"-1957.

Writer and lecturer on arctic marine operations, the Northwest Passage, and sovereignty issues.

Expert witness in litigation involving mishandling of ships in ice. Witness on arctic marine matters before committees of both the House of Commons and the Senate.

Awarded the Massey Medal of the Royal Canadian Geographical Society, 1984. Appointed an Officer of the Order of Canada, 1984. Doctor of Science (Hon), 1985. Fellow of the Arctic Institute of North America and the Explorers Club.

Awarded the Admirals' Medal, an annual award established by three retired Admirals to recognize work done by former Naval personnel, October 1990 (awarded posthumously).

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Selected Studies & Undertakings

Personnel Considerations in the safe operation of ships transiting the Canadian Arctic. (Melville Shipping - Study - 1985)

Public Lecture series on the successful 9,000 mile transit of the Northwest Passage by the expedition ship "Lindblad Explorer", Ottawa, Toronto and Victoria- 1984.

Adviser to the Federal Environmental Assessment Review Panel on moving Beaufort Sea oil to market by ship. Environment Canada- 1983.

Proposed navigation of the Northwest Passage by "Arctic Shiko". Study and recommendations prepared for Federal Commerce- 1983.

Report to the Department of Fisheries & Oceans on the level of client satisfaction provided by the Canadian Hydrographic Service - 1982.

Consultant to the Govt. of the Northwest Territories for National Energy Board hearings into the shipment of liquid natural gas (LNG) by sea to market by the Arctic Pilot Project- 1982.

Consultant, with Dutch experts, to Dome Petroleum concerning the design and use of icebreaking dredgers in the Beaufort Sea - 1982.

Witness before the Standing Senate Committee on Foreign Affairs (Sub-Committee on National Defence) on the Navy's Arctic role- 1982.

"Manhattan" - the 155,000 tonne icebreaking tanker's Northwest Passage Voyage. Post voyage report to the Dominion Hydrographer- 1970.

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Selected Speeches

Royal Canadian Geographical Society, Convocation Hall University of Toronto.

NORTHWEST PASSAGE—1984.

Canadian Centre for Mineral & Energy Technology, Ottawa, 1984.

THE ARCTIC SHIPS & BRITTLE FRACTURE .

Arctic Circle, Ottawa, 1984.

THE NORTHWEST PASSAGE LINDBLAD EXPLORER IN
1984.

Swedish Trade Fair, Gothenborg, 1983.

THE NORTHWEST PASSAGE -PROSPECTS FOR YEAR-
ROUND NAVIGATION.

- Arctic Circle, Ottawa, 1982.
TOW OF THE 'ARVIK II TO THE ARCTIC.
- Canadian Meteorological & Oceanographic Society, Ottawa. 1982.
ARCTIC SURVEY.
- Northwest Territories Chamber of Mines, Yellowknife, 198 2
ARCTIC OVERVIEW.
- Royal Nova Scotia United Services Institute, Halifax, 1981
THE ARCTIC MARINE SCENE.
- Arctic Circle, Ottawa, 1978.
THE ARCTIC MARINE SCENE.
- University College Alumnae Association, Hart House, 1971.
NORTHERN WATERS.
- Women's Canadian Club, London, 1971.
THE MANHATTAN's ARCTIC VOYAGES.
- Dominion Marine Association, 1971.
IN THE WAKE OF THE 'MANHATTAN'.
- Ditchley, Oxfordshire, 1971.
ARCTIC OCEAN CONFERENCE.
- Canadian Club, Ottawa, 1970.
LESSONS FROM THE 'MANHATTAN' VOYAGES.

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Canadian Clients

Albery. Pullerits. Dickson & Associates, Toronto
Alfred Bunting & Company, Toronto
Aquitaine
Arctic Canada Transmission Company, Toronto
Baffinland Iron Mines. Toronto
Bechtel Canada, Toronto
Brissct, Bishop, Davidson. (Advocates), Montreal
Canadian Hydrographic Service. Ottawa
Canada Centre for Remote Sensing, Ottawa

Chemacryl Plastics, Toronto
Cominco, Vancouver, Toronto & Yellowknife
DeLeuw Cather. Ottawa
Dept. of the Environment, Ottawa
Dept. of Fisheries & Oceans, Bayfield Lab., Burlington
Dept. of Indian Affairs & Northern Development, Ottawa
Dept. of National Defence. Ottawa
Dept. of Transport, Ottawa
Dome Petroleum, Calgary
Falconbridge Canada, Toronto
Federal Commerce & Navigation, Montreal
German & Milne. Naval Architects, Montreal
Government of New Brunswick. Fredericton
Government of the Northwest Territories, Yellowknife
Great Plains Committee. Toronto
Hudson Bay Mining & Smelting. Toronto
Imperial Oil, Calgary
International Iron Ore Co .. Toronto
James Bay Development Corporation. Montreal
Lalonde. Valois. Lamarre & Associates. Montreal
Lea, Benoit & Associates. Montreal
LGL Environmentalists. Toronto
Leslie Engineering. Toronto
Marinav Corporation, Ottawa
Melville Shipping. Calgary
Montreal Shipping Company, Montreal
Pacific Petroleums. Calgary
Polar Gas Project. Toronto
Protective Plastics, Toronto
Price Pulp & Paper. Newfoundland
P. S. Ross & Partners, Ottawa
Royal Canadian Geographical Society. Ottawa
Strathcona Mineral Services (Nanisivik Mines)
Sun Oil Company, Calgary
TransCanada Pipelines. Toronto
Transportation Development Agency. Montreal
Watts, Griffis & McOuat Limited, Toronto
Western Decalta. Calgary

International Clients

Atlantic Richfield, Seattle
Discovery Reederei, Hamburg, Shipowners & Operators
Donovan, Maloof, Walsh & Kennedy, Solicitors, New York
Henry, J. J., Naval Architects, New York
Holman, Fenwick & Willan, Solicitors, London
Humble Oil, Dallas
Lauritzen, J., Shipowner, Copenhagen
Lost River Mining Corporation, Alaska
Lindblad Travel, New York
Noble Denton & Associates, Ocean Engineering, London
Norton, Rose, Botterell & Roche, Solicitors, London
Raymond and Whitcomb, New York
Salen Lindblad Travel, New York
Salen Shipping Companies, Stockholm
Seatrains Lines, Inc., New York
Society Expeditions, Seattle
Zanen Verstoep NV, The Hague, Holland

Published Material

Politics of the Northwest Passage. Review. *Canadian Geographic*, Feb/Mar, 1988.

The Bonnie. HMCS Bonaventure. Review. *Canadian Geographic*, Feb/Mar, 1988.

What Price Canadian Sovereignty? "Proceedings" of the United States Naval Institute, September, 1987.

Why we need a Polar 8. *Canadian Geographic*, April/May, 1987.

The Northwest Passage- 1984. *Canadian Geographic*, December, 1984/January 85.

The North Atlantic Run. Review. *Canadian Geographic*, August/September, 1985.

U-Boats Against Canada. Review. *Canadian Geographic*, Oct/Nov, 1985.

- The View from the Bridge- Then & Now- The Franklin Era in Canadian Arctic History 1845-1859. National Museum ofMan, 1984.
- The Ocean Almanac. Review. Canadian Geographic, June/July, 1984.
- Arctic Marine Transportation. Canadian Arctic Resources Committee, "People, Resources & the Environment North of Sixty, Yellowknife, 1983.
- 3,000 mile Arctic Towing Odyssey. Canadian Geographic, Dec 81/Jan 82 issue.
- Arctic Outlet. Canada-Japan Trade Council, 1981.
- Development of Arctic Ships. A Century of Canada's Arctic Islands, 1880-1980. Royal Society of Canada, 1980.
- Natural Gas from the Arctic by the Marine Mode. Science Council of Canada & Atlantic Provinces Economic Council, 1977.
- Moving Energy to Market. Seventh National Northern Development conference, Edmonton, 1977.
- Arctic Sightseers. Hudson's Bay Company Journal *Beaver*, 1973.
- Arctic Challenge. Canadian Defence Quarterly, 1973.
- Arctic Shipping - Time for Decision. Northern Miner, 1972.
- Expanded Arctic Shipping. Sentinel, Department of National Defence, 1971.
- Surface Marine Shipping. Fifth National Northern Development Conference, Edmonton, 1970
- In the Wake of the Manhattan. Canadian Shipping & Marine Engineering, 1970.
- The Northwest Passage. American Petroleum Institute, 1970.
- Manhattan's Northwest Passage Voyage. The Empire Club, 1970.
- S.S. Manhattan in Arctic Waters. Canadian Geographic, May, 1970.

Polar Experience: A Summary

1955	HMCS <i>Labrador</i> *	Eastern Arctic & Foxe Basin- Distant Early Warning (DEW) Line Sealift familiarization.
1956	HMCS <i>Labrador</i> *	Commanding Officer & Senior Officer, USN, USCG & Canadian Eastern Arctic DEW-Line Sealift Convoys.
1957	HMCS <i>Labrador</i> *	Commanding Officer & US Navy Task Group Commander for "Operation Bellot", the survey & opening of Bellot Strait.
1965	CCGS <i>John A Macdonald</i> *	Eastern Arctic (Milne Inlet, Eclipse Sound, Baffin Bay) route survey for Baffinland Iron Mines.
1966	CCGS <i>d'Iberville</i> *	(as for 1965)
1967	CCGS <i>John A Macdonald</i> *	(as for 1965)
1968	CCGS <i>Camsell</i> *	Alaskan & western arctic sea route survey to Coppermine, NWT, from Point Barrow, Alaska, for mining interests.
1969	<i>S/T Manhattan</i> *	Northwest Passage (Halifax, NS, to the Chukchi Sea & return) as Canadian Government representative, co-ordinator of supporting icebreaker operations, & adviser to Humble Oil (now EXXON).
1970	CCGS <i>Louis St Laurent</i> *	Second Manhattan Arctic Tanker test voyage to Pond Inlet, Baffin Is. (representing Hudson Bay mining).
1971	USCGC <i>Glacier</i> *	First survey of winter icc regime in the Bering Sea to assess shipping prospects.
1974	<i>M/S Lindblad Explorer</i>	First cruise by an ice-strengthened passenger ship into high latitudes of Canadian arctic waters including Kane Basin.
1976		To Wartsila Shipyard, Helsinki, with Government team Design & building of large icebreakers
1977	<i>M/S Gothic Wasa</i>	Icc Master for the first ship to load product at the new lead/zinc mine at Nanisivik, North Baffin.
1978		To the Chukchi Sea, Alaska, to select a port site near Kivalina for U.S. mining interests.
1979	CCGS <i>Sir John Franklin</i> *	Hydrographic survey of uncharted Prince Albert Sound, Victoria Is, NWT for Polar Gas Project.
	<i>M/S South Rainbow</i>	Ice Master. 80,000 ton Swedish bulk carrier. Ice

		transit, Gulf of St Lawrence.
1980	CCGS <i>J.E. Bernier*</i>	Hydrographic survey of uncharted Minto Inlet, Victoria Island, NWT, for Polar Gas Project.
1981	O/T <i>Irving Cedar</i>	Ice Master. Ocean tow, TIIree Rivers, PQ, to the high arctic. of the 12,000 ton process barge <i>Arvik II</i> , & to represent the owner's interests (Cominco) & prime contractor (Bechtel).
1982	M/V <i>Lindblad Explorer</i>	Ice Master for a 7,000 mile voyage Iceland, Greenland and the eastern Canadian arctic
1983		To Prudhoe Bay, Alaska, representing underwriters during Ice transit of a 26,000 tonne, \$350 million, sea-water treatment plant on tow from Korea.
1984	M/V <i>Lindblad Explorer</i>	Ice Master. Northwest Passage voyage from St John's, Nfld, to Yokahama, Japan.
1986	M/V <i>World Discoverer</i>	Ice Master. Unsuccessful attempt on Northwest Passage - Greenland to Larsen Sound & return.
1987	M/V <i>Society Explorer</i>	Antarctic voyage- Cape Horn, Drake Passage, Antarctic Peninsula, Falkland Islands, Strait of Magellan & Beagle Passage.
1988	M/V <i>Society Explorer</i>	Ice Master. Northwest Passage from the Aleutians & Provideniyeh, Siberia to Southwest Greenland.
1989	M/V <i>Society Explorer</i>	Ice Master. Greenland., Foxe Channel, Frozen Strait & Hudson Bay

(* denotes icebreaker)

CCGS Canadian Coast Guard Ship O/T Ocean Tug
 HMCS Her Majesty's Canadian Ship S/T Steam Tanker
 M/S Motor Ship USCGC U.S. Coast Guard Cutter
 M/V Motor Vessel

Of all the foregoing, a number stand out as having particular significance:

- The double transits in one season of that enormous 15 5, 000 ton icebreaker Manhattan
- The successful tow, from the St Lawrence to the high Arctic, of the 12,000 ton process barge in the face of so many critics who were determined it could not be done.
- The completion of four Northwest Passage transits.
- Circumnavigation of Baffin Island including the navigation of Fury & Hecla Strait, late in the season, and totally unaided.

Appendix C: List of Northwest Passage Voyages, 1906-89

NORTHWEST PASSAGE

1906 - 1989

A record of ships, submarines & small craft
known to have navigated the Passage to date.

compiled by

T.C. Pullen

Ottawa Canada

As we passed between the islands (Diomedes) and the shore (Cape Prince of Wales, westernmost point of Alaska), we "old hands" gathered on deck and drank the first cup to celebrate the final accomplishment of the Northwest Passage by ship."

Roald Amundsen, August 30, 1906

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NORTHWEST PASSAGE - DEFINITION

The Northwest Passage is the route to the north of America linking the Atlantic and Pacific Oceans. To succeed in navigating the Passage, and it is the ubiquitous, infinitely variable and unpredictable ice conditions that constitute the challenge, ships must negotiate more than 2,500 nautical miles, through ice-packed waters shared by Canada, Denmark (Greenland), and the United States (Alaska). Of the 48 transits listed here, 42 were between the Atlantic and Pacific Oceans.¹

¹ In 1969, two westbound icebreakers, *Manhattan* and *John A Macdonald*, having reached open water in the Chukchi Sea west of Point Barrow, retraced their steps to the North Atlantic. A third ship, the icebreaker *Northwind*, sailed eastward from the Pacific to Greenland (Thule) to take part in the 1969 Arctic Tanker Test but was obliged to withdraw on account of main engine problems. She returned to the Pacific independently by the coastal route. These three ships became the first to navigate the Passage in both directions in a single season.

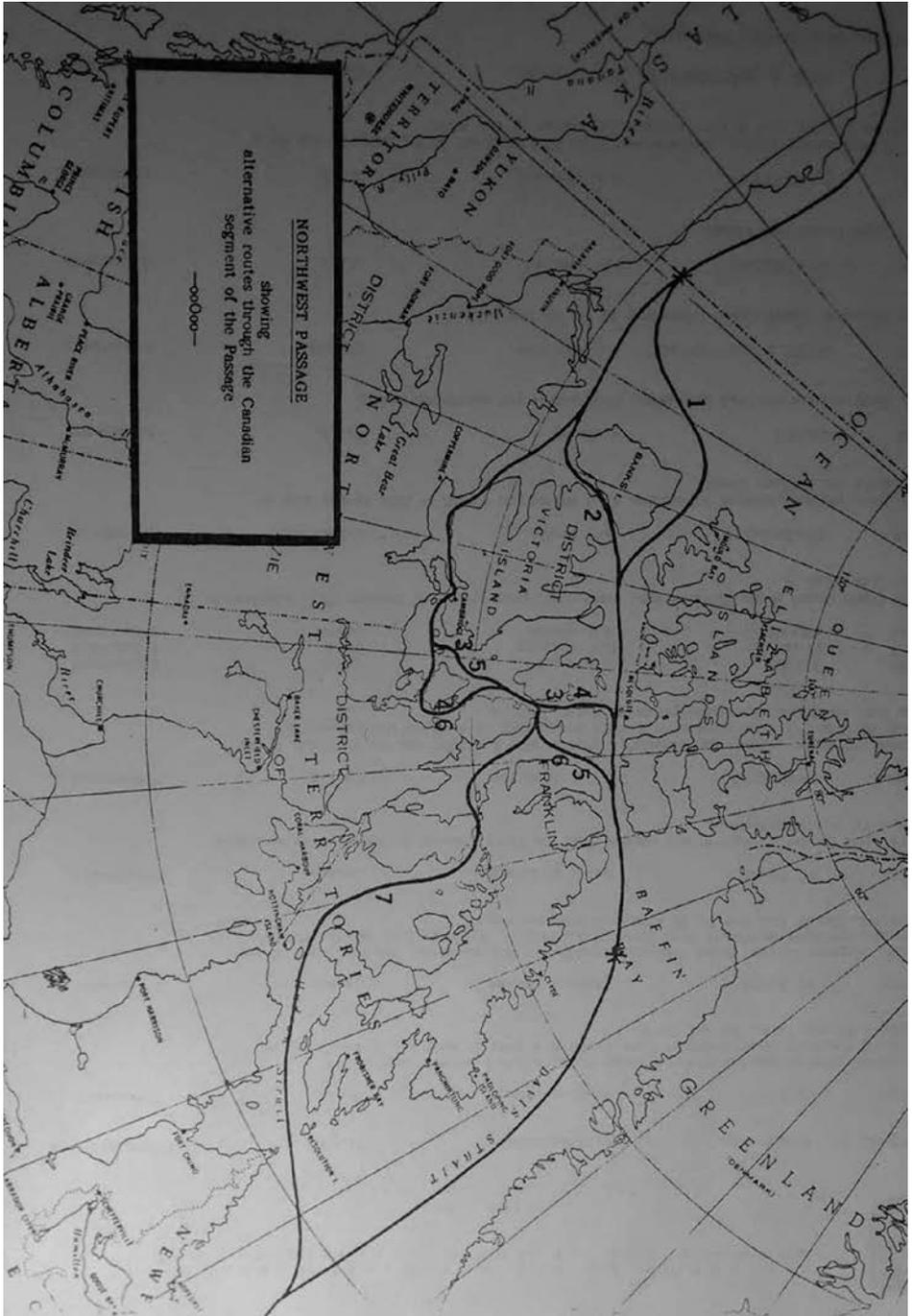
The criterion for compiling this list is navigation between Davis and Bering Straits. See Canadian Hydrographic Service Sailing Directions *ARCTIC CANADA*, Volume 1, Third Edition, 1982, Chapter 1, para 2, The Northwest Passage.

ROUTES (see MAP)

Route 1	Chukchi Sea, M'CLURE Strait, PARRY Channel, Baffin Bay & Davis Strait. The most difficult route on account of its exposure to heavy ice. The route used by submarines because of water depths.
Route 2	Chukchi Sea, Beaufort Sea, AMUNDSEN Gulf, PRINCE OF WALES Strait, Parry Channel, Baffin Bay & Davis Strait. To a degree the sheltered alternative to 1 above favoured by deep draft ships.
Route 3	Chukchi & Beaufort Seas, Amundsen Gulf thence coastal to VICTORIA & FRANKLIN Straits, PEEL Sound, Barrow Strait, Lancaster Sound, Baffin Bay & Davis Strait. Victoria Strait has yet to be surveyed to modern standards. Icebreakers drawing up to 30 ft have successfully navigated this route. They have also touched bottom.
Route 4	As for Route 3 but via SIMPSON (23 f t ruling depth) & JAMES ROSS Straits thence PEEL Sound etc. James Ross Strait is known to have a depth of 31 ft. but where can be a guess. Transiting this poorly surveyed strait, flanked by low-lying and featureless land, where there are currents and shoals, calls for careful navigation.
Route 5	As for Route 3 but via BELLOT Strait, PRINCE REGENT Inlet to Lancaster Sound etc.
Route 6	As for Route 4, SIMPSON & JAMES ROSS Straits, thence BELLOT Strait, PRINCE REGENT Inlet, Lancaster Sound etc. Ruling depth for this option remains Simpson Strait (23 ft).
Route 7	Gulf of Boothia, FURY & HECLA Strait, Foxe Basin, Hudson & Davis Straits. Difficult route because of the heavy multi-year pack to the westward of Fury & Hecla.

Note: Parry Chanel is the collective for Lancaster Sound, Barrow Strait, Viscount Melville Sound and M'Clure Strait.

Key features of each route in block capitals.



TRANSITS OF THE NORTHWEST PASSAGE
 BETWEEN THE ATLANTIC & PACIFIC OCEANS
 - 1906 - 1989 -

	YEAR	NAME	COMMANDING	FLAG	ROUTE/ DIRECTION
1	1906	GJOA	Roald Amundsen	Norway	4/Westward
1903-06. First navigation of the Passage during which 2 winters were passed making magnetic observations at Gjoa Haven & a third at King Pt., Yukon Territory. Gjoa a 57 ton, 13 hp, herring fisher.					
2	1942	ST ROCH	Henry A. Larsen	Canada	6/Eastward
Staff Sergeant Larsen, Royal Canadian Mounted Police, completed the first west to east transit, wintering in Walker Bay, Victoria Is., 1940-41, & Pasley Bay, Boothia Peninsula, 1941-42. The 80 ton, 106 ft, St Roch was schooner rigged					
3	1944	ST ROCH	Henry A. Larsen	Canada	2/Westward
First east to west transit in one season, first via Parry Channel & first to have navigated the NWP in both directions.					
4	1954	LABRADOR	O.C.S. Robertson	Canada	2/Westward
Flying the white ensign, Her Majesty's Canadian Ship Labrador was the first ship (7,000 tons, 30 ft draft), first icebreaker & first armed ship, to navigate the Passage & the first continuous circumnavigation of North America.					
5	1957	STORIS	H.L. Wood	U.S.A.	6/Eastward
6	1957	SPAR	C.V. Crewing	U.S.A.	6/Eastward
7	1957	BRAMBLE	H.H. Carter	U.S.A.	6/Eastward
U.S. Coast Guard ships. Storis a light icebreaker, remainder buoy tenders. First squadron & first U.S. ships.					
8	1960	SEADRAGON	G.P. Steele	U.S.A.	1/Westward
U.S. Navy nuclear-powered submarine. First submerged transit & first by any ship or submarine via M'Clure Strait.					
9	1962	SKATE	J. Skoog.	U.S.A.	1/Eastward
U.S. Navy nuclear-powered submarine. First submerged eastbound transit.					
10	1967	JOHN A. MACDONALD	P.M. Fournier	Canada	3/Westward
First Canadian Coast Guard icebreaker to transit the NWP.					
11	1969	NORTHWIND	J.D. McCann	U.S.A.	3/Eastward
U.S. Coast Guard icebreaker.					
12	1969	MANHATTAN	R.A. Steward	U.S.A.	2/Westward
1005 ft icebreaking tanker, displacement 155,000 tons, draft 55 ft. Largest ship by a margin of 140,000 tons & first commercial transit of the NWP.					

	YEAR	NAME	COMMANDING	FLAG	ROUTE/ DIRECTION
13	1969	JOHN A. MACDONALD	P.M. Fournier	Canada	2/Westward
Icebreaker. Accompanying Manhattan.					
14	1969	MANHATTAN	R.A. Steward	U.S.A.	2/Eastward
Return voyage bearing a symbolic cargo of Prudhoe Bay oil in a gold-painted barrel.					
15	1969	JOHN A. MACDONALD	P.M. Fournier	Canada	2/Eastward
Icebreaker. Accompanying Manhattan.					
16	1969	NORTHWIND	J.D. McCann	U.S.A.	3/Westward
17	1969	STATEN ISLAND	E.F. Walsh	U.S.A.	2/Eastward
U.S. Coast Guard Icebreaker. Accompanying Manhattan.					
18	1970	HUDSON	D.W. Butler	Canada	2/Eastward
Canadian Survey Ship. First circumnavigation of the Americas, north and south.					
19	1970	BAFFIN	P.M. Brick	Canada	2/Eastward
Hydrographic surveys.					
20	1975	SKIDEGATE	P. Kalis	Canada	6/Eastward
Training ship. Redeployment.					
21	1975	PANDORA II	R. Dickinson	Canada	7/Eastward
191 ft. First by way of Fury & Hecla Strait/Foxe Basin.					
22	1975	THETA	K. Maro	Canada	7/Eastward
Converted sealer. Accompanied Pandora through Fury & Hecla.					
23	1976	J.E. BERNIER	F. Chouinard	Canada	3/Eastward
Canadian Coast Guard icebreaking buoy tender.					
24	1977	WILLIWAW	Willy de Roos	Holland	4/Westward
Ketch. First by a yacht & first such in a single season.					
25	1978	J.E. BERNIER II	Real Bouvier	Canada	4/Westward
Yacht. Over-wintered at Resolute 1976-77 & Tuktoyaktuk 1977-78					
26	1978	PIERRE RADISSON	P. Toomey	Canada	2/Eastward
Canadian Coast Guard icebreaker.					
27	1979	LOUIS S. ST LAURENT	G. Burdock	Canada	2/Westward
Canadian Coast Guard icebreaker.					
28	1980	J.E. BERNIER	E. Chasse	Canada	4/Eastward
Canadian Coast Guard small icebreaking buoy tender. Same ship as #23.					
29	1980	PANDORA II	R. Jones	Canada	4/Eastward
See #19.					
30	1981	HUDSON	F. Mauger	Canada	3/Eastward
Hydrography.					

	YEAR	NAME	COMMANDING	FLAG	ROUTE/ DIRECTION
31	1982	MERMAID	Kenichi Horie	Japan	6/Westward
Sloop. Over-wintered at Resolute 1979-80 & 1980-81 followed by a third winter at Tuktoyaktuk 1981-82.					
32	1983	ARCTIC SHIKO	J. Dool	Canada	3/Eastward
225 ft tug/supply. Ice strengthened.					
33	1983	POLAR CIRCLE	J.A. Strand	Canada	3/Eastward
Survey ship.					
34	1984	LINDBLAD EXPLORER	Hasse Nilsson	Bahamas	4/Westward
First passenger ship. Ice-strengthened.					
35	1985	POLAR SEA	John T. Howell	U.S.A.	2/Westward
U.S. Coast Guard icebreaker.					
36	1985	WORLD DISCOVERER	Heinz Aye	Liberia	6/Eastward
First west to east passenger ship transit. Ice-strengthened.					
37	1988	BELVEDERE	John Bockstoce	U.S.A.	6/Eastward
60 ft motor sailer. First US. yacht NWP & first yacht from west to east. 1983-88. 5 winters at Tuktoyaktuk.					
38	1988	VAGABOND II	W. Jacobson	Canada	6/Eastward
Yacht. 1985-88. Over-wintered at Tuktoyaktuk 1985-86 & 2 winters at Gjoa Haven, 1986-87 & 87-88.					
39	1988	HENRY A. LARSEN	S. Gomes	Canada	5/Eastward
Canadian Coast Guard icebreaker.					
40	1988	SOCIETY EXPLORER	Heinz Aye	Bahamas	6/Eastward
(ex Lindblad Explorer) First passenger ship both east & west.					
41	1988	CANMAR EXPLORER II	(various)	Canada	3/Westward
Drillship. Escorted by CCGS Louis St Laurent to the Beaufort from the east in 1976.					
42	1988	MARTHA L. BLACK	R. Mellis	Canada	3/Eastward
Icebreaking buoy-tender. Route westward around Point Barrow blocked by ice. Obligated to return to the west coast via Panama Canal.					
43	1988	POLAR STAR	Paul R. Taylor	U.S.A.	3/Eastward
U.S. Coast Guard icebreaker. Damaged & blocked by ice off Alaska, returned to Seattle via Panama Canal.					
44	1989	POLAR STAR	R. Hammond	U.S.A.	3/Westward
U.S. Coast Guard icebreaker.					

	YEAR	NAME	COMMANDING	FLAG	ROUTE/ DIRECTION
45	1989	NORTHANGER	Rick Thomas	Britain	3/Westward
48 ft centerboard ketch. Over-wintered at Inuvik, 1988-89.					
46	1989	MABEL HOLLAND	E David S. Cowper	Britain	4/Westward
ex-R.N.L.I. Watson-Class 42 ft lifeboat. First British transit & first solo transit of the NWP, en route to the first solo circumnavigation via the Northwest Passage. Over-wintered at Fort Ross (Bellot Strait), 1986-87 & 1987-88, & at Inuvik, 1988-89.					
47	1989	ARCTIC NANABUSH	Selby Wiseman	Canada	4/Eastward
Supply vessel					
48	1989	ARCTIC NANOOK	Selby Wiseman	Canada	3/Eastward
Supply vessel. Master returned on completion of #47 to repeat navigation of the Passage with #48 escorted by CCGS Sir John Franklin.					

T.C. Pullen
Ottawa, Canada

List last revised 1 Mar 90

TRANSITS OF THE NORTHWEST PASSAGE - SUMMARY

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Total Northwest Passages	-----	48
Westward		18
Eastward		30

By flag:

Canada	26 (19E & 7W)
U.S.A.	14 (8E & 6W)
Britain	2 (2W)
Bahamas	2 (1W&1E)
Norway	1 (W)
Holland	1 (W)
Japan	1 (W)
Liberia	1 (E)

38 of the 48 transits were completed in a single season

By icebreakers (heavy & light)

Canada	10 (4W & 6E)
U.S.A.	9 (4W & 5E)

By submarines via Route 1 2* (W & E)

By private (non-military, non-commercial)

vessels (yachts/lifeboat etc) 7 (5W & 2E)

Total transits via Parry Channel or Parry Channel & Prince of Wales
Strait (Routes 1 & 2): 15

Total transits via coastal route
(Routes 3 to 7 incl.): 33

To date no ship or small craft has navigated the Northwest Passage by way of
M'Clure Strait (Route 1)

* Clandestine transits excluded

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1 April 1990

NOTEWORTHY VOYAGES

Any attempt to record successful voyages through the Northwest Passage should include a selection of those having particular significance viz.:

1 The great Norwegian explorer, Roald Amundsen, in Gjoa, because his was the first.

2 Staff Sergeant Henry Larsen, Royal Canadian Mounted Police, with St Roch. The first to navigate the Passage in both directions, by different routes, the latter in a single season, also a first.

3 HMCS Labrador (Captain O.C.S. Robertson) on account of the size and draft of his ship in navigating predominantly uncharted waters. The first to succeed flying the white ensign in what had challenged Her Majesty's ships for centuries.

4 The first submerged transit by the United States Navy's nuclear-powered submarine Seadragon (Commander G.P. Steele). A triumph of technology over the pack ice by gliding under it.

5 Manhattan (H. Steward), U.S. flag, because of her enormous size and its significance for the future. Mass, power, endurance, and strength will be the keys to success in year-round navigation as was demonstrated. The first commercial transit which is what the Passage is all about.

6 The 1970 scientific cruise of the Canadian hydrographic ship ship Hudson (D.W. Butler), the first ship to circumnavigate the Americas, North and South.

7 Mabel E. Holland (David S. Cowper), for the first solo navigation leading also to another first, a global solo circumnavigation via the Passage. The first British transit yet interestingly it ranks 46th overall considering the pioneering by Britons over centuries, particularly the Royal Navy, not only to find that elusive passage but also to sail through it.

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Appendix D: Sea Ice Glossary

C.A. Linder

http://www.whoi.edu/arcticedge/arctic_west03/facts/facts_ice.html

Arctic ice can be divided into two different types, classified by their method of formation. Icebergs are chunks of floating ice that have "calved" (broken off) from a glacier. Since they are formed from compacted snow, they are composed entirely of fresh water, like big floating ice cubes. The Greenland ice sheet and the Ellesmere, Devon, and Baffin Island glaciers in Canada account for the vast majority of arctic bergs. Since 90% of an iceberg is below the surface of the water, they travel with ocean currents and not the winds. Most bergs formed in Canada and Greenland stay in the eastern Arctic, eventually being carried into the Atlantic via Davis Strait and melting away.

The other kind of arctic ice is pack ice. This kind of ice is formed by the freezing of seawater. Seawater, because of the salt it contains, freezes in a different manner compared to fresh water. The density of seawater steadily increases as it cools, until reaching the freezing point of around -2°C (although this depends on how salty the water is). At the onset of winter, cold air chills the surface waters until a relatively large layer of water at -2°C has formed on the surface. A soupy crystalline mixture known as frazil ice begins to form in the upper layer. As this soup thickens, a thin film of ice known as grease ice forms. This film is strong enough to support the weight of a seabird, and can ripple with the waves passing beneath. As the surface temperature continues to drop, the ice forms a solid layer and is then called pack ice. Ice that forms each winter and melts each summer is known as annual ice, and is usually about six feet thick. In the central Arctic, the ice never thaws completely in summer, and thus it is known as multi-year ice. This ice ranges in thickness from 15 feet to 25 feet. Why doesn't it just keep getting thicker and thicker? Multi-year ice eventually enters an equilibrium where the amount of new ice being formed on the bottom of the layer in winter is exactly balanced by the loss due to melting off the top in summer.

Mariners have adopted a number of different names for icebergs and pack ice. The following glossary of ice terms is from Bowditch's Glossary of Marine Navigation.

Anchor ice. Submerged ice attached or anchored to the bottom, irrespective of the nature of its formation.

Bergy bit. A large piece of floating glacier ice, generally showing less than 5 meters above sea level but more than 1 meter and normally about 100 to 300 square meters in area. It is smaller than an ICEBERG but larger than a GROWLER. A typical bergy bit is about the size of a small house.

Blue ice. The oldest and hardest form of glacier ice, distinguished by a slightly bluish or greenish color.

Brash ice. Accumulations of floating ice made up of fragments not more than 2 meters across, the wreckage of other forms of ice.

Bummock. A downward projection from the underside of an ice field; the counterpart of a HUMMOCK.

Close pack ice. Pack ice in which the concentration is 7/10 to 8/10, composed of floes mostly in contact.

Compact pack ice. Pack ice in which the concentration is 10/10 and no water is visible.

Consolidated pack ice. Pack ice in which the concentration is 10/10 and the floes are frozen together.

Fast ice. Sea ice which forms and remains attached to the shore, to an ice wall, to an ice front, between shoals or grounded icebergs. Vertical fluctuations may be observed during changes of sea level. Fast ice may be formed in situ from the sea water or by freezing of pack ice of any age to the shore, and it may extend a few meters or several hundred kilometers from the coast. Fast ice may be more than 1 year old and may then be prefixed with the appropriate age category (old, second-year or multi-year). If it is thicker than about 2 meters above sea level, it is called an ICE SHELF.

Fast-ice boundary. The ice boundary at any given time between fast ice and pack ice.

Fast-ice edge. The demarcation at any given time between fast ice and open water.

First-year ice. Sea ice of not more than one winter's growth, developing from

young ice, with a thickness of 30 centimeters to 2 meters. First-year ice may be subdivided into THIN FIRST YEAR ICE, WHITE ICE, MEDIUM FIRST YEAR ICE, and THICK FIRST YEAR ICE.

Floe. Any relatively flat piece of sea ice 20 meters or more across. Floes are subdivided according to horizontal extent. A giant flow is over 5.4 nautical miles across; a vast floe is 1.1 to 5.4 nautical miles across; a big floe is 500 to 2000 meters across; a medium floe is 100 to 500 meters across; and a small floe is 20 to 100 meters across.

Floeberg. A massive piece of sea ice composed of a hummock, or a group of hummocks frozen together, and separated from any ice surroundings. It may float showing up to 5 meters above sea level.

Firn. Old snow which has recrystallized into a dense material. Unlike snow, the particles are to some extent joined together; but, unlike ice, the air spaces in it still connect with each other.

Frazil ice. Fine spicules or plates of ice, suspended in water.

Glacier ice. Ice in, or originating from, a glacier, whether on land or floating on the sea as icebergs, bergy bits, or growlers.

Glaze. A coating of ice, generally clear and smooth but usually containing some air pockets, formed on exposed objects by the freezing of a film of super cooled water deposited by rain, drizzle, fog, or possibly condensed from super cooled water vapor. Glaze is denser, harder and more transparent than either rime or hoarfrost Also called GLAZE ICE, GLAZED FROST VERGLAS.

Grease ice. Ice at that stage of freezing when the crystals have coagulated to form a soupy layer on the surface. Grease ice is at a later stage of freezing than frazil ice and reflects little light, giving the sea a matte appearance.

Grounded ice. Floating ice which is aground in shoal water.

Growler. A piece of ice smaller than a BERGY BIT or FLOEBERG, often transparent but appearing green or almost black in color. It extends less than 1 meter above the sea surface and its length is less than 20 feet (6 meters). A growler is large enough to be a hazard to shipping but small enough that it may escape visual or radar detection.

Hummock. 1. A hillock of broken ice which has been forced upwards by pressure. It may be fresh or weathered. The submerged volume of broken ice under the hummocks, forced downwards by pressure, is called a BUMMOCK; 2. A natural elevation of the earth's surface resembling a hillock, but smaller and lower.

Hummocked ice. Sea ice piled haphazardly one piece over another to form an uneven surface. When weathered, hummocked ice has the appearance of smooth hillocks.

Iceberg. A massive piece of ice greatly varying in shape, showing more than 5 meters above the sea surface, which has broken away from a glacier, and which may be afloat or aground. Icebergs may be described as tabular, dome shaped, pinnacled, drydock, glacier or weathered, blocky, tilted blocky, or drydock icebergs. For reports to the International Ice Patrol they are described with respect to size as small, medium, or large icebergs.

Ice-blink. A whitish glare on low clouds above an accumulation of distant ice.

Icefoot. A narrow fringe of ice attached to the coast, unmoved by tides and remaining after the fast ice has moved away.

Land sky. Dark streaks or patches or a grayness on the underside of extensive cloud areas, due to the absence of reflected light from bare ground. Land sky is not as dark as WATER SKY. The clouds above ice or snow covered surfaces have a white or yellowish white glare called ICE BLINK.

Lead. A fracture or passage-way through ice which is navigable by surface vessels.

Nilas. A thin elastic crust of ice, easily bending on waves and swell and under pressure, thrusting in a pattern of interlocking "fingers." Nilas has a matte surface and is up to 10 centimeters in thickness. It may be subdivided into DARK NILAS and LIGHT NILAS. See also FINGER RAFTING.

Nipped. Beset in the ice with the surrounding ice forcibly pressing against the hull.

Old ice. Sea ice which has survived at least one summer's melt. Most topographic features are smoother than on first-year ice. Old ice may be subdivided into SECOND-YEAR ICE and MULTI YEAR ICE.

Open pack ice. Pack ice in which the concentration is 4/10 to 6/10, with many leads and polynyas, and the floes generally not in contact with one another.

Pancake ice. Predominantly circular pieces of ice from 30 centimeters to 3 meters in diameter, and up to about 10 centimeters in thickness with raised rims due to pieces striking against one another. It may be formed on a slight swell from grease ice, shuga, or slush or as a result of the breaking of ice rind, nilas, or under severe conditions of swell or waves, of gray ice. It also sometimes forms at some depth, at an interface between water bodies of different physical characteristics, from where it floats to the surface; its appearance may rapidly cover wide areas of water.

Polynya. A non-linear shaped area of water enclosed by ice. Polynyas may contain brash ice and/or be covered with new ice, nilas, or young ice; submariners refer to these as SKYLIGHTS. Sometimes the POLYNYA is limited on one side by the coast and is called a SHORE POLYNYA or by fast ice and is called a FLAW POLYNYA. If it recurs in the same position every year, it is called a RECURRING POLYNYA.

Rafted ice. A type of deformed ice formed by one piece of ice overriding another.

Rotten ice. Sea ice which has become honeycombed and is in an advanced state of disintegration.

Sastrugi, (sing. sastruga). Sharp, irregular ridges formed on a snow surface by wind erosion and deposition. On mobile floating ice, the ridges are parallel to the direction of the prevailing wind at the time they were formed.

Sea ice. Any form of ice found at sea which has originated from the freezing of sea water.

Shuga. An accumulation of spongy white ice lumps, a few centimeters across, the lumps are formed from grease ice or slush and sometimes from anchor ice rising to the surface.

Stranded ice. Ice which has been floating and has been deposited on the shore by retreating high water.

Tabular iceberg. A flat-topped iceberg with length-to-height ratio greater than 5:1. Most tabular bergs form by calving from an ice shelf and show horizontal banding.

Tongue. A projection of the ice edge up to several kilometers in length, caused by wind or current.

Very close pack ice. Pack ice in which the concentration is 9/10 to less than 10/10.

Water sky. Dark streaks on the underside of low clouds, indicating the presence of water features in the vicinity of sea ice.

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