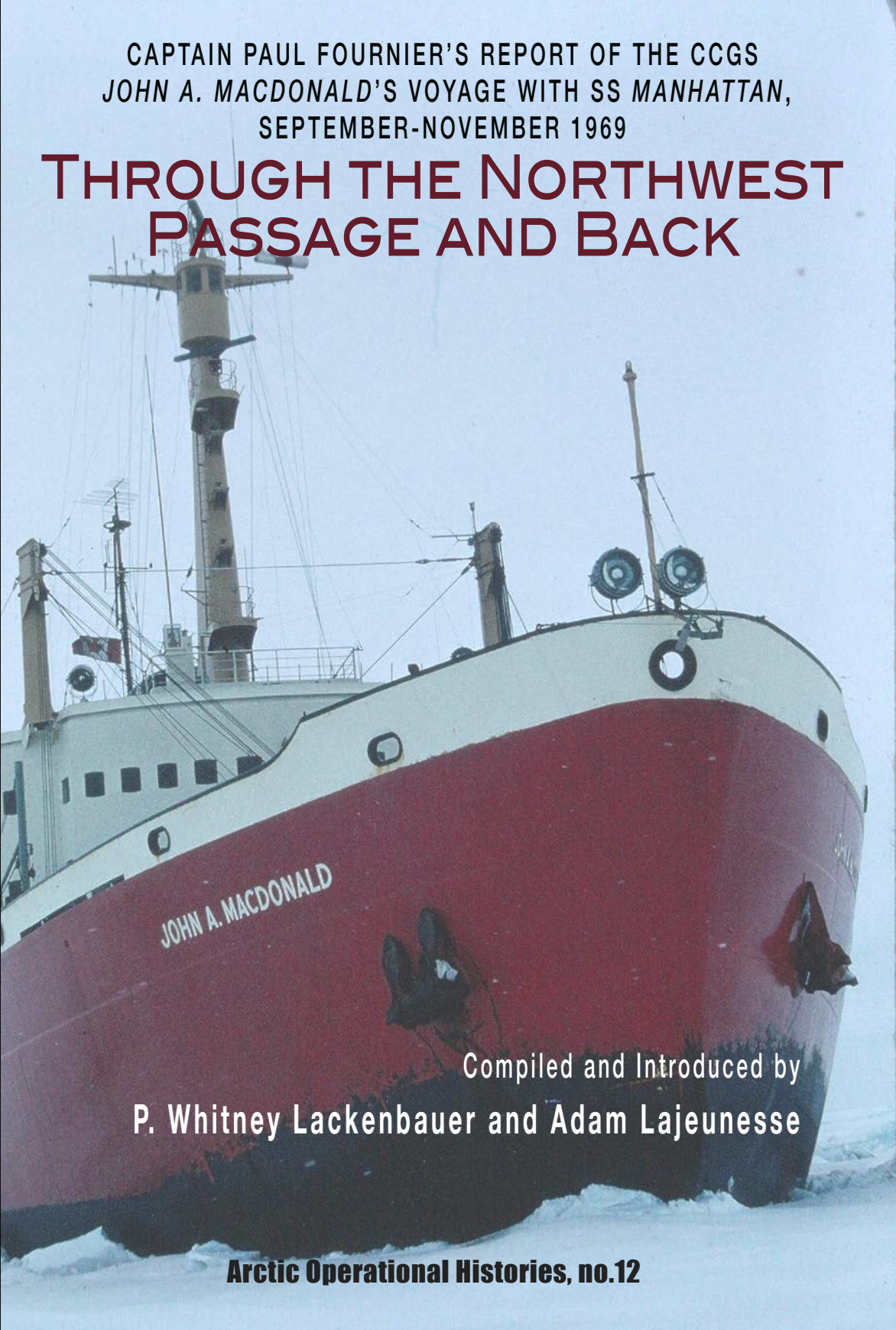
CAPTAIN PAUL FOURNIER'S REPORT OF THE CCGS
JOHN A. MACDONALD'S VOYAGE WITH SS *MANHATTAN*,
SEPTEMBER-NOVEMBER 1969

Through the Northwest Passage and Back



Compiled and Introduced by
P. Whitney Lackenbauer and Adam Lajeunesse

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The Arctic Operational History Series seeks to provide context and background to Canada's defence operations and responsibilities in the North by resuscitating important, but forgotten, reports, histories, and defence material from previous generations of Arctic operations.

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Adam Lajeunesse
Series Editor

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List of Acronyms

AWPPA	*Arctic Waters Pollution Prevention Act*
brg.	bearing
CCGS	Canadian Coast Guard Ship
ft.	feet
HMCS	Her Majesty's Canadian Ship
hrs	hours
km	kilometres
kts.	knots
LAC	Library and Archives Canada
Lat.	Latitude
Long.	Longitude
no.	number
pt.	part
RG	Record Group
(T)	true (direction)
Temp.	temperature
T.S.	Transport ship
US	United States
USCG	US Coast Guard
USN	United States Navy
vol.	volume

INTRODUCTION

In the summer of 1968, the American oil companies Atlantic Richfield and Humble Oil struck oil at Prudhoe Bay in Alaska. After years of dry wells the discovery was a watershed moment for the region. For the American oil industry it was electrifying. Only two years earlier the first Arab oil embargo had shown how vulnerable the market was and, while the US had been able to weather that shock with its own excess production, output was peaking by the end of the 1960s.[1] At a stroke, Prudhoe Bay increased America's proven reserves by approximately a third and gave the country a new and badly needed source of production growth.

Canadians also found the discovery exciting. Federal governments had been pushing Northern development since Prime Minister John Diefenbaker's 'Roads to Resources' program of the 1960s, though with little to show for it. Alaskan oil might lead to a similar find in Canada and a shipping route running through those potential fields would certainly help spark business interest.[2]

Industry and government were anxious to move quickly. Only three months after the announcement of the Prudhoe Bay discoveries, the Marine Department of Imperial Oil submitted a request to the Canadian Department of Transport for an informal meeting between a consortium of oil companies and those Canadian departments concerned with Arctic development. During the meeting, held in November 1968, the oil company representatives conveyed their interest in conducting an Arctic tanker experiment and informed the Canadian government that they had already begun the process of procuring a test vessel. Requests were naturally made for Canadian icebreaker support and any ice data that the government could provide.[3]

[1] US oil production peaked in 1971 and would not recover those levels until 2017 with the advent of shale oil.

[2] Cabinet Conclusions, 11 September 1969, Library and Archives Canada (LAC), Record Group (RG) 2, Privy Council Office, series A-5-a, vol. 6340.

[3] A.H.G. Storrs to Dr. Claude Isbister, 5 March 1969, LAC, RG 12, vol. 5561, file 8100-15-4-2, pt. 1.

This rapid progress reflected the oil companies' urgent need to resolve the crucial question of transportation. From the North Slope, oil had to travel roughly 4,100 km to refineries in San Francisco, or 8,000 km to the East Coast (through the Northwest Passage). Whether an Arctic transit was even possible remained to be seen since a deep draught tanker had never ventured through the icy passage.

Building a new ship would have taken too long, so the American oil companies chose to retrofit an existing vessel. Over the next nine months, SS *Manhattan* was refitted by a team of 10,000 workers working over 2.5 million hours.[4] To augment her for Arctic conditions the original bow was cut off and replaced with a custom designed icebreaking section. An ice belt of high tensile steel was also stretched around the whole length of the ship. In total, 10,000 extra tons of this Arctic ready steel was added. Internal stiffening was reinforced to help resist ice pressure, a second skin around the engine and boiler rooms was added, and a helicopter pad attached. To assist in the myriad of tests and measurements that the vessel was supposed to undertake, a great deal of sophisticated sensor and computer equipment was brought onboard. In the end, the budget for the project reached $26 million, a significant sum in 1969.[5] Once complete, the converted supertanker was one of the most powerful ice-capable vessels in the world. Yet, it was still only a half scale model of the Arctic class supertankers ultimately envisioned. If these tests proved successful, plans called for the construction of 26 to 30 massive 1,200 feet long icebreaking Ultra Large Crude Carriers of 350,000 tons, capable of carrying one million barrels of oil.[6]

Manhattan's mission in 1969 was to transit the Northwest Passage from East to West, testing its capabilities, measuring ice thickness, and collecting vital data that would enable engineers to construct the fleet of mammoth ships that would bring Alaskan oil to the Eastern Seaboard. While the ship's 115,000 deadweight ton displacement made it extraordinarily capable in the ice, it still lacked some of the capabilities of purpose-built icebreakers. Its

[4] Ibid, p. 38.

[5] This equates to $218 million in 2023 dollars. A.H.G. Storrs to Dr. Claude Isbister, 5 March 1969, LAC, RG 12, vol. 5561, file 8100-15-4-2, pt. 1.

[6] Minutes of the 73rd meeting of the Advisory Committee on Northern Development (ACND), 19 December 1968, LAC, RG 112, vol. 29803, file 170-80/A6, pt. 7.

bulk allowed the tanker to crush ice along a straight trajectory, but it had poor maneuverability and was weak from a standing start. Its engines had not been designed for work in the ice, leaving it without the strong reverse that an icebreaker needs to pull back to ram ice repeatedly. For that reason, the American oil companies were pleased to enlist a Canadian escort.

At the time, Canada's most powerful icebreaker was the Canadian Coast Guard Ship (CCGS) *John A. Macdonald*.[7] Built in 1960, the ship displaced 9,300 tons – making it roughly a tenth the size of *Manhattan*. Still, it boasted 15,000 ship horsepower and the ability to break 18 feet of ice. The pride of the icebreaker fleet, reporter William D. Smith described "Johnny Mac" as "beautifully appointed," particularly when compared to its more spartan American coast guard counterparts. "There were no gray steel bulkheads," Smith wrote, "but wood panelling in all quarters. *Macdonald* was immaculate from her completely enclosed bridge to her dinner table and her diesel-electric engine room."[8] Her crew was roughly 90 men and officers, leaving far more space than the cramped Second World War-vintage American Wind-class vessels which were smaller but accommodated nearly 200 crew. The American ships, Smith wrote, saw "men sleep in very close quarters," often "over the roaring engines." The "Mac," on the other hand, had only two or three men to a room and singles for the officers.[9] Canadian icebreakers had another extraordinary luxury: a full bar. It made long Arctic voyages more comfortable and frequently led visiting American sailors to wallow in envy. *MacDonald* offered a luxurious way to break ice by the standards of the day.

By the time of *Manhattan's* voyage, the Canadian icebreaker had spent nearly a decade in the Arctic waters and was experienced working with the Americans. The two coast guards had worked closely in the region since the mid-1950s when Canada launched its first icebreaker – HMCS *Labrador* – to support the US Coast Guard (USCG) and the US Navy (USN) in establishing and resupplying military facilities and civilian weather stations.[10] Only two years earlier, soon after Captain Paul Moise Fournier

[7] The more powerful *Louis S. St-Laurent* would enter service one month later, in October 1969.

[8] William D. Smith, *Northwest Passage* (New York: American Heritage Press, 1970), 146.

[9] Ibid.

[10] *Labrador* was transferred to the Coast Guard in 1958.

had taken command of *John A. Macdonald in* 1967, the Canadian icebreaker had rescued the USCG icebreaker *Northwind* north of Alaska. An older and smaller Wind-class vessel, *Northwind* had lost a propeller blade while working in too heavy ice roughly 800 km north of Point Barrow. Beset and in grave danger of becoming locked into the ice for the winter, Fournier received the call for assistance. He moved with haste to the Chukchi Sea where *Macdonald* worked its way through leads, until finally a crack in the ice emerged which allowed her to reach and extract the American ship. The official history of the Canadian Coast Guard recounts that "she was one of the very few ships in the world which could have rendered assistance."[11]

In Seattle, the families of *Northwind's* officers and crew praised Captain Fournier and the men of *Macdonald* as the Canadian ship made its transit down the US West Coast, enroute to the Panama Canal. Fournier dismissed the praise, saying that *Macdonald* was simply reciprocating for the many favours that the USCG had done for its Canadian counterparts over the years. "We're paid to do this job. We try to do our best," Fournier was later quoted in obituary in the *Halifax Daily News*.[12] The US Coast Guard was far less nonchalant. A commendation from the Commandant of the USCG noted how:

> Despite increasingly severe ice conditions, shifting floes, changing winds, and the great risk presented by seemingly impenetrable pressure ridges which severely taxed the limits of both vessel and crew, *Macdonald* persevered and rendezvous was accomplished at 78 deg. 40 min. North. 168 deg. 06 min. West. The operation required the utmost in ice seamanship, skillful maneuvering of the vessel and outstanding teamwork from the entire crew of the *Macdonald* which resulted in *Northwind* clearing the ice on 8 October. The courageous action, initiative, diligence and perseverance of the personnel on board the *Macdonald* during this

[11] Thomas E. Appleton, *Usque ad Mare: A History of the Canadian Coast Guard and Marine Services* (Ottawa: Department of Transport, 1968), 184.

[12] "Icebreaker's captain always kept his cool," *Halifax Daily News*, 13 March 2005. The obituary also quoted a *Montreal Gazette* editorial which noted that "The Arctic has truly been conquered when a ship's master can say the Northwest Passage is all in a summer's work. The ghosts of a thousand mariners who tried to find the passage without success must have watched the *John A. Macdonald* smash her way through."

> hazardous operation were in keeping with the finest traditions of the United States Coast Guard.[13]

Fournier was a capable mariner, remembered by his crew as a master in manoeuvring through ice. Captain Earl Jennex, who served with Fournier as chief officer on *Macdonald* for two years, noted that "He was a good icebreaking skipper…. Very cool. It was like a cup of tea for him."[14] At the time of his death in 2005, the author of Fournier's obituary explained that he and *Macdonald* had "become legendary in the annals of Canadian Arctic navigation. Supplying native communities in the icebound bays and inlets of the high Arctic in the summer and escorting through ice in the Gulf of St. Lawrence during the winter months, Capt. Fournier earned a reputation as a cool 'icebreaking skipper.'"[15] To cap his time with *Macdonald*, Captain Fournier was awarded the Order of Canada for his icebreaking work and heroic escort of *Manhattan* through the Northwest Passage.

The importance of that escort lay in the legal, political, and economic implications of *Manhattan's* groundbreaking – or, more appropriately, icebreaking – voyage. While the Canadian government was anxious to see a new shipping route emerge in the region to unlock its development potential, it faced lingering fears that a purely American expedition might call into question Canada's sovereignty over the Northwest Passage.

The legal status of the route remained an awkward uncertainty. Since the 1950s, Canadian governments had claimed ownership over those waters – thought without ever clarifying the legal basis for that ownership.[16] The United States had consistently pushed back on the idea that Canada could exercises sovereignty or jurisdiction over any waters beyond its three nautical

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[13] Quoted in Appleton, *Usque ad Mare*, 184-85.

[14] "Icebreaker's captain always kept his cool," *Halifax Daily News*, 13 March 2005.

[15] Ibid.

[16] See Donat Pharand, *The Law of the Sea of the Arctic: With Special Reference to Canada* (Ottawa: University of Ottawa Press, 1973); Franklyn Griffiths, *Politics of the Northwest Passage* (Montreal and Kingston: McGill-Queen's University Press, 1987); Pharand, *Canada's Arctic Waters in International Law* (Cambridge: Cambridge University Press, 1988); Adam Lajeunesse, *Lock, Stock, and Icebergs: A History of Canada's Arctic Maritime Sovereignty* (Vancouver: UBC Press, 2016); and P. Whitney Lackenbauer, Suzanne Lalonde, and Elizabeth Riddell-Dixon, *Canada and the Maritime Arctic: Boundaries, Shelves, and Waters* (Peterborough: North American and Arctic Defence and Security Network, 2020).

mile territorial sea. Earlier in the decade, negotiations between the two states had ended in frustration for the Canadian government, after the United States flatly refused to recognize the Arctic waters (as well as several other bodies off the East and West Coasts) as Canadian. This American recognition was important to Canada, not because the US government had the power to approve or deny the maritime jurisdiction of foreign governments, but because Canada knew that American approval would likely lead to broader global acceptance. Official US resistance, on the other hand, could lead to a formal challenge that would drag Canada to arbitration and, potentially, do serious damage to its claims.[17]

Despite this long-standing disagreement on sovereignty and jurisdiction, the two states had built a solid track record of practical cooperation in the Arctic. Legal questions had always been pushed aside with an eye towards achieving practical results.[18] There was little reason to think that *Manhattan* would be much different from the USCG and USN voyages of the 1950s that had built the continent's early warning systems. Indeed, as late as 20 August 1969, only five days before the supertanker's departure, Canada's Interdepartmental Committee on Territorial Waters concluded that the project would not jeopardize Canadian sovereignty.[19]

If there was any danger to Canadian sovereignty it lay not in *Manhattan* itself but in its accompanying USCG icebreaker. The tanker was a

[17] For the full story see Lajeunesse, *Lock, Stock, and Icebergs,* chapter 7, and P. Whitney Lackenbauer and Peter Kikkert, "Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945-68," in *Serving the National Interest: Canada's Department of Foreign Affairs and International Trade, 1909-2009*, eds. Greg Donaghy and Michael Carroll (Calgary: University of Calgary Press, 2011).

[18] See for example: Elizabeth B. Elliot-Meisel, *Arctic Diplomacy* (New York: Peter Lang, 1998); Andrea Charron, "The Northwest Passage: Is Canada's Sovereignty Floating Away?" *International Journal* 60/3 (2005): 831-48; Ken Coates, P. Whitney Lackenbauer, Bill Morrison, and Greg Poelzer, *Arctic Front: Defending Canada in the Far North* (Toronto: Thomas Allen, 2008); Lajeunesse, *Lock, Stock, and Icebergs*; P. Whitney Lackenbauer and Peter Kikkert, eds., *Legal Appraisals of Canada's Arctic Sovereignty: Key Documents, 1904-58,* Documents on Canadian Arctic Sovereignty and Security Series vol. 2 (Calgary: Centre for Military and Strategic Studies, 2014); and Lackenbauer and Kikkert, "Sovereignty and Security."

[19] Addendum to the minutes of the 74th meeting of the ACND, August 20, 1969, LAC, RG 112, vol. 29803, file 170-80/A6, pt. 7.

commercial vessel that relied on the Canadian government for assistance. The USCG *Northwind*, however, was a state vessel belonging to a country that did not recognize Canada's sovereignty over the Northwest Passage and was proceeding independent of Canadian assistance. Prior to the voyage, the Canadian government suggested that the State Department make an outright request for permission for *Northwind's* transit, but the American officials refused to do so.[20] Although this came as little surprise to External Affairs, residual concerns remained.

More than any legal precedent that the voyage might lead to, the Canadian government worried about the optics of the American expedition. Unlike past US icebreaker and resupply expeditions, *Manhattan's* dramatic trial run through the passage would garner significant public attention. The impression of an American ship forcing its way through the Canadian Arctic, against the backdrop of lingering national sovereignty fears, made the Trudeau government uncomfortable.

While the Canadian federal government supported the voyage, it sought ways to assert Canadian control. In March 1969, the Advisory Committee on Northern Development and the Interdepartmental Committee on Territorial Waters submitted a joint review of Arctic sovereignty and shipping, offering the government three options to demonstrate that control. First, Canada could formalize its Arctic sovereignty claims, though that might lead to a direct American challenge and a case before the International Court of Justice. The second option was as simple as it was politically impossible: Canada could abandon its claim and allow unimpeded foreign transit. This was never a serious consideration, given the inevitable political fallout that it would bring. The third option was to try and maintain the *status quo*. This meant continuing to defer any formal claim that would invite an American rebuke, asserting a physical official Canadian presence, and hoping that the issue could be managed rather than resolved.[21] The first option was rejected as being too dangerous and the second as political suicide. That left the *status quo*.

[20] Edgar Dosman, "The Northern Sovereignty Crisis," *The Arctic in Question* ed. Edgar Dosman (Toronto: Oxford University Press, 1976), 39.
[21] Memorandum for Cabinet, March 20, 1969, LAC, RG 12, vol. 5561, file 8100-15-4-2, pt. 1.

Macdonald was the lynchpin of the government's *status quo* approach. It would provide a visual counterweight to *Manhattan.* Canada could show that the US was not proceeding unilaterally, that this was a joint expedition, and one that could only have been a success with Canada's support. In this mission, the icebreaker under the command of Captain Fournier achieved remarkable results.

On 26 August 1969, *Manhattan* left Pier No. 2 at the Sun Shipyard on the US Eastern Seaboard, heading towards Davis Strait and Baffin Bay. There it rendezvoused with its icebreaker escorts *Macdonald* and *Northwind*. Together the three ships headed westward through the Northwest Passage without difficulty.

The initial leg of the transit was a complete success. On the first day of icebreaker, the onboard Canadian observer Thomas C. Pullen proclaimed that "the *Manhattan* broke ice today better than any ship I have ever seen."[22] Nonetheless, the ship had its limitations. As noted earlier, the supertanker was not built as an icebreaker and its strength lay in its weight and momentum. When it got stuck, it got very stuck. After moving through easier ice conditions in the Eastern Arctic, the task force soon reached the heavy ice in McClure Strait. Just inside the strait, *Manhattan* found itself stuck in a vast polar floe and progress slowed to a crawl. Trapped in a solid block of ice six and a half kilometres across, the *Manhattan* spent twelve hours backing up and ramming without making any real progress. Captain Fournier remarked from the bridge of *Macdonald*: "It's as though she were sailing through a granite quarry."[23]

As *Manhattan* gained ground at a snail's pace, it was forced to rely on *Macdonald* to break a path forward and remove some of the constraining ice to allow the supertanker to retreat to a more southerly route. William Smith of the *New York Times*, who accompanied *Manhattan* and later wrote a book about the voyage, said Canadian reporters aboard the *Macdonald* were elated that the mighty U.S. tanker was calling for help. "The stocky Canadian ship charged through the ice like a horse bucking through deep snow," wrote Smith. "She cut a path across the Manhattan's stern and up the port side. Then she backed off and did the same on the starboard side.

[22] Ross Coen, *Breaking Ice for Arctic Oil: The Epic Voyage of the SS* Manhattan *through the Northwest Passage* (Fairbanks: University of Alaska Press, 2012), 84.
[23] Coen, *Breaking Ice for Arctic Oil,* 125.

The prescription was perfect. The tanker was able to back up far enough to gather momentum. The ice broke in front of her, and the expedition was on the way again."[24] *Macdonald's* crew was equally elated to have the opportunity. One junior officer commented: "it's not that we don't want the mission to succeed. We most certainly do. But the fact is that every one of us has been on his knees praying that [the] big bastard would get stuck just once."[25]

In retirement, Captain Fournier recalled how he found it "truly frightening" as *Manhattan* "tip-toed" past icebergs off Greenland – a mere "midget" or "bathtub toy among menacing, crystalline giants." When asked how many times the tanker got stuck, Fournier blurted: "Oh my God, I couldn't tell you how many times."[26] Over the course of the journey, *Macdonald* was called to *Manhattan's* rescue on more than a dozen occasions. This reliance was politically satisfying for Ottawa. Equally gratifying for the Canadians was that the ice in Viscount Melville Sound had forced the older and relatively underpowered *Northwind* to take the easier and more southerly coastal route well in advance of *Manhattan* and *Macdonald*. Accordingly, the American icebreaker contributed very little to the *Manhattan* trial. Rather than demonstrating an independent ability to support the tanker, the US icebreaker often forced the convoy to slow down. At one point, Lieutenant Commander Erling Stolee, the Royal Canadian Navy's observer aboard *Manhattan*, noted that *Northwind* had become "a hindrance in this ice."[27] The image of a Canadian vessels saving *Manhattan* and even *Northwind*, particularly after the US coast guard was forced to beat a hasty retreat, provided exactly the optics for which Ottawa had been looking.

For the operator Fournier – "a leaner, taller version of [Hollywood actor] Charles Boyer with heavy brows and dark, brooding Gallic eyes," in Smith's

[24] "Icebreaker's captain always kept his cool," *Halifax Daily News*, 13 March 2005.
[25] Coen, *Breaking Ice for Arctic Oil,* 106.
[26] "Manhattan begins historic voyage 25 years ago," Canadian Press Newswire, 23 August 1994.
[27] Erling B. Stolee, *Defining Ice: Lieutenant E.B. Stolee's Accounts of the Canadian Arctic Voyages of CCGS* John A. Macdonald*, 1969/70*, eds. P. Whitney Lackenbauer and Adam Lajeunesse (Antigonish: Mulroney Institute on Government, Arctic Operational History Series no. 8, 2019).

description[28] – these optics came with tremendous stress, uncertainty, and practical frustration. For example, he flew by helicopter to *Manhattan* in the early morning on 9 September after *Northwind* became beset in the ice yet again. Journalist William Smith described the scene. "The dark circles under Fournier's eyes were even deeper, and his naturally sallow complexion had taken on a distinctly green cast." Captain Donald J. McCann of *Northwind*, his face "as gray as the ice, and his lips … a bloodless blue," walked into the meeting and asked that his ship be permitted to leave the mission. "The assister has become the assisted," McCann conceded to his Canadian coast guard counterpart. "My ship and my crew are here to serve, not to hinder. I am sorry. We tried our damndest." Fournier, who Smith noted was "too close to Captain McCann for such an easy emotion as sympathy," was "quietly angry" – while cognizant that the *Northwind* was a "decidedly inferior weapon" to the *Macdonald* when battling the Canadian Arctic ice.[29]

Macdonald completed its mission that Fall, returning *Manhattan* to the Atlantic. When the two ships sailed into Halifax on 8 November, Smith explained that the American tanker crew was anxious to "honour our gallant companion, the 'Johnny Mac.' She had been our mentor, our rescuer, and our friend. Her crew, our drinking buddies, had helped to give a sense of belonging and pride to the disparate bunch of hired hands on the tanker."[30]

The Canadians clearly shared in the success of the experiment. "No small amount of the credit was due to the little red and white Canadian icebreaker," Smith wrote.[31] Expressing a similar sentiment at an end of voyage banquet, Stan Haas of Humble Oil took the stage to personally thank the crew of *Macdonald*. "When we encountered the heavier ice in Melville Sound … we Texans had not yet learned all the lessons," he proclaimed. "But during the voyage to Prudhoe Bay and Point Barrow, Alaska, the *John A. MacDonald* steamed along at our stern waiting for a call for assistance from us and then answered that call as required with a vigor and enthusiasm typical of the character of the ship and her master."[32]

[28] Smith, *Northwest Passage*, 74.
[29] Ibid, 110.
[30] Ibid, 189.
[31] Ibid.
[32] Coen, *Breaking Ice for Arctic Oil*, 154.

While the *Manhattan's* voyages[33] proved successful, the anticipated shipping route failed to materialize. Over 1970-71, the economic calculations continued to evolve and the costs of moving oil by sea came to be seen as too high. The oil companies ultimately opted for an oil pipeline across Alaska, ending the immediate prospect of a fleet of new supertankers plying the Arctic waters.[34]

Nevertheless, the voyages sparked a significant shift in Canada's Arctic policy. The public had been roused by the perceived pollution threat to Canada's Arctic waters. The political passions aroused by the sovereignty issue unsettled politicians and senior officials in Ottawa. The spectre of an American challenge had led to zealous attacks by the opposition Conservatives and critical opinion pieces in the *Globe and Mail*, the *Toronto Star,* and the *Toronto Telegram.*[35] The Canadian public demanded an outright declaration of sovereignty over the Northwest Passage – although sober-minded officials knew that this carried legal risks.

Concerned that its legal position was not yet well enough developed and ever cognizant of a potential American challenge, the Liberal government chose to address the pollution risk more directly. In April 1970, Parliament passed the *Arctic Waters Pollution Prevention Act* – path-breaking environmental legislation which continues to underpin Canada's marine protection regulations in the Arctic a half century later. These regulations were presented to the House of Commons on 8 April 1970 and passed as Bill C-202 under the official title *Arctic Waters Pollution Prevention Ac*t (AWPPA). Through this novel piece of legislation, Canada asserted jurisdiction to regulate navigation in waters out to 100 miles for the purpose

[33] The ship made a return to the Eastern Arctic the following year

[34] On this era, see Edgar J. Dosman, *The National Interest: The Politics of Northern Development 1968-75* (Toronto: McClelland and Stewart, 1975); Dosman, ed., *The Arctic in Question* (Toronto: Oxford University Press, 1976); Robert Page, *Northern Development: The Canadian Dilemma* (Toronto: McClelland and Stewart, 1986); and P. Whitney Lackenbauer and Elizabeth Elliot-Meisel, eds., *"A Highly-Coveted Consultant": Captain T.C. Pullen's Contributions to Arctic Knowledge, Volume 2: Consulting,* Documents on Canadian Arctic Sovereignty and Security Series vol. 20 (Calgary: Arctic Institute of North America, 2023).

[35] Coen, *Breaking Ice for Arctic Oil*, 74; John Kirton and Don Munton, "The Manhattan Voyages and Their Aftermath," in *Politics of the Northwest Passage* ed. Franklyn Griffiths (Kingston: McGill-Queen's University Press, 1987).

of pollution prevention. These regulations related to hull and fuel tank construction, navigational aids, safety equipment, qualification of personnel, time and route of passage, pilotage, and icebreaker escort. At certain times of the year, or when certain ice conditions prevailed, the legislation allowed Canada to exclude ships entirely from any given area. The AWPPA further provided for the appointment of pollution prevention officers with broad powers, including authorization to board ships within the shipping control zones for inspection purposes, and to order ships in or near a control zone to remain outside of it if the officer suspected that it did not comply with the Canadian regulations applicable for the zone in question.[36]

The voyage also catalyzed an enduring discussion about developing a broader defence of the polar waters. This led to nearly two decades of diplomatic and legal efforts to shape international environmental protection regulations and the law of the sea. Canadian negotiators pushed these changes at the Stockholm Conference on the Human Environment in 1972 and the Inter-Governmental Maritime Consultative Organization in 1973. While their success was limited, the real test was the UN Conference on the Law of the Sea, which began in Caracas, Venezuela in 1974. Over the next eight years, the Canadian delegation managed to convince the American and the world community to incorporate many of the principles of the AWPPA into international law, leading to Article 234 of the 3rd United Nations Convention on the Law of the Sea (UNCLOS), commonly called the "Arctic Exception."[37] While the sovereignty question was put to the side, *Manhattan's* voyage ensured that it could not be ignored. Behind the scenes,

[36] On the *AWPPA*, see Richard B. Bilder, "The Canadian Arctic Waters Pollution Prevention Act: New Stresses on the Law of the Sea," *Michigan Law Review* 69 (1970): 1-54; Albert E. Utton, "The Arctic Waters Pollution Prevention Act, and the Right of Self-Protection," *University of British Columbia Law Review* 7 (1972): 221; J. Alan Beesley, "The Arctic Pollution Prevention Act: Canada's Perspective," *Syracuse Journal of International Law and Commerce* 1 (1972): 226; and R. Michael M'Gonigle, "Unilateralism and International Law: The Arctic Waters Pollution Prevention Act," *University of Toronto Faculty Law Review* 34 (1976): 180; and Christopher Kirkey, "The Arctic Waters Pollution Prevention Initiatives: Canada's Response to an American Challenge," *International Journal of Canadian Studies* 13 (Spring 1996): 41-60.

[37] On this process see: Donald M. McRae, "The Negotiation of Article 234," in *Politics of the Northwest Passage*, ed. Franklyn Griffiths (Montreal and Kingston: McGill-Queen's University Press, 1987), 102-04.

External Affairs spent the next decade laying the groundwork for an explicit Canadian legal claim to the waters of the Northwest Passage that came under the Mulroney Conservatives in 1985.[38]

This volume offers a first-hand account by Captain Paul Fournier of an historic voyage which was, in many ways, a decisive turning point in how Canadian governments prioritized and approached the Arctic. This diary of Fournier's observations aboard *Macdonald* provides a primary source to trace the voyage and understand Canada's critical contribution. This book is also intended as a companion to a previous volume in this series, which published the reports of Lieutenant Commander Erling Stolee, the Royal Canadian Navy's observer aboard *Manhattan*.[39] Together, they show the two sides of the voyage – from the deck of the *Manhattan* and the *Macdonald*. For a general overview of the context in which the *Manhattan* voyage was conceived, as well as Canadian political responses to the sovereignty threat that some observers associated with the voyage, readers can also consult the introduction to the Stolee volume.

[38] See Lackenbauer and Kikkert, "Sovereignty and Security," and Lajeunesse, *Lock, Stock, and Icebergs,* chapter 7.
[39] Stolee, *Defining Ice.*

Editor's Note

Fournier's report has been reproduced almost verbatim in this volume, with some minor grammatical edits. In several cases, we have converted underlining in the original to italics (for aesthetic reasons) and corrected obvious typographical errors. Otherwise, we have retained the original wording in the report to preserve its integrity as an historical document produced at a specific time (1969) and bearing the biases of the era in which it was written. Accordingly, some of the terms used by the authors are no longer preferred usages for people or places. Today, the name "Eskimos" has been replaced by "Inuit" ("the people" in Inuktut) as the preferred nomenclature. Various locations described in the text have also been renamed, such as Pond Inlet (Mattimatalik), Frobisher Bay (Iqaluit), Godthab (Nuuk), and Sondrestrom (Kangerlussuaq). In other cases, there are Inuktut names for the locations described in these reports that reinforce that the Canadian Arctic is Inuit Nunangat – the Inuit homeland.[40]

[40] On Inuit land use and occupancy at the time of the *Manhattan* voyages, see: Milton Freeman Research Ltd., *Inuit Land Use and Occupancy Project*, 3 vols. (Ottawa: Department of Indian Affairs and Northern Development, 1976).

REPORT OF CCGS *JOHN A. MACDONALD* VOYAGE THROUGH THE NORTHWEST PASSAGE AND BACK WITH SS *MANHATTAN* SEPTEMBER-NOVEMBER 1969

by
Captain Paul Fournier,
Master of the *Macdonald*

This … report covers the part C.C.G.S. *John A. Macdonald* played in assisting and working with the tanker *Manhattan* in its attempt to find if the carriage of bulk oil is economical from ports in the Arctic. This experiment is being closely watched by world-wide interests.

31 August

Our first step in the operation was to proceed to Frobisher Bay to take on board members of the Press who will cover the whole operation. As accommodation is at a premium on board due to the number of Departments interested and who wish to collect data on this operation, the hospital ward and all spare bunks in cabins were used, with some of the crew doubling up to provide space. All passengers were suitably accommodated and seemed satisfied with the arrangement. Radio contact was established with T.S. *Manhattan* soon after leaving Frobisher Bay and at 23:25 hrs. August 31st and after the customary exchange of greetings and welcome, T.S. *Manhattan* requested that C.C.G.S. *John A. Macdonald* take up position two miles on port bow. So on a fine clear night in Lat. 62.05.5'N Long 57.36'W operation *Manhattan* commenced.

The second step in the operation was for T.S. *Manhattan* to have preliminary ice tests in the ice pack along the Baffin Coast. A northerly course was set and at a speed of 14.8 kts. T.S. *Manhattan* was being prepared for her first contact with the ice. First impressions on seeing T.S. *Manhattan* by light of day [were] very favourable. She appears to be very sturdily built and looks very sleek. With her harpoon bow and her saddle tanks which extend the whole length of the cargo compartments, she appears to be ready to meet any eventualities that might occur when she reaches the ice. As the Arctic has no respect for persons or ships, this remains to be seen. The weather was good and the opportunity was taken by the Press to photograph T.S. *Manhattan*. The daylight hours of September first were spent in visits by helicopters to *Manhattan* and vice-versa and meeting by Heads of Operations and Masters of both vessels to discuss future intentions of T.S. *Manhattan*.

1 September

At approximately 18:00 hrs. September 1st in Lat. 66.42'N Long. 59.32'W T.S. *Manhattan* requested that C.C.G.S. *John A. Macdonald* take station three miles ahead so as to give them plenty of warning of icebergs

and that tests could commend at daylight September 2nd. depending on weather conditions. A course of 060° (T) from 18:00 hrs. September 1st position with minor adjustments of course so as to skirt ice edge was made during the hours of darkness.

2 September

At 04:20 hrs. September 2nd in Lat. 69.29'N, Long 58.10'W course was altered to approach ice edge and helicopter sent off to assess ice conditions. T.S. Manhattan requested that we take station astern. From 06:00 - 07:00 hrs. from our position approximately 1 mile on the port beam of T.S. Manhattan, she appeared to be making very little headway. Ice conditions were 2/10 2nd year 20 miles 5/10 2nd year multi-years maximum ridge 16 ft. average ridge 7 ft. Thickness, multi-year 8 - 10 ft., 2nd year 6 - 8 ft., first year ice 3 - 4 ft. at that time.

08:00 hrs. Lat. 69130'N Long 59.02'W. T.S. *Manhattan* was still making very little headway, apparently testing recording equipment and sensors which are fitted all over the ship. She did in fact break her first ice at 07:45 hrs. with no difficulty at all but this did not seem to give her any confidence to attempt larger pieces. As C.C.G.S. *John A. Macdonald* was barely making headway herself, it was necessary to increase to full speed occasionally to keep engines operational. This was done and various manoeuvres at full speed were carried out, including circling the tanker which [led] the Press to believe that we were showing how to break ice, yet the real purpose was not that at all.

At 10:20 hrs. September 2nd Lat. 69.29'N Long 58.17'W T.S. *Manhattan* reached open water and speed was adjusted to keep astern of T.S. *Manhattan*. Reconnaissance indicated beyond the open water was a patch of loose ice extending 1/2 mile; and ice concentration up to 6/10ths. would be encountered.

Noon Position September 2nd Lat. 69.29'N Long 60.05'W. Weather conditions were such that the *Manhattan* performance could be closely followed. She appeared to have no trouble breaking this type of ice but there was no indication that she was using full power. On breaking the ice, the vessel maintained a steady trim with slight yawing on contact with heavy pieces, some reportedly 10 ft. thick. The ice appeared to erupt prior to contact with the ship's bow, then turn on end and slide past the forward section of the ship. The saddletanks were very effective in stopping the ice

from slipping under the hull, though heavy pieces were seen to come from directly under ships propellers and rudders. The officials on board T.S. *Manhattan* were very interested in the performance of the ice flow around the stern and stationed a helicopter over the stern for this purpose.

Surprisingly T.S. *Manhattan* appeared to be highly maneuverable and made frequent sharp turns in both directions. Whether his was carried out by engines or by rudder action alone, cannot be determined. *Manhattan* completed her preliminary experiments and left Long 60.14'W, setting course for Thule and C.C.G.S. *John A. Macdonald* took up station three miles ahead to warn T.S. *Manhattan* of icebergs. Various alterations of course throughout 8 -12 watch to avoid ice and at 00:00 hrs. September 3rd Lat. 71.342'N Long 59.18'W, course northerly speed 14 kts. favourable weather conditions.

3 September

This day was spent mainly in various visits by senior personnel in the *Manhattan* project to C.C.G.S. *John A. Macdonald* and press conference onboard both ships.

Noon position September 3rd Lat. 74.15'N Long 64.10'W. Excellent weather. Speed 15 kts. The object of the visit to Thule of T.S. *Manhattan* was to pick up American officials, both Government and company officials and then proceed to Lancaster Sound to give the officials an opportunity to see the tanker operating in ice. Speed and arrival time was determined by arrival of aircraft carrying these officials to Thule. T.S. *Manhattan* stopped of Cape York at 18:05 hrs. and C.C.G.S. *John A. Macdonald* kept station on her.

4 September

During the early hours of September 4th T.S. *Manhattan* was seen to increase speed and because of the fog patches and numerous icebergs in vicinity, T.S. *Manhattan* was guided through the icebergs into relatively clear water by 08:00 hrs. Both vessels were approaching Thule, C.C.G.S. *John A. Macdonald* three miles ahead, but on the final approach to the anchorage T.S. *Manhattan* decided to make her own course which was much closer to the shore. This meant that we had to steam back and forth waiting, for her to find a good anchorage. At approximately 11.45 hrs. September 4th, *Manhattan* anchored and we came to anchor near her.

It took the T.S. *Manhattan* approximately four hours to come to anchor and to make her own course. Disregarding the clear anchorage and safe track indicated by our ship did not make sense, nevertheless it is impossible to steer another ship, one can only indicate the safest way to approach any problem. The final decision rests with the master of that vessel.

Once both ships were safely anchored #3 barge was lowered and at the request of T.S. *Manhattan* divers from C.C.G.S. *John A. Macdonald* inspected the rudders and propellers of the tanker. No damage was found but it was pointed out by divers that at least 18 feet of propeller shafting was unprotected and the rudders being of the balanced type did not seem to have any protection apart from ice skegs. On a visit to the bridge of T.S. *Manhattan* it was noted that there were instructions posted stating that no more than 5 degree of rudder should be used and no more than 8 kts. to be steamed when in ice. As the vessel does not have bridge control all manoeuvring is done by ships telegraph and it seems that top speed is 80 rev. It must be pointed out that the inspection was not a detailed one so little weight should be given to these facts. *Manhattan's* draft was 51 feet 3 inches and was on even keel. The rest of the day was spent in visiting each others ships, but no one was allowed to land in Thule apart from helicopter at the air field.

5 September

V.I.P's for T.S. *Manhattan* arrived in the evening of September 4th and at 04:00 hrs. September 5th left anchorage in Thule (Lat. 76.28.9'N Long 69.19'W) and proceeded to Lancaster Sound area with T.S. *Manhattan* astern. Moon position September 5th Lat. 75.16'N Long 75.00'W, course 233° (T). Speed 14 ½ kts. Weather westerly 20 kts. Overcast and clear. A Canadian Parliamentary delegation flying into Resolute sent greetings to T.S. *Manhattan* from the aircraft but because of bad visibility could not fly low enough to see tanker.

6 September

00:00 hrs. September 6th Lat.74,16'N Long 82.02 1/2'W, various course were steered to keep T.S. *Manhattan* clear of ice during the hours of darkness and radio contact was made with U.S.C.G.C. *Northwind* and C.C.G.S. Labrador and at 08:00 hrs. in Lat.74:31'N Long 92.55'W, visual sighting of both vessels were made. As Canadian Parliamentary delegation were on board C.C.G.S.S. Labrador, this party was transferred by helicopter

to T.S. *Manhattan* during the morning. T.S. *Manhattan* proceeded independently on icebreaking tests for the benefit of the visitors whilst close support was given by all three icebreakers. Fog hampered all operations during the later part of the day. T.S. *Manhattan* stayed approximately 25 miles south and west of Resolute in deep water and well clear of Lowther Island C.C.G.S. *John A. Macdonald* had to return to Resolute in order to land passengers and take on new ones. Names of passengers embarked.

Mr. A.H.G. Storrs	Mr. W.P. Fellows	Mr. E.A. Gray
Mr. W. Slipehenko	Mr. P.W. Walter,	Mr. P. Ward
Mr. C.C. Lagasse	Mr. R.K. Williams	

At 17:49 hrs. anchored in position Lat.74.39 ½'N Long 94.52 ½ 'W, with T.S. *Manhattan* hove to 25 miles away in dense fog. C.C.G.S. *Labrador* anchored close to in the late hours of the 8 - 12 watch and ships barge was sent to pick up ships personnel and guests from C.C.G.S. *Labrador*.

7 September

At 07:45 hrs. September 7th C.C.G.S. *John A. Macdonald* left the anchorage and proceeded to a position nine miles southeast of Lowther Island to rendezvous with T.S. *Manhattan*.

Noon position Lat. 74.36'N Long 95.45'W. Winds light Temp. 36°F. Restricted visibility.

By 15:38 hrs. September 7th in position awaiting T.S. *Manhattan*. During these days C.C.G.S. Labrador took off all visitors from T.S. *Manhattan* and returned once again to Resolute.

19:00 hrs September 7th in position astern of T.S. *Manhattan* with southwest tip Lowther Island brg. 055° (T) distance 6.1 miles, course set 275°(T). Winds northeast 8 kts. Overcast. Proceeding towards Winter Harbour. Ice conditions 9/10 second year ice.

8 September

00:00 hrs. September 8th, Lat. 74.29 ½ 'N Long 99.56.5'W. Light winds. Temp. 30° F. Overcast. Proceeding astern of *Manhattan* U.S.C.G.C. *Northwind* bringing up the rear. Ice conditions 7/10 second year, with multi-year ice in large floes to a concentration of 9/10.

All ships made good progress through ice averaging 7.5 kts. and 06:00 hrs. September 8th T.S. *Manhattan* stopped for the purpose of making tests. This continued till 13:45 hrs. and T.S. *Manhattan* requested that all ships rendezvous at a position 15 miles south of Cape Clarendon.

Noon position September 8th Lat. 74.36'N Long 102.20'W. Weather conditions were good. Winds north 27 kts. Fog patches at times but predominantly cloudy and clear. From 13:45 hrs. till 14:15 hrs a good speed was maintained on a 275° (T) course then 255° (T) was steered.

C.C.G.S. *John A. Macdonald* kept station approximately 0.5 miles astern of T.S. *Manhattan* and U.S.C.G.C. *Northwind* astern of us. An average speed of 9 kts. was maintained during the 8 - 12 watch.

9 September

00:00 hrs. September 9th position Lat. 74.31'N Long 108.51'W with ice conditions 9/10 second year and 1/10 multi-year ice. It soon became apparent that the ice was under pressure and at 00:30 hrs. September 9th C.C.G.S. *John A. Macdonald* had to stop to assist U.S.C.G.C. *Northwind*. This operation took till 03:55 hrs. and it was decided that U.S.C.G.C. *Northwind* should keep the position astern of T.S. *Manhattan* and C.C.G.S. *John A. Macdonald* would be astern of her.

05:00 hrs. U.S.G.G.C. *Northwind* became stuck in heavy ice under pressure; approx. position Cape Bounty brg. 356° (T) distance 33 miles. It required the full power of the C.C.G.S. *John A. Macdonald* with heeling system activated to free the U.S.C.G.C. *Northwind* but conditions were such that it was decided to leave U.S.C.G.C. *Northwind* until the pressure eased and then she could proceed independently. In the meantime T.S. *Manhattan* was proceeding independently and making fair progress, but in an attempt to turn to port she lost headway and stopped in the ice. C.C.G.S. *John A. Macdonald* had taken station astern of T.S. *Manhattan* by 07:15 hrs. September 9th. Whether the alteration to port was intentional or whether she had attempted to turn round and try and assist us to free the U.S.C.G.C. *Northwind* cannot be determined.

Nevertheless T.S. *Manhattan* stopped approximately 08:00 hrs. in position Lat. 74.18'N Long 109.30'W. Weather condition northwest 25 kts. Air temp. 24°F., barometer 30.07 inches. Ice conditions 4/10 multi-year

and 6/10 second year ice. Large ice floes under pressure consolidated weathered ridges. 3/10 puddling, 3 inches new ice.

At 09:40 hrs. T.S. *Manhattan* requested that C.C.G.S. *John A. Macdonald* relieve pressure on her port side. This event is now history and has been recorded on T.V. tape film and sound equipment which can describe the operation better than any verbal description. Nevertheless with nine (9) engines and heeling system in operation C.C.G.S. *John A. Macdonald* broke out T.S. *Manhattan* in approx. thirty minutes. By breaking the ice on the port side of T.S. *Manhattan* in about seven passes the tanker came astern and then charged the ice having enough momentum to carry her through the ridges. We then took up station astern of her and maintained a distance of 7.5 cables. At 11:15 hrs. tanker informed us that she would stop in a [polynya] close by and called a conference for all Masters.

Noon position September 9th Lat. 74.22'N Long 110.14'W. Ice conditions were as mentioned in 08:00 hrs. position. At 12:56 hrs. September 9th Admiral Storrs and myself boarded T.S. *Manhattan* for conference and the main item discussed was the fact that U.S.C.G.C. *Northwind* was hampering the progress of the operation and it was decided that the U.S.C.G.C. *Northwind* should proceed independently also T.S. *Manhattan* would attempt the northern run around Banks Island. Conference ended at 14:24 hrs and on return to ship I brought C.C.G.S. *John A. Macdonald* alongside T.S. *Manhattan* to take on bunkers and water. Vessel secured alongside at 14:45 hrs and bunkering commenced at 15:40 hrs. During the time alongside *Manhattan*, ice recco. were flown by helicopter and canister dropped by KAE. Ice recce. plane containing ice charts were picked up by ships helicopter. Bunkering completed at 19:56 hrs then left tanker to await further instructions.

In the meantime T.S. *Manhattan* continued making tests. I think at this point of the report the word "tests" should be explained. T.S. *Manhattan* had a full complement of scientists and technicians on board to study every aspect of the tankers capabilities and as Humble Oil had engaged these men for the purpose of evaluating the findings, these men had a great deal of influence in the operating of the tanker. Naturally, these men could stop her or start her as they wished, use as much power as they saw fit and they were very reluctant to indicate to us what were their real intentions. So it became obvious that when the T.S. *Manhattan* informed us that she was making

tests we must be prepared to stand-by and watch until she called for assistance. Many times during the operation she would amaze us at the thickness of ice she would calmly steam through, then again she would surprise us by asking for assistance in conditions we know for a fact she had had no problems with previously.

10 September

At 00:00 hrs September 10th found us in position Lat. 74.22'N Long 110.14 ½ 'W. Ice conditions 10/10 multi-year ice under pressure. T.S. *Manhattan* got underway for about ten minutes during the early part of 12 - 4 watch then she stopped and was seen to use her heeling system and manoeuvre her engines ahead and astern and finally ask for our assistance at 03:45 hrs C.C.G.S. *John A. Macdonald* came to T.S. *Manhattan* assistance on two occasions on the 4 - 8 watch so working on the starboard side of the tanker the pressure was quickly eased. It is becoming evident that the T.S. *Manhattan* had very little astern power and it is necessary to break the tanker free right to her bow before she can free herself. By 05:50 hrs with pressure easing on the ice the tanker was free and with C.C.G.S. *John A. Macdonald* about 0.5 miles astern set course 230° (T) and a speed of 10 kts. was maintained during watch.

08:00 hrs position Lat. 74.03'N Long 110.26'W. Ice conditions 10/10 second year ice, pressure easing.

Following close astern of T.S. *Manhattan* at an average speed of 6 kts. Ice reconnaissance was carried out during 8 - 12 watch.

Noon position September 10th Lat. 73.56'N Long 112.17'W. Weather overcast, fine and clear. Ice conditions predominantly second year ice with 1/10 multi-year, trace of ridging. Air Temp. 29° F. Sea Temp. 29°F. Barometer 30.09 inches. Wind west 15 kts. Distance run noon to noon 48 miles. During 12 - 4 watch T.S. *Manhattan* developed steering gear trouble and at 14:57 hrs stopped in polynya to effect steering repairs. This was found to be a hydraulic line broken. T.S. *Manhattan* used this period to fly off by helicopter two ice parties and C.C.G.S. *John A. Macdonald* took the opportunity to send one party. Their reports [indicate] the ice to be 8 feet 8 inches deep with 2 inches of snow.

16:00 hrs position Lat. 73.32'N Long 113.31'W. Course 230°(T). 16:37 hrs T.S. *Manhattan* asked us to return on reciprocal course to assist

helicopter N316Y down on the ice. Full speed was ordered and we returned through 10/10 multi-year ice and dense fog to a position about four miles astern of T.S. *Manhattan*. On approaching helicopter, it was found to be lying on its starboard side as its starboard sponson had been broken through the ice. The main problem was to manoeuvre the vessel into such a position so the starboard crane could be sad to hoist the helicopter on the flight deck. As the helicopter were close to the ice-edge should the ship hit the ice hard, then there was every possibility that the ice supporting the helicopter would break and the helicopter would sink. In order to get a better view of the operation navigation was transferred to Top Bridge and at 16:55 hrs the ship was carefully backed into position close to helicopter. Bosun's and four seamen were lifted onto ice by crane and fortunately his type of helicopter has a lifting lug in the centre of [rotor] blades just for occasions as this. A 17-ton shackle with strap was connected to the lifting lug and hook of crane connected to the strap.

With careful manoeuvring of the ship, the crane was allowed to take the weight of helicopter and it was gently eased out of the ice. Unfortunately the sponson had sunk too deep in the ice to be freed without damage and as the helicopter was lifted clear the sponson broke. By 17:50 hrs helicopter N316Y was on board and chocked up on flight deck. The bosun rigged with safety line managed to get a wire strap around sponson and at 18:19 hrs sponson was lifted onboard, crew taken onboard by crane and C.C.G.S. *John A. Macdonald* was underway and turning to T.S. *Manhattan* to land chopper on deck.

Alongside T.S. *Manhattan* by 19:20 hrs and on coming alongside starboard side T.S. *Manhattan* to tankers port side C.C.G.S. *John A. Macdonald* struck a heavy floe forward and fell heavily alongside tanker. The ships fenders took the brunt of the shock but as the sidetanks of the tanker have a shaft edge running the length of the ship, side plating suffered a score of 1/10 in. for about 6 feet. There was no dent or structural damage done to either ship. Helicopter and sponson were landed on tankers main deck by crane and 19:45 hrs. cleared *Manhattan* awaiting instructions.

20:00 hrs Lat. 73:31'N Long 113.31'W. Barometer 30.02 inches. Wind south 8 kts. Fog 20:55 hrs T.S. *Manhattan* got underway and C.C.G.S. *John A. Macdonald* took up position close astern. Ice conditions at the time was 1/10 ths. multi-year and 8/10 the second year ice with few open water leads. Average speed for watch 8 - 9 kts.

11 September

00:00 hrs September 11th position Lat. 71.43.5'N Long 114.12'W. Course 315°(T) Ice condition 8/10 second year ice. Course 315°(T) Wind Northwest by North 15 kts. Barometer 29.97 inches. Weather dense fog. In the early morning watches of September 11th a good progress was made with C.C.G.S *John A. Macdonald* in position 6 cables astern of T.S. *Manhattan* through 9/10 ice, 1/10 multi-year and 8/10 second year ice. On a base course of 315°(T) both ships proceeded up McClure Strait at about 4 kts. Apart from about twenty minutes in the 4 - 8 watch when T.S. *Manhattan* stopped, no other stoppages were recorded.

08:00 hrs September 11th position Lat. 74.12'N Long 115.42'W. Barometer 30.10 inches. Light overcast and haze. Wind northwest 16 kts. Temp. 32°(F). Course 320°(T).

At 08.53 hrs T.S. *Manhattan* requested assistance. Ice conditions at that time were, heavy multi-rear ice floes were jarred against T.S. *Manhattan* sides. After breaking the ice floes to relieve pressure on port side the tanker was freed at 10.40 hrs. C.C.G.S. *John A. Macdonald* took station astern of T.S. *Manhattan*. Course altered to port to fine areas of lesser pressure.

Noon position September 11th, Lat. 74.13.3'N Long 115.45.5'W. Northwest 20 kts. Barometer 30.00 inches. Air Temp 32°(F). Cloudy and clear. Vicinity of Banks Island. Course 288°(T). Distance run noon to noon 108 miles. Ice coverage 3/10 multi-year, 7/10 second year and 2/10 ridging. Ice floes were from 6 feet to 12 feet thick under pressure.

At 12.55 hrs T.S. *Manhattan* was caught by the bow in a heavy pressure ridge and 13.30 hrs, requested assistance. The ice conditions at this time were 3/10 multi-year, 7/10 second year, 9/10 large floes, 2/10 ridging, trace of hummocking and 8/10 snow covered. Height of ridges 2 - 6 feet thickness of ice 6 - 8 feet and heavy pressure. After relieving pressure on port side of tanker and with her engine manoeuvres, she broke free at 14.01 hrs by this time snow was reducing visibility and T.S. *Manhattan* was making very slow progress.

Distance covered on 12 - 4 watch 17 miles and at 16.00 hrs position Lat. 74.17.8'N Long 116.48'W. Wind northwest 12 kts. Barometer 30.13 inches. Temp 30°F. Overcast, light snow. Course 288°(T).

The ice conditions on 4 - 8 watch were no better and during this watch T.S. *Manhattan* stopped three times and managed to free herself but at 18.52 hrs in position Rodd Head brg. 192°(T) distance 6.8 miles T.S. *Manhattan* requested that we break the ice that had closed in around her stern. C.C.G.S. *John A. Macdonald* kept battering away at the ice but T.S. *Manhattan* was making no headway at all.

20.00 hrs position Lat. 74.21'N Long 117.24'W. Wind north northwest 12 kts. Barometer 30.12 inches. Temp. 32°F. C.C.G.S. *John A. Macdonald* then concentrated on the starboard side to try and ease the pressure. Ice conditions at the time 3/10 multi-year, 7/10 young polar, 1 - 2/10 ridging, height of ridges 3 feet and thickness of 7 feet. After sufficient area had been freed of ice T.S. *Manhattan* backed off and charged ahead, making about 600 ft. By 20.43 hrs she was making headway.

Weather conditions deteriorated and visibility was reduced to one mile, at 20.45 hrs T.S. *Manhattan* stopped once again. After five charges in the ice C.C.G.S. *John A. Macdonald* freed T.S. *Manhattan*. Tanker informed us that a conference would be held with Mission Director. It was decided that T.S. *Manhattan* navigate stern first out of what was realized as an ice floe. C.C.G.S. *John A. Macdonald* at the request of Mission Director proceeded downtrack to investigate the possibility of assisting tanker to navigate stern first out of the ice floe. 22:00 hrs. Rodd Pt. brg. 188 ½ °(T) distance 6.2 miles. C.C.G.S. *John A. Macdonald* carried out this request and returned to close-by T.S. *Manhattan*. It was then agreed to await daylight to reassess the situation and perhaps a change in conditions.

12 September

00:00 hrs September 12th, position Lat. 74.19.5'N Long 117.18'W. Overcast with light snow flurries. Wind northwest 18 kts. Barometer 30.02 inches. Air temp. 26°F. Ice conditions 7/10 second year, 3/10 multi-year, ridging and under heavy pressure. (Track closed rapidly after passing through ice). From 00:00 hrs to 11:20 hrs September 12th both vessels were stopped in ice. Position Lat. 74.20'N Long 117.15'W, and a slight easterly drift was detected. Weather conditions were such that visibility was restricted through fog and snow flurries. The conditions curtailed flying, so no definite information could be gathered concerning the ice floe. Ice in the immediate vicinity was 7/10 second year, 3/10 multi-year, 3/10 ridging and hummocking and under heavy pressure. Fortunately pressure eased and

weather improved so the C.C.G.S. *John A. Macdonald* turned around and proceeded on a reciprocal course for about four miles to see if track was still open.

Noon position September 12th Lat. 74.15'N Long 116.51'W. Barometer 30.10 inches. Wind northwest 27 kts. Weather improving, temp. 23°F. Distance run noon to noon 31 miles. At 12:04 hrs we returned along the track already made and then manoeuvred to lie stern to about 80 to 100 feet from T.S. *Manhattan*. This was in keeping with the original plan of towing T.S. *Manhattan* out of the floe. Helicopter 059 came on board in the mid-morning with Captain Pullen, Mr. Haas and Captain Steward to discuss the situation with myself and Admiral Storrs. The main points to come out of the conference was firstly to abandon the attempt to break through McClure Strait and try for Prince of Wales Strait and secondly to find the most practical way to extricate T.S. *Manhattan* from her present position. Bearing in mind the obvious dangers the tanker's rudders and pro74.16'N would be exposed to in the operation. Both parties were very reluctant to attempt this and only as a last resort.

However with weather improving and ice recces. reported small patches of open water and leads to the north and east of the tanker's position. This area was inspected by myself in ship's helicopter and it was found the distance to open lead by going ahead and the distance to the area where the tanker would have to be towed first in order in turn around was about equal. It was therefore decided by T.S. *Manhattan* to attempt and break out in a north easterly direction using every means at her disposal. Ice conditions were 3/10 multi-year, 7/10 second year, 3/10 ridging and hummocking with 8/10 snow covered. Full opportunity was taken by the ice parties to collect ice samples and make tests whenever the ships were stopped and one party working close to T.S. *Manhattan* found the ice to be 13 feet thick.

16:00 hrs position Lat. 74.16'N Long 116.56'W. Barometer 30.10 inches. Wind northwest 28 kts. Air temp. 30°F. 16:49 hrs C.C.G.S. *John A. Macdonald* got underway and after many manoeuvres turned round and was ready to assist T.S. *Manhattan*. By 18:00 hrs. T.S. *Manhattan* was ready to break-out and with C.C.G.S. *John A. Macdonald* working on her starboard side, the tanker backed up and with all power, heeling system in operation and wetting down system, she began the break-out. T.S. *Manhattan* gained [about] 500 feet at the first charge and the distance gained was increased at each assault.

C.C.G.S. John A, Macdonald kept close-by breaking ridges as she came to them or at her stern when the ice showed a tendency to collect there. The combined assault was effective and although very little headway was made, the fact was the tanker was moving and moving into easier conditions.

20:00 hrs position Lat. 74.15.5'N Long 116.56'W. Wind west northwest 30 kts. Barometer 30.14 inches. Overcast and clear. By 20:00 hrs T.S. *Manhattan* was beginning to turn to starboard and finally reached open water at approx. 20:15 hrs. After turning approx. 120° to starboard i.e. from 295°(T) to 060°(T) she stopped and informed us she would be making same repairs and set the time for starting again at 04:00 hrs next morning.

20:55 hrs Rodd Head brg. 249°(T) at 8.2 miles. Ice coverage 8/10 plus, 3/10 multi-year, 7/10 second year, little pressure and some open water.

13 September

00:00 hrs. September 13th, position Lat 74.16.7'N Long 116.54'W. Barometer 30.07 inches. Wind north 20 kts. Sea temp. 29°F. Slight southeasterly drift indicated. Both vessels remained stopped during the 12 - 4 watch and a slight southeasterly drift was experienced. As it was the intention of T.S. *Manhattan* to get underway at 04:00 hrs all ships gear was ready for that time. Barometer 30.18 inches. Wind southwest 25 kta. Weather high overcast temp 28° F. Ice conditions 8/10 second year, 1/10 multi-year, some open water.

04:01 hrs T.S. *Manhattan* underway on a base course of 070°(T) and good progress was made for the first hour. At approximately 05:00 hrs T.S. *Manhattan* entered a big floe, in fact one she had previously been through about two days before. Ice conditions 8/10 second year, 1/10 multi-year under pressure and although she was stopped by these conditions she eventually freed herself and proceed on course. Between 06:00 and 07:00 hrs. good progress was made. Ice conditions 8/10 second year, 1/10 multi-year and traces of open water. At 07:30 hrs *Manhattan* was stopped again and eventually proceeded underway by her own efforts. Ice conditions 7/10 second year, 2/10 multi-year and trace of open water. 2/10 ridging and hummocking. T.S. *Manhattan* could have avoided these concentrations of ice but did not do so.

08:00 hrs position Lat. 74.14.7'N Long 115.28'W. Distance run 22 miles. Barometer 30:19 inches. Wind northwest 25 kts. Weather cloudy and

clear. At this position course was altered to 090°(T) and again at 09:45 hrs. to 135°(T) and maintained this course till 10:45 bra when she altered to 180°(T) and headed for Prince of Wales Strait. Good progress was made throughout the watch averaging 9-3/4 kts. Ice conditions 8/10 second year, 1/10 multi-year with trace of open water. Ridging and hummocking under moderate to heavy pressure with 7/10 snow covered.

Noon position September 13th Lat. 74.04'N Long 114.09'W. Weather partly cloudy and clear. Wind northwest 22 kts. Distance run noon to noon 64 miles. During the afternoon watch T.S. *Manhattan* made good progress and was stopped on two occasions and she freed herself both times. Ice conditions 9/10 young polar, 1/10 multi-year ice, 2/10 ridging, 1/10 hummocking and 1/10 snow covered. There is strong evidence that there is great pressure on the ice as there are relatively new ridges and track is filling in fast.

16:00 hrs position 18 miles north of Russel Point at the entrance to Prince of Wales Strait. Barometer 30.24 inches. Wind west 18 kts. Temp. 34°F. Overcast, sunny intervals.

During the 4 - 8 watch T.S. *Manhattan* made very slow progress through heavy ridges and between 16:00 - 17:00 hrs she was stopped once by a heavy ridge. It took about ten minutes for the T.S. *Manhattan* to free herself and the heavy pressure became very noticeable. Ice conditions 2/10 multi-year, 8/10 second year and 5/10 ridging. 17:00 hrs Russel Poing brg. 255°(T) at 15.8 miles. C.C.G.S. *John A. Macdonald* was keeping close station astern of T.S. *Manhattan* but at 15:55 hrs with Walker Point brg. 245°(T) at 16.0 miles a heavy ice ridge caused us to stop and due to the heavy pressure it was difficult to go astern because of the large ice floes forced under the stern. With heeling system activated and full power C.C.G.S. *John A. Macdonald* continued battering at the ridge. No progress was made between 18:00 and 19:00 hrs but at 19:35 hrs a path was washed open. During this time T.S. *Manhattan* had proceeded about 4 miles ahead of us and was stopped waiting for us to rejoin her.

20:00 hrs position Lat. 73.36.2'N Long 114.45'W. Distance run for watch 7 miles. Course 180°(T). Wind northwest 8 kts. Barometer 30.25 inches. Temp. 33°F. Cloudy and clear. At this time T.S. *Manhattan* and C.C.G.S. *John A. Macdonald* was 0.4 miles apart proceeding on 180°(T) course and T.S. *Manhattan* was stuck by a heavy pressure ridge which she

attacked by herself by backing and charging. This method had no effect and at 21:40 hrs. T.S. *Manhattan* requested assistance. C.C.G.S. *John A. Macdonald* relieved the pressure on her port side which meant the vessel was breaking ice about 50 to 100 feet from the tankers side. T.S. *Manhattan* informed us that she would be stopped for a few hours to repair a damaged steering gear and at 23:30 hrs informed that she would commence operations again at 06:00 hrs September 14th. C.C.G.S. *John A. Macdonald* stayed in close proximity.

14 September

00:00 hrs September 14th position Lat. 73.36.2'N Long 114.54'W. Wind northwest 15 kts. Barometer 30.10 inches. Air Temp. 31° F. Cloudy and clear. Ice conditions 2/10 multi-year, 8/10 second year, 8/10 snow covered, 2/10 ridging, 1/10 hummocking, some frozen puddles with moderate pressure.

During the 12 - 4 watch T.S. *Manhattan* remain stopped but as she had her turbine running she progressed about 700 feet. Ice conditions 8/10 young polar, 2/10 multi-year, 2/10 ridging, 2/10 hummocking and 2/10 frozen puddles. 04:00 hrs position Lat. 73.36'N Long 114.49'W (10 miles north of Prince of Wales Strait). Barometer 30.21 inches. Wind northwest 11 kts. Temp. 31°F. Sea Temp. 29°F, overcast and clear.

From 04:00 - 06:00 hrs both vessels remained stopped but at 06:18 hrs with C.C.G.S. John A Macdonald on station astern the tanker she started to move once again on a 215°(T) course and made steady progress through 8/10 second rear ice, 2/10 multi-year, 3/10 ridging, 5/10 hummocking and 8/10 snow covered. It was obvious that the ice that both ships were passing through was thick but not under pressure. At. 07:30 hrs entered the Prince of Wales Strait and in this area ice was seen to be 6 - 12 feet thick with some ridges 12 - 15 feet thick. At approximately 07:50 hrs starboard propeller was noted to be vibrating badly and it must be assumed that damage had been done to it. It is also noted that T.S. *Manhattan* is trying to find leads which she had not been in the practice of doing before. 08:00 hrs position Lat.73.28.2'N Long 115.06'W. Distance run for watch 13 miles. Wind southwest 20 kts. Barometer 30.02 inches. Air temp. 32°F. Sea temp. 29°F.

The 8 - 12 watch was a continuing battle to break through heavy ice ridges and it needed the fall power of both ships to break and keep track open. With the ice conditions the same as noted in 4 - 8 watch T.S.

Manhattan became stuck at 06:07 hrs after five charges at the ice broke through on her own at 08:03 hrs.

At 08:52 hrs. T.S. *Manhattan* found herself in the same predicament and after four charges at the ice freed herself at 09:24 hrs. Again at 09:30 hrs. by four charges at the ridge. At 09:45 hrs. tanker was stopped again and after trying desperately to free herself by six charges at the ice she called for assistance. At 10:35 hrs. C.C.G.S. *John A. Macdonald* cut along starboard side to try and ease the pressure which by this time had become severe. By 11:00 hrs. after five to six charges at the ice by Macdonald T.S. *Manhattan* responded with backing off and charging about four times. With both ships working together *Manhattan* finally broke through ridge at 11:55 hrs. Only three-and-a-half miles were made during the watch and it is no doubt that this has tested the tanker's capabilities to the limit. Noon position September 14th Lat. 73.28'N Long 115.17'W. Distance run noon to 34 miles.

Barometer 30.02 inches. Wind Southwest 20 kts. Course 210°(T). Air Temp. 32°F. Sea temp. 29°F. Ice conditions 2/10 - 4/10 multi-year, 6/10 second year, 2/10 ridging, 8/10 snow covered, 1/10 hummocking and under heavy pressure ridges 12 - 15 feet thick.

With the pressure exerted on this type of ice the 12 - 4 watch brought no respite with T.S. *Manhattan* having to fight for every inch of ground covered from 14:00 to 15:00 hrs. C.C.G.S. *John A. Macdonald* was hard pressed to battle through a heavy ridge, but eventually caught up to the T.S. *Manhattan*. By 15:00 hrs position Lat. 71.21.3'N Long 115.34'W. Easier ice conditions prevailed and through ice recco. Found that open water lay ahead. Ice conditions 10/10 young polar, 3/10 puddling, 2/10 ridging little or no hummocking.

16:00 hrs position Lat. 73.17'N Long 115.44'W. (20 miles inside Prince of Wales Strait). Light overcast, fog patches. Wind southwest 20 kts. Barometer 30.10 inches. Air temp. 31°F. Sea temp [missing]°F. Distance run for watch 12 miles. From 16:00 - 17:00 hrs both vessels were in ice. Ice conditions 7/10 second year, 1/10 first year and patches of open water.

By 17:13 hrs both vessels in open water and at one mile apart tanker leading. 19:00 hrs Armstrong Pt. brg. 317°(T) distance 8 miles. A/C 335°(T). 20:00 hrs position Lat. 72.47.3'N Long 117.55.5'W. A/C 220°(T). Weather cloudy and clear. Wind southwest 15 kts. Barometer

30.05 inches. Distance run for watch 49 miles. Air temp. 36°F. Sea temp. 29°F. During the last watch of the day both vessels were in open water and good progress was made. At 21:45 hrs in position Lat. 72.41.3'N Long 118.48'W altered course to 220° speed was reduced at various times during watch because of fog and vessels maintained a distance of one mile apart from each others.

15 September

00:00 hrs September 15th position Lat. 72.06'N Long 119.23'W. Weather dense fog. Barometer 30.04 inches. Wind south 24 kts. Course 220°(T). Sea Temp. 36°F. Air temp. 35°F. Distance run for watch 50 miles. Both vessels averaged between fourteen and fifteen kts throughout the first half of the day. By 04:00 hrs they had cleared Prince of Wales Strait and were entering [Amundsen] Gulf bound for Sachs Harbour. At 03:50 hrs course was altered to 250°(T) position Lat. 71.15'N Long 120.42'W. Although ice was seen on radar no ice was encountered by either vessels.

06:00 hrs Nelson Head was bearing 261°(T) at 10.5 miles. 07:00 hrs Cape Lambton brg. 318°(T) distance 5.3 miles. 07:15 hrs course was altered to 318°(T). 08:00 hrs position Lat. 71.07.7'N Long 123.29'W. Barometer 30.04 inches, wind east by south 13 kts. Air Temp. 40°F. Fine and clear. Course 318°(T). Speed 14 kts. Both vessels made good speed throughout 8 - 12 watch and at 11.30 hrs speed was reduced on approaching anchorage at Sachs Harbour, course 312°(T).

Noon position September 15th Lat. 71.49.5'N Long 125.29'W. Barometer 29.96 inches. Wind southwest 10 kts. Weather cloudy and clear. Air temp. 40°F. Sea Temp. 34°F. Distance run noon to noon 287 miles. 12:45 hrs *Manhattan* approached the anchorage slowly and dropped anchor in position Sachs Harbour Beacon brg. 027°(T) at 8.6 miles. C.C.G.S. *John A. Macdonald* came alongside T.S. *Manhattan* and tied up by 13:35 port side to tanker's starboard side and commenced taking fuel and water. The opportunity was taken to check our propellers and frogmen confirmed our suspicions were correct i.e. that one blade from starboard propeller was broken to about two feet from the boss, with the tips of the other blades on starboard propeller having ragged edges on them, otherwise rudder and the other two propellers were in good condition. Inspection of the T.S. *Manhattan* rudders and propellers found that no damage had been done apart from a few zinc anodes missing around her stern.

The following passengers disembarked:

Mr. E.A. Gray	Mr. W.P. Fellows	Mr. D.J. Newlands
Mr. P. Ward	Mr. P.W. Walters	Mr. D.R. McNicoll
Mr. W. Slipchenko	Mr. R.P. Stone	Mr. N.R. DePoe
Mr. H.J. Whyte	Mr. S.J. Lake	Mr. M.B. Graig
Mr. J.C. Paquet		

The following passengers embarked:

Mr. J.D. Fellows	Mr. J.E. James, Jr.	Mr. S. Beauchemin
Mr. A.L. Dupont	Mr. B. Gosselin	

16 September

00:00 hrs September 16th position Sachs Harbour Beacon brg. 022°(T) at 8.6 miles. Weather fine and clear. Barometer 29.72 inches. Air temp. 38°F. Wind southeast 16 kts. At 00:30 hrs bunkering completed C.C.G.S. *John A. Macdonald* cleared tanker and stopped waiting for T.S. *Manhattan* to heave up and proceed. At 02:18 hrs T.S. *Manhattan* was underway and course 200°(T) was set and C.C.G.S. *John A. Macdonald* took up position one mile astern. Two small strings of ice were encountered during watch but they were successfully navigated.

04:00 hrs position Lat. 71.33'NLong 125.40'W. Barometer 29.75 inches. Wind southeast 18 kts. Air temp. 38°F. Sea temp. 29°F. During the 4 - 8 watch course 200°(T) was steered and good speed was maintained. At 06:30 hrs T.S. *Manhattan* increased speed to 10 kts. and at 07:18 hrs increased again to 14 kts.

08:00 hrs position Lat. 71.00'N Long 126.40'W. Barometer 29.67 inches. Weather cloudy and clear. Wind west southwest 7 kts. Air temp. 36°F. Sea temp. 35°F. Course was altered to 270°(T) at 08:30 hrs and speed was reduced to 3 kts. due to fog. 10:00 hrs position Lat. 70.58.5'N Long 126.58'W, course 270°(T) speed increase to 10 kts. 10:10 hrs altered course to 259°(T).

Noon position September 16th Lat. 70.55.5'N Long 127.59'W. Barometer 29.70 inches. Wind west 20 kts. Air temp. 31°F. Sea temp. 36°F. Weather fog banks. Distance run noon to noon 88 miles. Little or no ice was encountered by both vessel throughout 12 - 4 watch. Fifty-six miles

were steamed during the four hours. A few fog patches and snow flurries were experienced.

16:00 hrs position Lat. 70.44.5'N Long 130.43'W, course 259°(T). Wind west 20 kts. Barometer 29.81 inches. Air temp. 30°F. Sea temp. 34°F. Fog patches. From 16:00 to 20:00 hrs speed was determined by fog banks and speed was reduced accordingly. At 19:35 hrs T.S. *Manhattan* requested that C.C.G.S. *John A. Macdonald* take station one mile ahead so that adequate warning could be given if shallow water was encountered by C.C.G.S. *John A. Macdonald*.

At 19:52 hrs C.C.G.S. *John A. Macdonald* encountered ice. 20:00 hrs Lat. 70.40'N Long 132.39'W. Barometer 29.85 inches. Wind west 23 kts. Air temp. 31°F. Fog patches. Course 259°(T). Both vessels were in ice by 20:30 hrs T.S. *Manhattan* decided to take the lead again. Ice conditions 3/10 multi-year, 7/10 second year loose. This ice was successfully negotiated at a speed of 8 - 10 kts. and by 22:30 hrs both vessels were in open water with large floes about one mile from either side of the track.

17 September

00:00 hrs September 17th Lat. 70.35'N Long 134.14'W, wing west 24 kts. Barometer 29.83 inches. Air temp. 30°F. Fog banks. Course 259°(T). From 00:00 - 04:00 hrs both vessels were in ice but T.S. *Manhattan* proceeded on a 259°(T) course averaging 10 kts. Ice conditions 3/10 polar, 7/10 thick winter under heavy pressure to moderate pressure, Medium size floes with 1/10 hummocking, 2/10 ridging and it is noted that track fills in quickly. 04:00 hrs position Lat.70.28'N Long 135.57'W. Fog, heavy snow. Barometer 30:01 inches. Wind northwest 15 kts. Air temp. 35°F. Course 259°(T). Distance run for watch 35 miles. 04:30 hrs A/C to 270°(T). C.C.G.S. *John A. Macdonald* kept station one mile astern of *Manhattan* averaging 7 ½ kts for watch in ice conditions as follows 7/10 first year, 2/10 second year and a trace of multi-year ice under slight pressure and by 07:30 hrs many leads were visible. Snow stopped at 05:30 hrs.

08:00 hrs position Lat. 70.28'N Long 137.26'W. Cloudy and clear. T.S. *Manhattan* decided to carry out ice tests during the 8 - 12 watch but these were cancelled because the ice was not thick enough end dense fog curtailed all operations. 08:15 hrs T.S. *Manhattan* altered to 000°(T) in order to carry out these tests but at 11:15 hrs resumed a 255°(T) course. Ice conditions ice was scattered until 09:00 hrs then 2/10 multi-year, 7/10 second year, 9/10

snow covered, 1/10 ridging, 1/10 hummocking, 2/10 frozen puddles. 11.25 hrs T.S. *Manhattan* entered a polynya then encountered ice as reported above.

Noon position September 17th Lat. 70.45'N Long 137.38'W. Fog restricted visibility. Barometer 30.05 inches. Wind northwest 10 kts. Air temp. 30°F. Sea temp. 29°F. Distance run noon to noon 210 miles. Course was adjusted to 257°(T) and both ships made good progress averaging 7 kts. Ice conditions were 10/10 with 6/10 multi-year, 4/10 young polar, these conditions stopped T.S. *Manhattan* but the tanker freed herself without any trouble. Both ships cleared this ice about 13:00 hrs and for the rest of the watch there was 3/10 coverage consisting of 6/10 multi-year, 4/10 young polar. Dense fog throughout watch.

16:00 hrs position Lat. 70.41'N Long 139.00'W. Barometer 30.20 inches. Wind west 8 kts. Air temp. 32°F. Sea Temp. 30°F. Restricted visibility slowed both vessels during the 4 - 8 watch. Ice coverage varied from 2/10 to 5/10 of young polar and multi-year. Both vessels maintained a course of 257°(T) and averaged just under 6 kts.

20:00 hrs position Lat. 70.36.5'N Long 140.0'W. Course 257°(T). Barometer 30.21 inches. Wind northeast 7 kts. Air temp. 33°F. Sea temp. 31°F. Weather Dense fog. Dense fog prevailed throughout 6 - 12 watch and both vessels steamed at reduced speed. ln open water most of the watch but T.S. *Manhattan* altered course to 255°(T) at 23:05 hrs. Again at 23:50 hrs T.S. *Manhattan* altered course to 270°(T). These alterations of course were due to soundings indicating shallow water.

18 September

00:00 hrs September 18th position Lat. 70.12'N Long 141.14'W. Course 270°(T). Barometer 30.10 inches. Wind northwest 6 kts. Air temp. 28°F. By 04:00 hrs both vessels were approximately 25 miles northeast of Bartes Island. Averaging 8 kts T.S. *Manhattan* successfully navigated through all ice encountered stopped on two occasions to make tests. Ice conditions scattered pieces of multi-year and second year ice.

04:00 hrs position Lat. 70.25'N Long 142.50'W. Course 770°(T). Distance run for watch 33 tiles. Barometer 30.10 inches. Wind northeasterly 4 kts. Air temp. 25°F. Fog throughout watch. Ice conditions on 4 - 6 watch were good and although T.S. *Manhattan* steamed at reduced

speed the ice conditions did not interfere in any way with her progress. Ice conditions 1/10 - 4/10 young polar and multi-year ice. 07:00 hrs Barter Island brg. 193°(T) distance 19 miles. Course 270°(T), speed 4 kts. 07:40 hrs altered course to 180°(T) to anchorage position off Barter Island.

08:00 hrs position Lat. 70.24'N Long 143.39'W. Barometer 30.06 inches. Wind easterly 15 kts. Air temp. 31°F. Fog patches. Distance run for watch 16 miles. C.C.G.S. *John A. Macdonald* kept station 0.5 miles astern through-passage. Due to fog banks in the vicinity T.S. *Manhattan* approached the anchorage very slowly but by 09:20 hrs was safely anchored 9 miles off Barter Island.

At 09:52 hrs. C.C.G.S. *John A. Macdonald* came to anchor three cables astern of T.S. *Manhattan* in position Lat. 70.17'N Long 143.43'W.

Noon position September 18th Lat. 70.17'N Long 143.41'W. Barometer 30.05 inches. Wind easterly 28 kts. Air temp. 32°F. Sea temp. 30°F. Overcast, restricted visibility. Distance run for watch 7 ½ miles. Distance run noon to noon 133 miles. Ice conditions. Scattered ice floes and growlers. A good deal of the projected programme that was arranged for Barter Island had to be cancelled because of adverse flying conditions but T.S. *Manhattan* requested U.S.C.G.C. *Northwind* for a diving team to check her rudders and propellers. As far as can be gathered no damage was found. [It is] quite obvious that T.S. *Manhattan* had no problems on this part of the voyage. The tanker took everything in her stride and probably the only comment to be made is one of navigational aspect. T.S. *Manhattan* was concerned on a few occasions about "shoal water" And this naturally so, as she draws over fifty feet of water. The tanker had onboard a satellite navigation system and C.C.G.S. *John A. Macdonald* has a temporary Lambda receiver fitted. Both worked reasonably well but there is a lot of room for improvement.

You will note the U.S.C.G.C. *Northwind* has rejoined the convoy after extricating herself from the ice off Cape Bounty. U.S.C.G.C. *Northwind* proceeded through Victoria Strait on her way to Point Barrow. After Point Barrow she is bound for her base in Seattle. Press conference and other Public Relations Functions continued throughout the afternoon until late evening and at 21:35 hrs T.S. *Manhattan* hove-up and proceeded on 000°(T) course and at 21:48 hrs C.C.G.S. *John A. Macdonald* took station astern.

22:00 hrs Barter Island brg. 175°(T) distance 9.8 miles. I might add that this area is a very good holding ground and I am sure[,] should this area be used by these super-tankers, there is little or no possibility of anchor dragging. After a few quick tests in the ice T.S. *Manhattan* altered course to 350°(T).

19 September

00:00 hrs September 19th position Lat. 70.28.2'N Long 143.34'W. Barometer 29.98 inches. Wind Northeast 28 kts. Air temp. 31°F. Overcast and fog. Distance run for watch 13 miles. Both vessels continued on a 350°(T) course until 01:00 hrs when in position Lat. 70.30'N Long 143.36'W, course was altered to 279°(T): A large floe of multi-year ice was successfully negotiated by both vessels at that time with no difficulty and apart from small floes and bergy bits, no ice of any large proportions were encountered. Total distance steamed for watch 21 miles.

04:00 hrs position Lat. 70.38'N Long 144.29'W. Fine and clear. Course 279°(T). Barometer 30.07 inches. Wind easterly 25 kts. Air temp. 33°F. Both vessels were in open water throughout watch with C.C.G.S. *John A. Macdonald* keeping close station astern. Drifting ice-floes were seen but none directly in tanker's track.

08:00 hrs position Lat. 70.43.5'N Long 146.34'W. Cloudy, fine and clear. Barometer 30.03 inches. Easterly 25 kts. Air temp. 32°F. Distance run for watch 46 miles. Course 279°(T). A course of 279°(T) was maintained by both vessels until 11:00 hrs when T.S. *Manhattan* began changing course in order to land helicopter and also to approach anchorage at Prudhoe Bay. C.C.G.S. *John A. Macdonald* kept close station on tanker.

Noon position September 19th, Lat. 70.41.5'N Long 148.08'W. Fine and clear. Barometer 29.95 inches. Easterly 20 kts. Air temp. 32°F. Sea temp. 31°F. Distance run noon to noon 122 miles. Distance run for watch 42 miles. The following guests were entertained to luncheon onboard C.C.G.S. *John A. Macdonald* by Admiral Storrs, Director, Marine Operations:

Mr. A.H.G. Storrs, Director, Marine Operations
Mr. K. Miller, Governor of Alaska
Mr. W. Smith, Admiral Commandant of U.S.C.G.
Mr. R. Goehring, R/Adm. Director Ops. U.S.C.G.

Mr. R. Hammond, R/Adm. Commander of U.S.C.G. 17 District
Mr. Galloway, Director of Humble Oil
Mr. N. Jones Director of Humble Oil
Mr. T. Fuson, Sen. Mgr. Marine Division Humble
Mr. S. Haas, *Manhattan* Project Director
Capt. T. Pullen, Canadian Representative
Mr. E. Stoles, Lt. Cmdr. (R.C.N.)

After luncheon guests were flown to T.S. *Manhattan* to be present for the ceremony at the landing of a token shipment of oil. Admiral Storrs returned to Ottawa after the ceremony. The ceremony was carried out at 18:13 hrs onboard T.S. *Manhattan* and due to delays in time table and the uncertainty of the departure time of T.S. *Manhattan*, C.C.G.S. *John A. Macdonald* dropped anchor at 18:21 hrs.

20:00 hrs position Lat. 70.45'N Long 148.23'W. Barometer 30.08 inches. Wind easterly 22 kts. Air temp. 33°F. At 21:22 hrs T.S. *Manhattan* was underway and bound for Point Barrow on a course of 315°(T) C.C.G.S. *John A. Macdonald* close astern. Both vessels in open water and maintaining a speed of 13 kts. At 23:30 hrs T.S. *Manhattan* altered course to 285°(T) to look for suitable floes for testing purposes. Only a few strings of second year ice were seen during watch.

20 September

00:00 hrs September 20th position Lat. 71.03.5'N Long 149.19'W. Distance steamed for watch 26 miles. Barometer 29.85 inches. Wind easterly 20 kts on 285°(T) course both vessels proceeding enroute to Point Barrow. Speed was again reduced to six kts during 12 - 4 watch due to dense fog. Scattered ice strings of multi-year type with several small ice floes were encountered but they did not create any problem.

16:00 hrs position Lat. 71.36'N Long 115.54'W [sic: 155.54'W?]. Course 255°(T). Restricted visibility due to fog. Distance run for watch 23 miles. T.S. *Manhattan* made two alterations of course on the approach to Point Barrow one at 16:24 hrs to 250°(T) again at 15:52 hrs to 220°(T). 18:00 hrs Point Barrow brg. 205°(T) distance 13.4 miles.

18:45 hrs detached from T.S. *Manhattan* proceeding to moor alongside U.S.C.G.C. *Northwind*. 19:35 hrs portside to starboard side of U.S.C.G.C. *Northwind* position Lat. 71.21'N Long 156.28'W. Distance run for watch

23 miles. Barometer 29.90 inches. Wind easterly 4 kts. Air temp. 28°F. Sea temp 30°F. Fog scattered ice floes. As the three ice-breakers namely U.S.C.G.C. *Staten Island*, U.S.C.G.C. *Northwind* and ourselves were alongside each other, the opportunity was taken for visiting each others ship and the usual social courtesies were extended. A most entertaining and relaxing evening was had by all after a long gruelling voyage.

21 September[1]

00:00 hrs September 21st position Lat. 71.21.5'N Long 156.405'W. Barometer 29.90 inches. Wind easterly 6 kts. Air temp. 29°F. Shortly after midnight a large ice-floe caught in the anchor of the *Northwind* which caused her to drag. The result of the additional weight of ice on the cable cause the anchored ships to move and unfortunately as we had our gangway out on to her flight deck, the gangway was damaged by being caught in her flight nets. It was only by quick action on the part of the ship's crew in lifting the gangway inboard that more serious damage could have been done to it. Nevertheless, the gangway is repairable and this will be done as soon as possible.

C.C.G.S. *John A. Macdonald* got underway from alongside *Northwind* at 02:32 hrs and anchored at 00:53 hrs. Anchor position Lat. 71.23.5'N Long 156.39'W. Barometer 29.92 inches. Wind northeast 8 kts. Air temp. 27°F. Sea temp. 29°F. Snow flurries. C.C.G.S. *John A. Macdonald* lay anchor about 3.5 miles from T.S. *Manhattan* and as this was the terminal point for the trip it had been necessary to request that helicopter spares and replacements be sent to point Barrow. Also a team of seismologists were boarding here, with their equipment. Again the main problem encountered was weather conditions. The previous days, all flights from Fairbanks to Point Barrow were cancelled due to bad weather so it was doubtful if the passengers and equipment would be in Point Barrow in time. As all the seismic equipment was heavy it was decided to use S.P. barges for this purpose.

Noon position September 21st, Lat. 71.23.2'N Long 156.39.5'W. Barometer 29.95 inches. Wind northerly 9 kts. Air temp. 27°F. Overcast, light snow flurries. The only communication with Point Barrow is through

[1] *Editors' note:* Some parts of the transcript are out of sequence for the 21-24 September timeframe, so we have endeavoured to place the narratives in proper chronological order.

the radio station on R/T. On making enquires if our passengers and equipment had arrived the radio station contacted the base and reported that one passenger had arrived but were doubtful about equipment as the plane had been charted for T.S. *Manhattan* and her cargo had priority.

C.C.G.S. *John A. Macdonald* was constantly working on the starboard side of T.S. *Manhattan*. The tanker was battling through ice of 10/10 coverage, 9/10 which was multi-year, 1/10 young polar, 2/10 ridging and hummocking, with 10/10 snow covered and 6 - 8 inches new ice, under heavy pressure. T.S. *Manhattan* was observed to be making headway at about 500 - 700 feet at each charge and it was also observed that U.S.C.G.C. *Staten Island* was hard pressed to keep station spout one mile astern of T.S. *Manhattan*. At 04:00 hrs it was found that only 1.5 miles had been covered in these very difficult conditions. 04:00 hrs position Lat. 70.17.5'N Long 138.38'W. Barometer 30.18 inches. Wind north northeast 6 kts. Air temp. 17°F. Sea temp. 26°F. Overcast and light snow flurries.

At 04:55 hrs T.S. *Manhattan* finally broke through into a patch of open water and stopped in order to allow U.S.C.G.C. Staten Island to close up sterna of C.C.G.S. *John A. Macdonald*. At 05:20 hrs T.S. *Manhattan* set base course of 080°(T) at a speed of 5 kts. 06:00 hrs position Lat.70.20'N Long 138.26'W. At 06.20 hrs T.S. *Manhattan* encountered one big floe and although the floe slowed her down a little, it was cleared safely. It was confirmed that another plane was due later in the day so Mr. Kershaw, who was in charge of the equipment, decided to wait and check his equipment when and if it arrived. Barge returned to ship and was hoisted onboard.

At 21:14 hrs barge returned to beach and we found that all the seismic equipment had arrived. This was loaded on the barge, in addition to about twenty bags of mail for the U.S.C.G.C. *Northwind*, *Staten Island* and T.S. *Manhattan*. Three passengers from T.S. *Manhattan* who had missed the barge loaded with her supplies were also taken onboard. Barge returned to C.G.G.S. *John A. Macdonald* at 00:00 hrs.

22 September

00:00 hrs September 22nd position Lat. 71.23.2'N Long 156.39.5'W. Barometer 29.89 inches. Wind northeast 10 kts. air temp. 22°F. After barge had discharged passengers and equipment onto C.C.G.S. *John A. Macdonald*, she steamed to U.S.C.G.C. *Staten Island* and delivered all mail,

returning to ship at 00:30 hrs to be hoisted onboard. T.S. *Manhattan* had already informed all ships that [we] would get underway at 01:00 hrs. By 00:50 hrs. C.C.G.S. *John A. Macdonald* heaved up and station astern of T.S. *Manhattan*.

Various courses were steered to give Point Barrow a good clearance. 4:00 hrs position Lat. 71.42'N Long 155.49'W. Barometer 30.01 inches. Wind northwest 10 kts. Air temp. 23°F. Sea temp. 28°F. Distance run for watch 30 miles. Overcast and snow. Ice conditions 1/10 to 2/10 multi-year and young polar. At 04:00 hrs T.S. *Manhattan* set a base course of 105°(T), with first stop Sachs Harbour. U.S.C.C.G. *Staten Island* is now accompanying the convoy through the Northwest Passage and then round to Seattle via Panama. Ice conditions during this watch were 1/10 to 2/10 young polar ice, with a trace of multi-year ice. Light snow flurries during the watch. 08:00 hrs position Lat. 71.31.5'N Long 154.10'W. Barometer 30.04 inches. Wind north northeast 15 kts. Air temp. 26°F. Distance run or watch 33 miles. Snow flurries, cloudy.

From 08:00 - 10:00 hrs an average speed of 8 - 9 kts was maintained through 2/10 to 3/10 second year ice in strings with traces of multi-year ice. Speed was increased when 8/10 coverage in ice was observed. This coverage was made up of 7/10 second year, 1/10 multi-year ice and all vessels took the advantage of the large open water leads in this area to navigate safely through.

Noon position September 22nd Lat. 71.15.2'N Long 152.39.5'W. Barometer 29.97 inches. Wind northeast 5 kts. Overcast and clear. Air temp. 25°F. Sea temp. 29°F. Distance run for watch 34 miles. Distance run noon to noon 91 miles. All vessels maintained a base course of 105°(T) throughout the 12 - 4 watch and speed was adjusted according to visibility. On the average a speed of 8 kts was maintained.

Ice encountered during the watch was scattered strings of 2/10 to 5/10 coverage, composed of multi-year and young polar ice, with signs that new ice was forming. Ridging and hummocking was observed in the scattered strings office.

16:00 hrs position Lat. 71.10'N Long 151.03'W. Barometer 30.09 inches. Weather conditions Fog. Wind north by east 20 kts. Air temp. 24°F. Sea temp. 28°F. Distance run for watch 32 miles. Keeping the same course for the 4 - 8 watch all vessels increased speed to twelve kts. At 16:30 hrs. ice

coverage during the watch was much the same as the 12 - 4 watch. Three to five tenths concentration of second year and multi-year ice end T.S. *Manhattan* displayed good manoeuvrability in skirting the larger pieces of ice.

20:00 hrs position Lat. 70.58.2'N Long 148.55'W. Wind northeast 18 kts. Overcast and clear. Air temp. 24°F. Sea temp 28°F. Distance run for watch 45 miles. With a base course of 105°(T) a total of forty six miles was covered on the 8 - 12 watch. Apart from an alteration of course to 125°(T) at 21:25 hrs to avoid ice, T.S. *Manhattan* resumed course of 105°(T).

22:00 hrs position Lat. 70.52.3'N Long 147.51'W. Ice coverage for the watch was about one to three tenths second year ice, with scattered floes and occasional strings.

23 September

00:00 hrs September 23rd position Lat. 70.44'N Long 146.37'W. Distance run for watch 46 ½ miles. Barometer 30.05 inches. Wind northeast by north 13 kts. Air temp. 22°F. Sea temp. 29°F. Overcast with fog patches.

The early hours of September 23rd still found the convoy on a 105°(T) and an average speed or [six] kts. was maintained. Speed was adjusted according to ice conditions and darkness, the ice conditions being no problems to any of the ships. Ice conditions: Occasional strings of multi-year and second year ice, approx. concentration 3/10 to 4/10.

It became apparent that T.S. *Manhattan* was now trying to find easier tracks to follow rather than charge blindly into any ice in its track regardless of thickness and size. From 05:00 hrs - 08:00 hrs ice conditions were 7/10 to 8/10 multi-year and young polar, 10/10 snow covered with hummocking and ridging. Various speeds were made during the watch as a result of the prevailing conditions.

04:00 hrs Lat. 70.38'N Long 145.28'W. Barometer 30.25 inches. Wind northeasterly 15 kts. Air temp 22°F. Distance run for watch 20 miles. A definitely cold morning with obvious signs of new ice forming. At 04:10 hrs T.S. *Manhattan* increased speed to 9 kts on a 105°(T) course and this was an uneventful watch, with the only ice encountered occasional strings of multi-year.

08:00 hrs position Lat. 70.32'N Long 143.49'W. Barometer 30.17 inches. Wind northeast 15 kts. Air temp. 22°F. Clear and cold. Distance run for watch 34 miles.

On the 8 - 12 watch an average of 11 ½ kts was maintained on the same course. Ice conditions had changed somewhat as there was approximately 4/10 new ice with traces of multi-year and second year.

Noon position September 23rd Lat. 70.20'N Long 141.37.5'W. Barometer 30.07 inches. Wind northeast 9 kts. Air temp. 18°F. Overcast and clear visibility. Distance run for watch 45 miles. Distance run noon to noon 223 miles. At noon course was altered to 093°(T) and an average speed of 8 ½ kts. was maintained throughout the watch. There are strong indications that pressure is coming on the ice, which at this time is predominantly frazil ice with trace of multi-year and young polar.

16:00 hrs Lat. 70.19 ½'N Long 140.00'W. Barometer 30.17 inches. Wind northwest 12 kts. Air temp. 21°F. Overcast and clear. Distance run for watch 34 miles.

At 16:45 hrs T.S. *Manhattan* reduces speed to 5 kts on approaching ice pack. Approximate position of ice edge Lat. 70.18'N Long 139.28'W.

From 17:00 -18:50 hrs ice conditions were 4/10 multi-year and T.S. *Manhattan* handled the situation with no trouble at all. However, at 19:20 hrs tanker informed us that she would activate her heeling tanks in order to break out C.C.G.S. *John A. Macdonald* moved up from her position astern to assist *Manhattan* on the starboard side.

20:00 hrs, position 70.17.5'N Long 138.43'W. Barometer 30.17 inches. Wind north 7 kts. Air temp. 22°F. Distance run for watch 27 miles. Cloudy and clear. Ice conditions 9/10 multi-year, trace of new ice under slight pressure and 10/10 snow covered.

During the 8 - 12 watch only two miles were made because of the ice conditions, which were 9/10 multi-year and 1/10 second year in large floes, with 8 inches of new ice and covered with snow. This concentration was under heavy pressure. To aggravate matters T.S. *Manhattan* informed us that her heeling system was not working. As C.C.G.S. *John A. Macdonald* was working on the starboard side of *Manhattan*, the tanker requested that the U.S.C.G.C. *Staten Island* work on the port side. This request was made at 20:46 hrs and by 22:55 hrs U.S.C.G.C. *Staten Island* had made no

progress at all. It was then decided to leave her in position astern. No change in ice conditions except that 1/10 - 2/10 ridging and hummocking was observed. Very little progress was made, even with constant backing and charging. T.S. *Manhattan* could only gain 300 - 500 feet at each charge.

24 September

00:00 hrs September 24th position 70.17½'N Long 138.42'W. Barometer 30.08 inches. Wind north northeast 6 kts. Cloudy and clear with light snow.

08:00 hrs position Lat. 70.24'N Long 137.40'W. Barometer 30.18 inches. Wind easterly 6 kts. Air temp. 20°F. Sea temp. 21°F. Cloudy with snow flurries. Distance run for watch 19 miles.

At 08:12 hrs all vessels had run into heavy ice once again and at 08:44 hrs T.S. *Manhattan* informed us that she was stuck. C.C.G.S. *John A. Macdonald* took station on her starboard side at 08:50 hrs, with U.S.C.G.C. *Staten Island* positioned on port side at 09:20 hrs. Ice conditions were 8/10 multi-year and second year, 8 - 10 feet thick with pressure in large floes, 10/10 snow covered and leads frozen over with 4 - 6 inches of new ice.

At 10:03 hrs T.S. *Manhattan* informed us that her stern turbine was over heating and it would be necessary to go slow ahead for 10 minutes in order to allow it to cool down. By 11:05 hrs T.S. *Manhattan* was in a frozen lead and stopped once again to cool her turbine. In the meantime, helicopter reconnaissance had confirmed that this lead would bring the vessels into open water.

T.S. *Manhattan* quite wisely took the advantage of this information and at 11:40 hrs a base course of 190°(T) was set. Noon position September 24th Lat. 70.17.5'N Long 137.31'W. Barometer 30.08 inches. Wind southerly 10 kts. Air temp. 20°F. Sea temp. 21°F. Overcast and clear. Distance run for watch 8 miles. Distance run noon to noon 91 miles.

Helicopters were used throughout the 12 - 4 watch so that T.S. *Manhattan* could take advantage of the open water leads. 13:00 hrs position Lat. 70.12'N Long 137.42'W. Speed 8 kts. 13:30 hrs altered course to 090°(T). north and east was attempted and an approximate base course of 070°(T) was steered. Ice conditions throughout watch was 10/10 coverage of which 6/10 was multi-year ice. A trace of second year ice was evident and

new ice was observed forming on the open water. Total distance run for watch was 32 miles.

16:00 hrs position Lat. 70.07'N Long 136.57'W. Overcast and clear, course 070°(T). Barometer 30.09 inches. Calm. Air temp. 23°F. Sea temp. 22°F. The 4 - 8 watch was spent in 6/10 to 9/10 multi-year ice but as T.S. *Manhattan* was now following the open leads no problems were caused by the ice. A good speed was slowed down to fly off ice reconnaissance by helicopter. A course of 070°(T) was maintained throughout watch. A speed of 10 kts. was averaged over the watch.

20:00 hrs position Lat. 70.29'N Long 135.18'W. Cloudy and clear. Calm. Barometer 30.09 inches. Air temp. 23°F. Sea temp. 22°F. Distance run for watch 41 miles.

Ice conditions eased considerably during 8 - 12 watch, although ice concentration was 3/10 to 4/10 multi-year and 6/10 new ice. Floes of multi-year ice were observed to be between 5 - 9 feet thick and new ice was seen to be 2 - 3 inches thick. T.S. *Manhattan* took advantage of leads and a good speed was maintained. Apart for a period of time when T.S. *Manhattan* altered course to 110°(T) to avoid ice the base course was 070°(T). At 23:45 hrs speed was reduced to 9 kts.

25 September

00:00 hrs September 25th position Lat. 70.53'N Long 133.12'W. Barometer 30.05 inches. Wind northwest by north 5 kts. Air temp. 24°F. Sea temp 24°F. Distance run for watch 49 miles. All vessels maintained a base course of 070°(T) averaging 9 kts in predominantly open water. A few scattered ice strings were observed but no heavy ice floes.

04:00 hrs position Lat. 71.01'N Long 131.30'W. Snow. Barometer 30.14 inches. Air temp. 25°F. Sea temp. 30°F. Wind west 15 kts. Course 070°(T) Distance run for watch 36 miles. The 4 - 8 watch steamed in open water for the four hours and a base course of 070°(T) was maintained. T.S. *Manhattan* varied her speed quite frequently throughout the watch. 04:30 hrs to 04:30 hrs speed 5 kts. 06:00 hrs position Lat. 70.11'N Long 129.33'W. Barometer 30.11 inches. Wind west 15 kts. Air temp. 24°F. Light snow throughout watch. Course 070°(T). Distance run for watch 39 miles.

Ice conditions varied from 1/10 to 3/10 multi-year ice in large floes. All vessels steered 070°(T) at 11 kts, in open water until 10:00 hrs position Lat. 71.20.5'N Long 128.33'W., when course was altered to 090°(T) and T.S. *Manhattan* increased speed to 15 kts. This speed caused T.S. *Manhattan* to pull ahead of the rest of the ships, but at 11:15 hrs T.S. *Manhattan* reduced speed because ice reconnaissance had spotted heavy ice ahead. Ice conditions 1/10 to 2/10 multi-year ice in floes.

Noon position September 25th Lat. 71.18.5'N Long 127.19'W. Barometer 30.12 inches. Wind north northwest 15 kts. Air temp. 72°F. Sea temp. 34°F. Scattered snow flurries. Cloudy and clear. Distance run for watch 46 ½ miles. Distance run from noon to noon 244 miles.

All vessels were in vicinity of Sachs Harbour and at 14:00 hrs Lat. 71.18'N Long 127.06'W. The final approach course of 020°(T) was set. Ice conditions were minimal between noon and 13:30 hrs and from this time on no ice was sighted apart from scattered floes. 15:00 hrs Sachs Harbour beacon bearing 023°(T) distance 29 miles. 16:00 hrs position Lat. 71.45'N Long 125.39'W. Overcast and clear. Barometer 30.11 inches. Wind north northwest 15 kts. Air temp. 22°F. Sea temp. 34°F. Distance run for watch 48 miles.

By 17:03 hrs C.C.G.S. *John A. Macdonald* was anchored in position Lat. 71.48.5'N Long 125.25'W. U.S.C.G.C. *Staten Island* tied up alongside T.S. *Manhattan*. During the brief stay at Sachs Harbour, T.S. *Manhattan* had various official functions to carry out and during this time the following passenger disembarked: - Mr. J.D. Fellows, Passengers embarked - Miss Isohel M. Dunbar, Mr. John C. Pelletier, Mr. Harry G. Blanchard.

Mail and stores were also taken onboard. During the voyage from Point Barrow to Sachs Harbour the Seismic equipment was tried out but it was not successful. The bosun's locker aft. was fitted so that the recording equipment would be out of the weather and would be handy to the operators. The towing parts of this equipment were overhauled by [ship's] crew and one man was stationed aft at all times. The sounding equipment was being towed so that if it was necessary for the vessel to go astern, the tow could be hauled in immediately, the warp being always on the drum end of the mooring winch.

The main problem was the ice. The delicate sensors in the towing section of this equipment could not stand up to the battering that they were subject

to when they were dragged through the ice. The operation was called off and it is now under discussion whether it will be more practical if small charges are used for the operation. These explosive charges will have to be requisitioned from U.S.C.G.C. *Staten Island.*

20:00 hrs position Lat. 71.48.5'N Long 125.25'W. Barometer 30.13 inches. Wind northwest 14 kts. Air temp. 21°F. Overcast and clear. T.S. *Manhattan* completed all her public relation functions at 21:50 hrs and got underway for Prince of Wales Strait. 22:19 hrs C.C.G.S. *John A. Macdonald* hove up and got underway and set course 180°(T) at 22:51 hrs set course 138°(T).

23:00 hrs Sachs Harbour Oil Tanks brg. 003°(T) distance 13.4 miles. At 23:20 hrs T.S. *Manhattan* commenced engine trials and it was decided that all ships should proceed independently to the ice edge.

26 September

00:00 hrs September 26th position Lat. 71.38.5'N Long 12.54'W. Barometer 30.07 inches. Wind north northwest 14 kts. Air temp. 24°F. Clear water. Distance run for watch 19 miles. Course 138°(T).

C.C.G.S. *John A. Macdonald* proceeded on a 138°(T) course at 15 kts towards Prince of Wales Strait. Weather conditions were good and there was open water all the way. 22:00 hrs Cape Queenston brg. 107°(T) distance 18.7 miles. At 02:30 hrs A/C 107°(T) 03:00 hrs Cape Lambton brg. 080°(T) distance 5.2 miles. 03:43 hrs A/C 070°(T). 04:00 hrs position Lat. 71.02'N Long 122.42'W. Overcast and clear. Barometer 30.21 inches. Wind northwest 13 kts. Air temp. 24°F. Sea temp. 34°F. Course 070°(T). Distance run for watch 62 miles.

Three vessels proceeding independently, with C.C.G.S. *John A. Macdonald* steering 070°(T) course. Speed was maintained until 06:55 hrs, when with Cardwell Brook brg. 325°(T) distance 11.9 miles A/C to 035°(T) to take station astern of T.S. *Manhattan*.

08:00 hrs position Lat. 71.30'N Long 120.18'W. Overcast and clear. Barometer 30.21 inches. Wind northwest 9 kts. Air temp. 27°F. Sea temp. 33°F. Course 035°(T) distance run for watch 61 miles.

At 08:40 hrs T.S. *Manhattan* took station ahead and set a base course at 025°(T). 09:00 Cape Tredwell brg. 260°(T) distance 10.3 miles. The varying speeds of each individual ship caused all ships to be scattered and at

11:20 hrs T.S. *Manhattan* reduced speed in order to allow the other two ships to take station. At noon C.C.G.S. *John A. Macdonald* was one mile astern of *Manhattan*.

Noon position September 26th Lat. 72.33'N Long 118.57'W. Overcast and clear. Barometer 30.13 inches. Wind northwest 9 kts. Air temp. 26°F. Sea temp. 30°F. course 025°(T). distance run for watch 70 miles. Distance run noon to noon 222 miles. Ice conditions 9/10 new ice two inches thick.

As it was obvious that all vessels were approaching ice edge, helicopter was sent to reconnoitre and establish the position of this. 14:00 hrs Johnson Pt. brg. 312°(T) distance 6.8 miles. 14:41 hrs. Altered course to 035°(T).

15:00 hrs position Lat. 72.48'N Long 117.55'W. Altered course to 053°(T).

16:00 hrs position Lat. 72.59'N Long 117.25'W. Overcast, fog patches, light snow. Barometer 30.25 inches. Wind west northwest 10 kts. Air temp. 25°F. Sea temp. 30°F. Ice conditions 9/10 coverage, new ice 2 - 6 inches, course 053°(T). Distance for watch 47 miles.

At 17:32 hrs T.S. *Manhattan* stopped until another ice reconnaissance was made. Position Lat. 73.09.8'N Long 116.27'W. At 18:55 hrs T.S. *Manhattan* got underway and informed all ships that she would be moving into pen water on the west side of Prince of Wales Strait. If the water was deep enough she would head into the ice. Ice conditions at the time were as follows: 3/10 multi-year, 6/10 second year with new ice rafting, 2/10 ridging, 1/10 hummoking, 1/10 frozen puddles and 9/10 snow covered. Various courses were steered to keep in the open water.

20:00 hrs position Lat. 73.14 ½'N Long 116.20'W. Overcast, light snow. Barometer 30.28 inches. Wind west northwest 13 kts. Air temp. 27°F. Sea temp. 30°F. Distance run for watch 24 miles.

Various courses were steered during 8 - 12 watch and progress continued until heavier ice conditions were encountered, when it was decided to stop until daylight. 21:10 hrs all vessels stopped awaiting daylight. Position Lat.73.19'N Long 115.42'W. Ice conditions 9/10 consisting of 3/10 multi-year, 6/10 second year, 1/10 grey ice, 2/10 ridging, 1/10 hummocking and 9/10 snow covered with slight pressure.

27 September

00:00 hrs September 27th position Lat. 73.19'N Long 115.42'W. Barometer 30.15 inches. Wind west southwest 9 kts. Air temp. 24°F. Sea temp. 30°F. Distance run for watch 11 ½ miles.

All vessels were stopped during the 12 - 4 watch awaiting daylight. Ice conditions 3/10 multi-year, 6/10 second year, 1/10 grey ice, 2/10 ridging, 1/10 hummocking and 9/10 snow covered, little or no pressure.

04:00 hrs position Lat. 73.19'N Long 115.42'W. Overcast and clear. Barometer 30.22 inches. Wind south southeast 10 kts. Air temp. 24°F. Sea temp. 30°F. All ships stopped throughout the 4 - 8 watch.

08:00 hrs position Lat.73.19'N Long 115.46'W. Overcast and clear. Barometer 30.15 inches. Wind south 12 kts. Air temp. 28°F.

During the 8 - 12 watch ice parties from T.S. *Manhattan* were put on the ice briefly. The ice party drilled holes in the ice, measuring the thickness and then took temperatures at certain points through the ice. The drills used are of a special type which bring a sample or core to the surface. This core is delicately sliced into sections for analysis, the method being very similar to oil drilling tests. Once these tests are made a path is marked with flags so that a track can be followed by the ship. When all tests are completed, the sensors and recording gear in the vessel are activated so that when the vessels ploughs through the ice, all stresses and strains and torques on the shafts are recorded. many of these tests, I am sure, will be made in the days to cone so that every possible condition that the tankers of the future will encounter can be assessed now and provision made to combine these facts for new tankers.

Noon position September 27th Lat. 73.19'N Long 115.46'W. Cloudy and clear. Barometer 30.10 inches. Wind south 25 kts. Air temp. 25°F. Ice conditions 3/10 multi-year, 6/10 second year, 9/10 snow covered, 2/10 ridging and 1/10 hummocking. Distance run noon to noon 83 miles.

12:00 hrs all vessels got underway on a base course of 090°(T). During this watch helicopter took hydrographic party to Banks Island to check marks. In the meanwhile T.S. *Manhattan* made steady progress to the North end of the Prince of Wales Strait. 14:00 hrs Peel Point brg. 109°(T) at 5.1 miles. At 14:21 hrs. T.S. *Manhattan* was stopped by the ice but freed herself without any help. Ice conditions 3/10 multi-year, 6/10 second year, 9/10

snow covered, 2/10 ridging and 1/10 hummocking. From 15:15 hrs to 15:45 hrs T.S. *Manhattan* stopped making engine tests, then got underway on 013°(T) course. All ships now at the Northern entrance to Prince of Wales Strait.

16:00 hrs position Lat. 73.29'N Long 114.46'W. Overcast and clear. Barometer 30:00 inches. Wind southeast 26 kts. Air temp. 29°F. Sea temp. 29°F. During the 4 - 8 watch T.S. *Manhattan* carried out power trials. 16:30 hrs T.S. *Manhattan* proceeds on a 013°(T) course on full power. 16:50 hrs T.S. *Manhattan* reduces speed again.

17:00 hrs position Lat. 73.29.6'N Long 144.44'W, tanker then stopped to allow both ice-breakers to regain their position astern. 17:55 hrs all ships in position. T.S. *Manhattan* increased to full power and at 18:28 hrs altered course to 045°(T).

19:00 hrs position Lat. 73.37.5'N Long 114.38.6'W. By 19:13 hrs *Manhattan* was stopped by an ice ridge and after backing and charging the ice, with heeling system activated, the tanker had made no progress at all. Ice conditions 3/10 multi-year, 6/10 second year and 1/10 new ice.

20:00 hrs position Lat. 73.38'N Long 114.38'W. Distance run for watch 10 miles Barometer 30.06 inches. Wind south 13 kts. Air temp. 29°F. Sea temp. 29°F. Overcast and clear. Course 045°(T).

By 20:11 hrs T.S. *Manhattan* had freed herself but was stopped by pressure ridge again at 20:28 hrs. The tanker finally broke through the ridge at 20:43 hrs but at 21:35 hrs was stopped once more. It was decided to stop for the right after assessing the situations. It is obvious this is an area in which the ice concentration will give shipping difficulty should it become possible to use the Prince of Wales Strait, where the ice pack is pressed down on the northern shore of Victoria Island.

28 September

00:00 hrs September 28th position Lat. 73.44.5'N Long 114.17.5'W. Barometer 29.94 inches. Wind south 20 kts. Air temp. 26°F. Distance run for watch 8 ½ miles. Ice conditions 3/10 multi-year, 6/10 second year, 1/10 new ice, 9/10 snow covered, 2/10 ridging, 1/10 hummocking and 9/10 large floes.

All vessels stopped during the 12 - 4 watch to await daylight, and a slight northeasterly drift was experienced.

04:00 hrs position Lat. 73.44.5' Long 114.17.5'W. Overcast and clear. Barometer 30.00 inches. Wind south 22 kts. Air temp. 25°F. Ice conditions 3/10 multi-year, 6/10 second year, 9/10 snow covered, 10 ridging, 1/10 hummocking and 9/10 large floes. All vessels awaiting daylight to get underway. Weather conditions overcast and snow flurries.

08:00 hrs position Lat. 73.44.5'N Long 114.17.5'W. Barometer 29.95 inches. Wind south southeast 17 kts. Air temp. 28°F.

At 08:14 hrs all vessels were ready, but T.S. *Manhattan* reported that she was stuck and after attempting to free herself asked for assistance.

At 08:52 hrs C.C.G.S. *John A. Macdonald* took up station on the starboard side and the U.S.C.G.C. *Staten Island* was to work on the port side but the latter was unable to get into position. C.C.G.S. *John A. Macdonald* freed *Manhattan* at 09:30 hrs. At 09:40 hrs T.S. *Manhattan* was stuck again but C.C.G.S. *John A. Macdonald* constantly kept easing the pressure by working the starboard side of tanker. 10:00 hrs position Lat. 73.48.7'N Long 114.02'W.

At 10:40 hrs T.S. *Manhattan* was underway again. She again became stuck at 10:50 hrs and 11:00 hrs C.C.G.S. *John A. Macdonald* was working on her starboard side relieving the pressure. Although all ships were using all the power at their disposal, with heeling system activated, very little progress was made - only six miles for the watch.

Noon position September 28th Lat. 73.48.4'N Long 114.02.5'W.

Heavy snow throughout watch, stopped at 11:30 hrs. Barometer 29.89 inches. Wind west southwest 20 kts. Air temp. 24°F. Sea temp. 29°F. Distance run for watch 6 miles. Distance run noon to noon 46 miles. Base course 080°(T). Ice conditions 3/10 multi-year, 7/10 second year, 2/10 ridging, 1/10 king and 10/10 snow covered.

There was no improvement in speed or in ice conditions during the 12 - 4 watch and C.C.G.S. *John A. Macdonald* was continually working starboard side tanker to ease pressure. The tanker constantly backing and charging the ice, made approximately four miles for the watch. On the average the T.S. *Manhattan* made about 1500 feet per charge. Ice conditions 7/10 second year, 3/10 multi-year, 2/10 ridging, 1/10 hummocking and 10/10 snow covered. Slight pressure.

16:00 hrs Lat. 73.50'N Long 113.48.5'W. Overcast and clear. Barometer 30.05 inches. Wind northwest 15 kts. Air temp. 22°F. Sea temp. 29°F. By 16:20 hrs all vessels were in a lead and this lead the convoy to the south eastward and at 16:58 hrs still following the leads and patches of open water to 045°(T).

18:00 hrs position Lat. 73.46.7'N Long 113.27'W. Ice conditions 6/10 second year, 3/10 multi-year, 9/10 snow covered, ridging and hummocking. By 19:00 hrs ice started to loosen up and we had a coverage of 5/10 second year, 2/10 multi-year ice with patches of open water.

20:00 hrs position Lat. 73.53'N Long 113.20'W. Distance run for watch 12 miles. Barometer 29.90 inches. Wind northwest 12 kts. Air temp. 16°F. Sea temp. 29°F. Fine and clear.

At 20:49 hrs. C.C.G.S. *John A. Macdonald* and U.S.C.G.C. *Staten Island* stopped for the night while T.S. *Manhattan* steamed about two miles further on to test her equipment against an ice floe. Ice conditions 2/10 multi-year, second year, 2/10 puddling, 2/10 ridging, 1/10 hummocking and 9/10 snow covered.

29 September

00:00 hrs September 29th Position Lat. 73.57 ½'N Long 133.10'W. Distance steamed for watch 5 ½ miles. Barometer 29.96 inches. Wind west 5 kts. Air temp. 13°F. Sea temp. 29°F. Fine and clear.

A slight southerly drift was experienced while awaiting daylight with Cape Hay brg. 004°(T) distance 27.2 miles. Ice conditions 2/10 multi-year, 5/10 second year, 2/10 frozen puddles, 2/10 ridging, 1/10 hummucking with 9/10 snow covered.

04:00 hrs position Lat. 73.57'N Long 113.10'W. Barometer 30.05 inches. Lt. Airs. Air temp. 16°F. Dense fog. All ships were stopped during the 4 - 8 watch. 08:00 hrs position Lat. 73.57'N Long 113.10'W. Barometer 30.03 inches. Wind easterly 4 kts. Air temp. 17°F.

At 08:00 hrs ice parties from all ships went out on the ice and made tests. Ice conditions 3/10 multi-year, 6/10 to 7/10 second year, 2/10 ridging, 1/10 hummocking and frozen puddles throughout.

Noon position September 29th, Lat. 73.57'N Long 113.10'W. Barometer 29.87 inches. Wind easterly 3 kts. Air temp. 16°F. Distance run

noon to noon 22 miles. Ice tests and sampling were completed by 15:00 hrs. T.S. *Manhattan* charged ice floe in the area of the markers placed by scientists. Course of 090°(T) was then set.

16:00 hrs position Lat. 73.57'N Long 113.03'W. Overcast and clear. Barometer 29.95 inches. Wind easterly 3 kts. Air temp. 24°F. Ice conditions 3/10 multi-year, 7/10 second year, 9/10 snow covered. All vessels proceeded on a easterly course and at 17:00 hrs Cape Hay brg. 346°(T) was distance of 27.6 miles. All vessels altered course to 045°(T). 18:00 hrs Cape Providence brg. 355°(T) distance 23.0 miles. Ice conditions 4/10 multi-year, 6/10 second year, 9/10 snow covered under slight pressure.

20:00 hrs position Lat. 74.12'N Long 111.43'W. Distance run for watch 27 miles. Barometer 29.91 inches. Wind southeasterly 10 kts. Overcast and clear. All vessels stopped for the night at 20:55 hrs with Cape Province brg. 314° distance 16.8 miles. Ice conditions 3/10 to 4/10 multi-year, 6/10 second year, 9/10 snow covered, 1/10 to 2/10 ridging and hummocking.

30 September

00:00 hrs September 30 position Lat. 74.14'N Long 111.33'W. Distance run for the watch 3 miles. All vessels stopped in the ice awaiting daylight, with no change in ice conditions.

04:00 hrs Cape Providence brg. 311°(T) distance 16.6 miles. Overcast and clear. 4/10 multi-year, 6/10 second year with 9/12 snow covered. Barometer 29.30 inches. Wind southeast 15 kts. Air temp. 21°F.

All vessels stopped in the ice awaiting daylight, with no change in ice conditions. At 07:00 hrs T.S. *Manhattan* informed us that she planned to get underway at 08:30 hrs.

08:00 hrs position Lat. 74.15.5'N Long 111.30'W. Cloudy and clear. Barometer 29.72 inches. Wind east southeast 10 kts. Air temp. 19°F. Sea temp. 29°F. At 08:40 hrs T.S. *Manhattan* commenced to back and charge the ice, and after four charges broke free at 09:15 hrs.

T.S. *Manhattan* had no further problems, but assistance had to be given to U.S.C.G.C. *Staten Island* which was stopped, between 08:45 hrs and 09:45 hrs 10:15 hrs to 10:37 hrs and 10:44 hrs to 10:54 hrs. At 11:00 hrs Cape Clarendon brg. 325°(T) distance 12 ½ miles, at 11:20 hrs all vessels stopped.

Noon position September 30th Lat. 74.19.6'N Long 111.04'W. Dense fog. Barometer 29.84 inches. Wind east 9 kts. Air temp. 22°F. Sea temp. 21°F. Ice conditions 3/10 multi-year, 5/10 second year, 1/10 grey/white, 1/10 ridging and hummocking, 9/10 snow covered. All ice was in predominantly large ice-floes. Distance run for watch 8 ½ miles. Distance run noon to noon 43 miles.

All vessels remained stopped throughout the 12 - 4 watch. Ice parties and Seismic parties were sent out by all ships. During the afternoon watch C.C.G.S. *Louis S. St. Laurent* approached the convoy and Captain W. Dufour flew onboard C.C.G.S. *John A. Macdonald* by helicopter to discuss the transference of passengers and mail from T.S. *Manhattan* and C.C.G.S. *John A. Macdonald* for landing at Winter Harbour. At 15:44 hrs all tests were completed and engines were ordered for 16:00 hrs.

16:00 hrs Lat. 74.20'N Long 111.04'W. Overcast with fog patches. Barometer 29.66 inches. Wind easterly 9 kts. Air temp. 24°F. Sea temp. 22°F. Ice conditions 3/10 multi-year, 5/10 second year, 2/10 grey and grey/white ice.

16:12 hrs C.C.G.S. *John A. Macdonald* carrying out ice-tests. T.S. *Manhattan* carrying out ice tests independently. 17:00 hrs Cape Clarendon brg. 320°(T) distance 14.2 miles. 18:00 hrs T.S. *Manhattan* completed ice tests and C.C.G.S. *John A. Macdonald* took station astern, with U.S.C.G.C. *Staten Island* and C.C.G.S. *Louis S. St. Laurent* on their way to Winter Harbour. 19:00 hrs Cape Clarendon brg. 310 ½°(T) distance 13.6 miles. T.S. *Manhattan* stopped for the night and intends to commence operations at 06:30 hrs October 1st.

20:00 hrs position Lat. 74.22'N Long 111.02'W. Foggy. Barometer 29.65 inches. Wind southeast 8 kts Air temp. 21°F. Sea temp. 29°F. Distance run for watch 21 miles. Ice conditions 4/10 multi-year and 6/10 second year.

All vessels remained stopped for the hours of darkness, and I think that it should be pointed out that at this point our role in the operation begins to change slightly. Instead of having the responsibility of making sure the T.S. *Manhattan* is in a safe position as regards navigating the Prince of Wales Strait and vicinity, our main duty is to assist her in finding suitable ice-floes for testing and making sure that we can always move eastward so that the convoy does not become trapped for the winter.

1 October

00:00 hrs October 1, 1969, Lat. 74.22'N Long 111.02.5'W. Fog patches. Barometer 29.60 inches. Wind southeast 8 kts. Air temp. 22° F. Ice conditions 4/10 multi-year and 6/10 second year. No change in position during the 12 - 4 watch and at 04:00 hrs, ships position was unchanged. Barometer 29.54 inches. Wind northeast 6 kts. Air temp. 20°F. Overcast and clear. Cape Clarendon brg. 309°(T) distance 13.0 miles. Ice conditions 3/10 multi-year and 6/10 second year.

Arrangements had been made to get underway at 06:30 hrs, but T.S. *Manhattan* contacted U.S.C.G.C. *Staten Island* and asked for divers to inspect her rudders and propellers. 08:00 hrs Cape Clarendon brg. 309°(T) distance 13.0 miles. Overcast and clear. Barometer 29.56 inches. Wind northeast 12 kts. Air temp. 20°F. As the T.S. *Manhattan* would not be underway for a few hours the normal ships routine was carried out. Various helicopter flights were made to C.C.G.S. *Louis S. St. Laurent* and the time was fully occupied.

Noon position Oct. 1st Lat. 74.22'N Long 111.02'W. All vessels stopped. Barometer 29.60 inches. Wind northeast 10 kts. Air temp. 24°F. Distance run noon to noon 3 miles. Overcast and clear. Ice conditions 3/10 multi-year, 6/10 second year with pressure increasing and 10/10 snow covered.

At 14:40 hrs. T.S. *Manhattan* got underway on a base course of 030°(T), with all ships in line astern of her. 15:00 hrs Cape Clarendon brg. 293°(T) distance 134 miles.

16:00 hrs position Lat. 74.27.5'N Long 110.45'W. Ice conditions 3/10 multi-year, 7/10 second year, 10/10 snow covered with large floes predominant. Pressure increasing, thickness of ice 6 feet to 12 feet.

T.S. *Manhattan* was now proceeding in the general direction of Winter Harbour and hoped when in at that area to find a suitable floe for testing. At 17:35 hrs T.S. *Manhattan* decided to alter course to the southeastward to find a suitable floe. 18:00 hrs Heurne Point brg. 286°(T) distance 5.6 miles T.S. *Manhattan* kept on a south easterly course until 19:30 hrs, when it was decided to set a course 20 miles south of Cape Ross for further ice testing. At 19:35 hrs T.S. *Manhattan* altered course to 080°(T). This would mean

that Winter Harbour would be in helicopter range and transfer of passengers and baggage could be safely carried out.

20:00 hrs Position Lat. 74.28'N Long 109.28'W. Overcast, fog and mist. Barometer 29.65 inches. Wind northeast 10 kts. Air temp. 26°F. Sea temp. 29°F. Ice conditions 8/10. New ice and 2/10 second year ice. All vessels stopped for the night.

2 October

00:00 hrs October 2nd, position Lat. 74.28'N Long 109.28'W. Overcast and clear. Barometer 29.68 inches. Wind Northeast 10 kts. Air temp. 28° F. Ice conditions 3/10 multi-year and 7/10 second year. With Cape Bounty brg. 359°(T) distance 25.2 miles, all vessels remained stopped. Weather conditions were overcast and clear, with ice conditions consisting of 7/10 multi-year and 3/10 second year. Barometer 29.72 inches. Wind Lt. Airs. Air temp. 27°F.

04:00 hrs Lat. 74.28'N Long 109.28'W. No change in ice conditions during the morning watch.

08:00 hrs position Lat. 74.26.8'N Long 109.32'W. Overcast and clear. Barometer 29.80 inches. Wind north 10 kts. Air temp. 26°F. Sea temp. 29°F. At 10:25 hrs T.S. *Manhattan* got underway and set a 180°(T) course for about 8 miles for tests in a large ice-floe. At 11:28 hrs T.S. *Manhattan* stopped at the edge of floe. Ice conditions 8/10 multi-year, 1/10 Grey/White, 1/10 New ice, 9/10 snow covered. No pressure.

Noon position October 2nd Lat. 74.18.5'N Long 109.24'W. Barometer 29.78 inches. Wind northeast by north 8 kts. Air temp. 26° F. Distance run from noon to noon 49 miles.

All vessels had ice parties out on the ice during the afternoon and there was no change in position. The usual procedure was carried out prior to the ice tests, i.e. samples of ice taken and marker placed in position.

16:00 hrs Lat. 74.18 ½'N Long 109.24'W. Overcast and clear. Barometer 29.62 inches. Wind northeast 11 kts. Air temp. 26°F. Sea temp. 29°F. C.C.G.S. *John A. Macdonald* carried out ice test from 16:10 to 16:35 hrs, then waited for T.S. *Manhattan* to complete her own tests. T.S. *Manhattan* commenced ice tests at 17:50 hrs, when the tanker informed us that they would be backing up and charging the ice floes. The tanker also reported that they were trying to activate their heeling system. By 19:50 hrs

no appreciable progress was observed and at 20:00 hrs all vessels ceased operations for the night.

20:00 hrs Lat. 74.18.5'N Long 109.24'W. Overcast and light snow. Barometer 29.75 inches. Wind northeast 12 kts. Air temp. 27°F. Sea temp. 29° F. All vessels were stopped for the 8 - 12 watch.

3 October

00:00 hrs October 3, position Lat. 74.18.5'N Long 109.24'W. Overcast and clear. Barometer 29.85 inches. Wind northeast by north 6 kts. Air temp. 28°F. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice. All vessels were stopped in the ice during the 12 - 4 watch, with no appreciable change in ice conditions.

Visibility was good, with wind from the north east at 12 kts. 04:00 hrs Lat. 74.18'N Long 109.24'W. Barometer 29.93 inches. Air temp. 28° F. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice. No appreciable change in position or ice conditions during 4 - 8 watch.

08:00 hrs. Lat. 74.17.8'N Long 109.22'W. Overcast and clear. Barometer 29.90 inches. Wind northeast by east 10 kts. Air temp. 28° F.

At 09:10 hrs T.S. *Manhattan* attempted to get underway, but by 10:25 hrs the tanker had only progressed approximately 1200 feet. T.S. *Manhattan* then requested assistance and C.C.G.S. *John A Macdonald* manoeuvred into position on the port side. After relieving pressure on port side C.C.G.S. *John A. Macdonald* took up station on the port bow clear of *Manhattan's* track. Ice conditions at the time were 10/10 multi-year ice floe with 9/10 snow covered, 1/10 - 2/10 ridging. At 11:02 hrs the tanker broke free and was underway at 11:16 hrs but was stuck again at 11:22 hrs. C.C.G.S. *John A. Macdonald* again relieved the pressure on her port side at the tanker's request.

Noon position October 3rd Lat. 74.15.5'N Long 109.19'W. Overcast and clear. Barometer 29.85 inches. Wind northerly 7 kts. Air temp. 26°F. Distance run noon to noon 2 miles.

By 15:05 hrs T.S. *Manhattan* had broken free of the ice floe and worked around to a north westerly course to re-enter the same floe at another position. At 14:25 hrs all vessels stopped and commenced ice tests. Position Lat. 74.16'N Long 109.27'W.

16:00 hrs position as above. Weather conditions Overcast with light snow. Barometer 29.96 inches. Wind easterly 12 kts. Air temp. 28°F. Ice conditions 9/10 multi-year, 1/10 grey/white, 10/10 snow covered. Between 17:00 - 17:15 hrs C.C.G.S. *John A. Macdonald* carried out ice tests and then went on half hour stand-by. No further movements were made during the night.

20:00 hrs Lat. 74.16'N Long 109.27'W. Barometer 30.07 inches. Wind southeast by east 12 kts. Air temp. 30°F. All vessels were stopped during 8 - 12 watch.

4 October

00:00 hrs position October 4th. Overcast and light snow, Barometer 29.89 inches. Wind southeast 8 kts. Air temp. 27°F. Ice conditions 9/10 multiyear, 1/10 grey/white, 10/10 snow covered. All vessels were stopped throughout the whole day.

04:00 hrs Lat. 74.17 ½'N Long 109.26'W. Overcast with light snow. Barometer 29.82 inches. Wind southeast 10 kts. Air temp. 27°F. No change in position or ice conditions.

08:00 hrs position Lat. 74.18.5'N Long 109.24'W. Cloudy and clear. Barometer 29.70 inches. Wind southeast 15 kts. Air temp. 28°F. Sea temp. 28°F. All vessels stopped in ice. T.S. *Manhattan* carrying out ice tests.

Noon position October 4th Lat. 74.20.5'N Long 109.26'W. Overcast and clear. Barometer 29.51 inches. Wind southeast 20 kts. Air temp. 28°F. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice, 10/10 snow covered. Distance run noon to noon 4 miles. A strong northly set is being experienced. Various helicopter flights to other ships. T.S. *Manhattan* carrying out ice tests.

16:00 hrs position Lat. 74.25.5'N Long 109.24.5'W. Overcast and clear. Barometer 29.46 inches. Wind southeast 26 kts. Air temp. 31°F. Sea temp. 29°F. No change in ice conditions. 20:00 hrs position Lat. 74.25.5'N Long 109.33 ½'W. Fog mist and light snow. Barometer 29.25 inches. Wind southeast 26 kts. Air temp. 31°F. Sea temp. 29°F. All vessels stopped for the hours of darkness.

5 October

00:00 hrs position October 5th Lat. 74.26.8'N Long 109.35'W. Barometer 29.19 inches. Wind south southeast 13 kt. Air temp. 32°F. Light snow changing to overcast and clear. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice.

04:00 hrs position Lat. 74.26 ½'N Long 109.35'W. Overcast and light snow. Barometer 29.22 inches.

Wind south 15 kts. Air temp. 33°F. All vessels stopped to await daylight. 08:00 hrs position Lat. 74.26.5'N Long 109.35'W. Light snow and fog patches. Barometer 29.15 inches. Wind southerly 12 kts. Air temp. 35°F. 08:40 hrs.

All vessels underway at 09:00 hrs. Cape Bounty brg. 359°(T) distance 23 miles. At 09:05 hrs C.C.G.S. *John A. Macdonald* stopped, and T.S. *Manhattan* and U.S.C.G.C. *Staten Island* carried on for another three miles until T.S. *Manhattan* became stuck. At 11:00 hrs T.S. *Manhattan* was freed after being assisted by U.S.C.G.C. *Staten Island* and C.C.G.S. John A. *Macdonald* moved into position about one mile from T.S. *Manhattan* at 11:50 hrs T.S. *Manhattan* informed us that she would stop for ice tests.

Noon position October 5th Lat. 74.29'N Long 109.18'W. Overcast and clear. Barometer 29.15 inches. Wind southeast 9 kts. Air temp. 33° F. Distance run from noon to noon 5 miles.

The 12 - 4 watch was spent in ice and seismic tests. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice with 10/10 snow covered. 16:00 hrs position Lat. 74.28'N Long 109.20'W; Low cloud, overcast and snow. At 16:16 hrs ice tests were completed by all ships and C.C.G.S. *John A. Macdonald* took station astern of T.S. *Manhattan*. From 17:32 to 18:00 hrs. slow progress was made by all vessels on a base course of 070°(T). 18:00 hrs Cape Bounty brg. 342°(T) distance 25.8 males. From 18.20 hrs onwards T.S. *Manhattan* was severely hampered by ice pressure with her backing power being restricted as each stern manoeuvre became shorter.

At 20:00 hrs all vessels stopped for the night. Position Lat. 74.27.3'N Long 108.56'W. Ice conditions mainly 9/10 multi-year, 1/10 new ice with slight pressure. After 19:00 hrs pressure became very heavy and ice was ridged for 4/10 coverage from 3 feet to 5 feet, 10/10 snow covered. Barometer 29.40 inches. Wind west 17 kts. Air temp. 32°F. Overcast, clear

visibility. All vessels were stopped during the 8 - 12 watch, and an easterly drift was noted.

6 October

00:00 hrs October 6th position Lat. 74.27.3'N Long 108.51'W. Overcast and clear. Barometer 29.40 inches. Wind southwest 15 kts. Air temp. 30°F. Ice conditions as above. All vessels were stopped during the hours of darkness.

04:00 hrs position Lat. 74.27 ½'N Long 108.51'W. Overcast and clear. Barometer 29.60 inches. Wind southwest 28 kts. Air temp. 31°F. Ice conditions 9/10 multiyear, 1/10 new ice, 10/10 snow covered, 4/10 ridging. No change in position or ice conditions during 4 - 8 watch.

08:00 hrs position Lat. 74.27 ½'N Long 108.51'W. Overcast and light snow. Wind westerly 30 kts. Barometer 29.68 inches. Air temp. 29°F. Sea temp. 29°F. At 08:26 hrs C.C.G.S. *John A. Macdonald* was underway, breaking out T.S. *Manhattan* on the port side. By 09.00 hrs the pressure on the port side was eased and we started working on tanker's starboard side. By 09:42 hrs. T.S. *Manhattan* was free and was attempting to turn to starboard to make a westerly course.

Progress was very slow, with T.S. *Manhattan* backing and charging the ice twelve times before becoming stuck once again at 11:03 hrs. During this time, C.C.G.S. *John A. Macdonald* was working forward and to starboard of the tanker in an attempt to make the tanker turn more easier. By 11:03 hrs an approximate course of 173°(T) had been made, but as a course of 270°(T) was needed it was decided that C.C.G.S. *Louis S. St. Laurent* would work on the starboard side and C.C.G.S. *John A. Macdonald* would work the port side. At 31:45 hrs this operation commenced.

Noon position Lat. 74.26.3'N Long 108.48'W. Overcast and clear. Barometer 29.76 inches. Wind west 15 kts. Air temp. 21° F. Distance run noon to noon 7 miles. Ice conditions 9/10 multi-year, 1/10 new ice, 4/10 ridging 3 feet to 5 feet, 10/10 snow covered.

With both ice-breakers working as required, the tanker was eventually turned and by 14:52 hrs progress had become a lot easier. Average speed was about 4 kts. and T.S. *Manhattan* had to back and charge the ice to make headway. Ice conditions were 8/10 multi-year, 2/10 new ice and grey/white ice with 10/10 snow covered.

16:00 hrs Lat. 74.26'N Long 108.44'W. Distance run for watch 9 miles. Barometer 29.76 inches. Wind west 15 kts. Air temp. 21° F. Overcast and clear. Between 16:00 hrs - 20:00 hrs different courses were steered by T.S. *Manhattan* to find a suitable ice floe. At 18:30 hrs all vessels stopped for the night. Ice and Seismic parties were put on ice by all ships. Ice conditions 7/10 multi-year, 7/10 second year and 1/10 new ice.

20:00 hrs position Lat. 74.23'N Long 107.45'N. Overcast and clear. Barometer 29.80 inches. Wind west by north 23 kts. Air temp. 23°F. All vessels stopped for the hours of darkness and by 20:30 hrs all ice seismic parties back on board.

7 October

00:00 hrs position October 7th Lat. 74.23'N Long 107.45'W. Overcast and clear. Barometer 29.78 inches. Wind west north by north 20 kts to 25 kts. Air temp. 25°F. Ice conditions 7/10 multi-year ice, 2/10 second year, 1/10 new, 4 to 5 feet thick with 5 feet ridges and no pressure.

04:00 hrs position Lat. 74.23'N Long 107.45'W. Overcast and clear. Barometer 29.90 inches. Wind west 10 kts. Air temp. 28°F. All vessels stopped for night.

08:00 hrs position Lat. 74.23'N Long 107.45'W. Cloudy and clear. Wind north 20 - 25 kts. Barometer 29.95 inches. Air temp. 25°F.

08:27 hrs C.C.G.S. *John A. Macdonald* moved closer to T.S. *Manhattan* in case the tanker required assistance and lay stopped until tanker carried out steering tests. Meanwhile C.C.G.S. *Louis S. St. Laurent* and U.S.C.G.C. *Staten Island* proceeded to Winter Harbour to transfer personnel and pick up mail.

At approximately 09:58 hrs C.C.G.S. *John A. Macdonald* took station astern as T.S. *Manhattan* proceeded on a base course of 235°(T). T.S. *Manhattan* was stuck at 10:23 hrs and freed herself by two successive changes at 10:34 hrs. At 10:38 hrs she was stopped again but freed herself at 10:49 hrs. At 10:53 hrs she was stuck once again and after many attempts to free herself requested assistance of C.C.G.S. *John A. Macdonald* which commenced working to relieve pressure on her port side. Ice conditions 8/10, multi-year 1/10 second year 1/10 new ice with heavy pressure.

Noon position October 7 Lat. 74.22'N Long 107.36'W. Fine and clear. Barometer 29.90 inches. Wind north 18 kts. Air temp. 25°F. Distance run noon to noon 31 miles. Distance run for watch 3 miles.

C.C.G.S. *John A. Macdonald* worked on the port side of T.S. *Manhattan* by 13:15 hrs had the tanker underway than took station astern. Good progress was made until 14:30 hrs T.S. *Manhattan* requested assistance on her port side, so that a sixty degree alteration of course could be made. The alteration of course was completed by 15:50 hrs and T.S. *Manhattan* attempted to move ahead on a 295°(T) course.

16:00 hrs position Lat. 74.22'N Long 107.50'W. Overcast and clear. Barometer 30.03 inches. Wind north 16 kts. Air temp. 26° F. Sea temp. 29°F. Ice conditions 8/10 multi-year, 1/10 grey/white, 1/10 new ice with 10/10 snow covered.

T.S. *Manhattan* could not make any progress on this course at all. Although the tanker came astern about 500 feet on two occasions, no impression was made on the ice. At 17:32 hrs C.C.G.S. *John A. Macdonald* answered a call for assistance to relieve pressure on *Manhattan's* port side. By 18:00 hrs T.S. *Manhattan* was underway.

18:17 hrs position Lat. 74.24'N Long 107.54'W making steady progress. At 18:48 hrs altered course to 045°(T) and at 19:00 hrs in position Lat. 74.30'N Long 107.46'W altered course to 090°(T) to rendezvous with C.C.G.S. *Louis S. St. Laurent* and U.S.C.G.C. *Staten Island* which were in position Lat. 74.30'N Long 106.31'W.

Ice conditions 16:00 to 18:00 hrs 8/10 multi-year, 1/10 second year, 1/10 new ice. From 19:00 hrs, 6/10 second year, 2/10 1st year and 2/10 new ice.

20:00 hrs position Lat. 74.29'N Long 107.04'W. Overcast and clear. Barometer 30.02 inches. Wind north [northeast] 10 kts. Air temp. 22°F. Distance run for watch 22 miles.

At 20:39 hrs all vessels stopped for night in position Lat. 74.30'N Long 106.51W when C.C.G.S. *Louis S. St. Laurent* passed close to and transferred ship's mail. Ice conditions as above.

8 October

00:00 hrs. October 8, position Lat. 74.30'N Long 106.51'W. Overcast and clear. Barometer 29.90 inches. Wind northeast 8 kts. Air temp. 16°F. All ships stopped awaiting daylight.

04:00 hrs position Lat. 74.30'N Long 106.51'W. Fine and clear. Barometer 30.00 inches. Wind Lt. sirs. Air temp. 13°F. Ice conditions 6/10 second year, 2/10 first year, 2/10 new ice.

08:00 hrs position Lat. 74.30'N Long 106.51'W. Fine and clear. Barometer 29.98 inches. Wind easterly 5 kts. Air temp. 15°F.

At 06:24 hrs ice reconnaissance was flown to establish position of next suitable ice floe testing and at 09:30 hrs U.S.C.G.C. *Staten Island* detached and proceeded the vicinity of Ross Pint for transfer of personnel. All vessels got underway on a base course of 190°(T) at 10:31 hrs pressure on ice had eased during the early hours and ice conditions at 11:00 hrs. 7/10 grey, 3/10 grey/white with no pressure, changing at 11:30 hrs to 7/10 multi-year, 1/10 grey/white, 1/10 white, 1/10 new, 2/10 ridging, 10/10 snow covered, 5/10 large floes and at 11:46 hrs T.S. *Manhattan* stopped in this floe to make ice tests.

Noon position October 8 Lat. 74.20'N Long 106.51'W. Fine and clear. Barometer 29.90 inches. Wind southeast 5 kts. Air temp. 12°F. Sea temp. 29° F. Distance run for watch 10 miles. Distance run noon to noon 37 miles. T.S. *Manhattan* was stopped until 13:29 hrs when she got underway to make engine trials and at 13:55 hrs with tests completed, all vessels set course of 130°(T) to look for another floe. At 14:45 hrs the tanker was stopped by an ice ridge and after repeated attempts to break through she requested that C.C.G.S. *John A. Macdonald* relieve pressure on port side. Ice conditions 8/10 multi-year, 1/10 grey 1/10 new ice, 10/10 snow covered.

16:00 hrs position Lat. 74.18'N Long 106.36'W. Fine and clear. Barometer 29.91 inches. Wind Lt. Airs. Air temp. 13°F. Sea temp. 29°F.

At 16:10 hrs after pressure had been eased T.S. *Manhattan* could manoeuvre astern and after backing up about 1800 feet charged the floe and broke through. At 16:35 hrs T.S. *Manhattan* altered 60° to starboard on an approximate 190°(T) at 17:00 hrs Lat. 74.16'N Long 106.37'W, then at 17:20 hrs stopped at ice floe to commence tests. At 17:50 hrs T.S. *Manhattan* backed up 3000 feet and charged ice floe. At 18:26 hrs all

operations ceased for the day. Ice conditions 7/10 multi-year, 1/10 second year, 1/10 new ice.

20:00 hrs position Lat. 74.13 ½'N Long 106.30.7'W. Cloudy and clear. Barometer 29.88 inches. Wind southeast 10 kts. Air temp. 14°F. Sea temp. 29°F. All vessels stopped for the night. U.S.C.G.C. *Staten Island* returned from Ross point at 21:30 hrs.

9 October

00:00 hrs October 9th position Lat. 74.13'N Long 106.30'W. Fine and clear. Barometer 29.80 inches. Wind southeast 10 kts. Air temp. 17°F. A slight north easterly drift was experienced during the 12 - 4 watch and ice conditions were as follows: 7/10 multi-year, 1/10 grey/white, 1/10 new ice with 10/10 snow covered.

04:00 hrs position Lat. 74.16'N Long 106.20'W. Fine and clear. All vessels were stopped throughout the 4 - 8 watch. Although the North easterly drift was still being experienced at 07:30 hrs T.S. *Manhattan* informed us that she would be moving south after landing an ice party on the ice at 08:30 hrs.

08:00 hrs position Lat. 74.16'N Long 106.10'W. Fine and clear. Barometer 29.70 inches. Wind south 18 kts. Air temp. 20°F.

Ice parties were put on the ice as arranged by T.S. *Manhattan* and U.S.C.G.C. *Staten Island* and T.S. *Manhattan* moved about two miles further south. With all other ships staying in their original positions both ice parties returned to their respective ships.

Noon position October 9th Lat. 74.17'N Long 106.10'W. Fine and clear. Barometer 29.65 inches. Wind south southeast 10 kts. Air temp. 22°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 1/10 grey/white, 1/10 white, 10/10 snow covered. Distance run noon to noon 10 miles.

During the 12 - 4 watch T.S. *Manhattan* was carrying out tests independently and as she required no assistance, an ice and seismic party was sent out from C.C.G.S. *John A. Macdonald* proceeded to berth alongside C.C.G.S. *Louis S. St. Laurent.*

16:00 hrs position Lat. 74.12 ½'N Long 106.05'W. Fine and clear. Barometer 29.77 inches. Wind south 7 kts. Air temp. 24°F. Sea temp. 29°F. Ice conditions 8/10 multi-year, 1/10 grey, and 1/10 new ice. At 16:24 hrs

tied up alongside C.C.G.S. *Louis S. St. Laurent* starboard side to her port side. This was a pleasant interlude for both ships' crews as it gave everyone an opportunity to see the new ice breaker and swap the local gossip.

20:00 hrs position Lat. 74.17.5'N Long 106.08'W. Fine and clear. Barometer 29.80 inches. Wind south southeast 10 kts. Air temp 24°F. Sea temp. 29°F. Both vessels still tied up alongside each other and the usual ship visiting in progress. The highlight of the evening was the fact that two polar bears came very close and these were the first polar bears seen so near the vessel throughout the whole operation.

10 October

00:00 hrs position October 10th Lat. 74.21.1'N Long 105.54'W. Fine and clear. Barometer 29.69 inches. Wind south 10 kts. Air temp. 24°F. Ice conditions 6/10 multi-year, 2/10 second year and 1/10 first year.

04:00 hrs position Lat. 74.21.3'N Long 105.57'W. Fine and clear. Barometer 29.89 inches. Wind south 10 kts. Air temp. 25°F.

08:00 hrs, position Lat. 74.21.3'N long 105.57'W. Fine and clear. 29.82 inches. Wind southerly 20 kts. Air temp. 23°F.

At 08:50 hrs C.C.G.S. *John A. Macdonald* cleared C.C.G.S. *Louis S. St. Laurent* and in company with U.S.C.G.C. *Staten Island* proceeded on a 108°(T) course to rendezvous with T.S. *Manhattan* approximately 12 miles away.

09:30 hrs position: Conspicuous Hill N.W. Stephanson [Stefansson] Island brg. 199°(T) distance 40 ½ miles. With the C.C.G.S. *Louis S. St. Laurent* leading U.S.C.G.C. *Staten Island* had difficulty in following so at 10:00 hrs. C.C.G.S *John A. Macdonald* took station ahead of *Staten Island*. At 10:04 hrs T.S. *Manhattan* stopped to make tests und C.C.G.S. *Louis S. St. Laurent* stopped at 10:07 hrs with C.C.G.S. *John A. Macdonald* and U.S.C.G.C. *Staten Island* kept moving until 11:05 hrs when both stopped to carry out ice tests.

Noon position October 10 Lat. 74.16.6'N Long 104.53'W. Fine and clear. Barometer 29.80 inches. Wind southerly 20 kts. Air temp. 27°F. Sea temp. 20°F. Distance run for watch 14 ½ miles. Distance run noon to noon 17 miles. Ice conditions 6/10 multi-year, 2/10 grey/white, 1/10 new ice with 10/10 snow covered.

All ships remained stopped during 12 - 4 watch apart from a few minor runs by T.S. *Manhattan*. C.C.G.S. *John A. Macdonald* landed seismic and ice parties on ice and tests were made.

16:00 hrs position Lat. 74.16.6'N Long 104.5'W. Fine and clear. Barometer 29.89 inches, wind southwest 15 kts. Air temp. 31°F. At 16:07 hrs C.C.G.S. *John A. Macdonald* got underway to take station astern of T.S. *Manhattan* and in the meanwhile T.S. *Manhattan* backed up about 3000 feet in order to make a turn northwards. By 17:30 hrs T.S. *Manhattan* was underway and slowly coming around to a northerly course but at 18:00 altered course to 050°(T). At 18:40 hrs T.S. *Manhattan* stopped for the night with all ships in close proximity to one another. Ice conditions 6/10 new ice, 2/10 multi-year, 1/10 second year.

20:00 hrs position Lat. 74.27.4'N Long 104.31'W. Distance run for watch 17 ½ miles. Barometer 30.00 inches. Wind southwesterly 15 kts. Air temp. 31°F. Sea temp. 29°F. All vessels stopped for the night.

11 October

00:00 hrs October 11, Lat. 74.27.6'N Long 104.31'W. Foggy. Barometer 29.95 inches. Wind northwesterly 19 kts. Air temp. 30°F. All vessels stopped in ice. Ice conditions 2/10 multi-year, 6/10 new ice 1/10 grey/white.

04:00 hrs position Lat. 74.26.4'N Long 104.25.3'W. Overcast and clear. Barometer 30.12 inches. Wind northwest 10 kts. Air temp. 25°F. All vessels stopped in ice throughout watch.

08:00 hrs position Lat.74.25.8'N Long 104.22.5'W. Cloudy and clear. Barometer 30.16 inches. Wind northwest 4 kts. Air temp. 23°F. Ice conditions 2/10 multi-year, 6/10 new ice, 1/10 grey/white with 10/10 snow covered.

At 08:05 hrs U.S.C.G.C. *Staten Island* went alongside T.S. *Manhattan*. Then at 09:40 hrs ice party from C.C.G.S. *John A. Macdonald* on ice conducting tests. T.S. *Manhattan* and U.S.C.G.C. *Staten Island* proceeded ahead to test another ice floe but C.C.G.S. *John A. Macdonald* remained on position and by 11:35 hrs ice party had completed all tests.

Noon position October 11 Lat. 74.25.8'N Long 104.22 ½'W. Overcast and clear. Barometer 30.10 inches. Wind calm air temp. 22°F. Sea temp 29°F. Ice conditions 6/10 new ice, 2/10 multi-year, 1/10 grey/white.

Distance run noon to noon 18 miles. At 13:30 hrs C.C.G.S. *John A. Macdonald* got underway to make test run and this was completed by 13:55 hrs distance run one mile. At 15:52 hrs seismic party was put on the ice to carry out tests. So further operations were carried out this day.

16:00 hrs position Lat. 74.25.8'N Long 104.22.5'W. Overcast and slight fog patches. Barometer 30.22 inches. Wind Lt. Airs. Air temp. 23°F.

During the 4 - 8 watch C.C.G.S. *Louis S. St. Laurent* went alongside T.S. *Manhattan* to take bunkers. 20:00 hrs position by satellite navigator Lat. 74.23.6'N Long 104.19.5'W. Barometer 30.18 inches. Lt. Airs. Air temp. 22°F. All vessels stopped for the night. Ice conditions 2/10 multi-year, 1/10 grey/white, 6/10 new ice.

12 October

00:00 hrs October 12th position Lat. 74.23.6'N Long 106.19 ½'W. Overcast and clearing. Barometer 30.05 inches. Wind northwest 10 kts. Air temp. 23°F. All vessels remained stopped in the ice throughout the watch.

04:00 hrs position Lat. 74.23.6'N Long 104.15.5'W. Overcast and clear. Barometer 30.02 inches. Wind southeast by east 10 kts. Air temp. 27°F. T.S. *Manhattan* informed all vessels that the earliest time for moving would be noon as this would be the time C.C.G.S. *Louis S. St. Laurent* would be finished bunkers.

08:00 hrs position Lat. 74.24.2'N Long 104.00'W. Sleet. Barometer 29.99 inches. Wind east by south 18 kts. Air temp. 23°F. C.C.G.S. *John A. Macdonald* sent ice and seismic parties on the ice at 10:00 hrs but operations [were] curtailed due to bad weather at 11:15 hrs.

Noon position October 12th Lat. 74.27.3'N Long 104.21'W. (By T.S. *Manhattan's* Satellite Navigator). Barometer 29.71 inches. Wind north by east. Air temp. 23°F. Distance run from noon to noon 1 mile.

At 14:46 hrs C.C.G.S. *John A. Macdonald* got underway for ice test and this operation was completed at 15:00 hrs. Bunkering of C.C.G.S. *Louis S. St. Laurent* took longer than expected and C.C.G.S. *John A. Macdonald* was ready to go alongside C.C.G.S. *Louis S. St. Laurent* to transfer passengers and mail after she had left T.S. *Manhattan*.

Ice conditions 6/10 new ice, 2/10 multi-year, 1/10 grey/white under medium pressure and 10/10 snow covered.

16:00 hrs position Lat. 74.25.2'N Long 104.12.6'W. Distance steamed [for?] watch 2 ½ miles. Barometer 29.88 inches. Wind east northeast 30 kts. Air temp. 22°F. Sea temp. 28°F.

16:70 C.C.G.S. *Louis S. St. Laurent* clear of T.S. *Manhattan* and the tanker commenced making tests. Meanwhile at 17:15 hrs C.C.G.S. *John A. Macdonald* went alongside C.C.G.S. *Louis S. St. Laurent* to transfer passengers and mail. Names of passengers were J.C. Pelletier, C.H. Kershaw, L.K. Kawerninski.

At 17:23 hrs C.C.G.S. *John A. Macdonald* was clear of C.C.G.S. *Louis S. St. Laurent* and proceeding astern of T.S. *Manhattan*. The tanker altered course many times looking for a suitable ice floe. 18:00 hrs position Lat. 74.25'N Long 104.10'W. At 19:20 hrs T.S. *Manhattan* stopped for the night. Ice conditions 5/10 multi-year and 5/10 new ice.

20:00 hrs position Lat. 74.32'N Long 104.06'W. Overcast, light snow. Barometer 29.88 inches. Wind northeast 18 kts. All vessels stopped for the hours of darkness.

13 October

00:00 hrs October 13th position Lat. 74.32.6'N Long 104.10'W. Overcast, light snow. Barometer 29.87 inches. Wind north northeast 15 kts. Air temp. 15°F. 04:00 hrs position Lat. 74.31'N Long 104.17'W. Fine and clear. Barometer 30.07 inches. Wind northeast by north 15 kts. Air temp. 14°F. All vessels stopped in ice awaiting daylight. Ice conditions 6/10 new ice, 4/10 multi-year, 10/10 snow covered.

08:00 hrs position Lat. 74.30.2'N Long 104.10'W. Fine and clear. Barometer 30.07 inches. Wind northerly 7 kts. Air temp. 12°F. Although T.S. *Manhattan* moved about 1.5 miles to carry out ice tests all vessels remained stationery.

Noon position October 13th Lat. 74.30.2'N Long 104.10'W. Fine and clear. Barometer 30.09 inches. Wind west northwest 10 kts. Air temp. 11°F. Sea temp. 29°F. Distance run from noon to noon 16 miles. No further movement during early part of watch and at 15:50 hrs T.S. *Manhattan* informed all ships that she would be proceeding 10 miles north of the present position.

16:00 hrs position Lat. 74.28.5'N Long 104.12'W. Fine and clear. Barometer 30.20 inches. Wind north northwest 6 kts. Air temp. 14°F.

C.C.G.S. *John A. Macdonald* following T.S. *Manhattan* and U.S.G.G.C. *Staten Island* on a base course of 000°(T).

18:00 hrs position Lat. 74.33.2'N Long 104.16'W. Ice conditions were 8/10 young ice, 2/10 new ice and 9/10 snow covered. At 19:34 hrs all vessels stopped in the ice and ceased operations for the night. The ice conditions at the time of stopping were 3/10 multi-year, 5/10 young, 1/10 new ice and 9/10 snow covered.

20:00 hrs position Lat. 74.55'N Long 104.21'W. Fine and clear. Barometer 30.09 inches. Wind north northwest 4 kts. Air temp. 17°F. All vessels were stopped during the 8 - 12 wat4ch and a slight easterly drift was detected.

14 October

00:00 hrs October 14th position Lat. 74.55.5'N Long 104.15'W. Overcast and light snow. Barometer 30.05 inches. Wind north northwest 10 kts. Air temp. 22°F. All vessels stopped in ice awaiting daylight.

04:00 hrs position 74.55.7'N Long 104.11'W. Cloudy and clear. Barometer 29.99 inches. Wind southwest 17 kts. Air temp. 23°F. Sea temp. 29°F. Vessels stopped in ice throughout watch.

08:00 hrs position Lat. 74.54.8'N Long 104.06'W. Overcast and clear. Barometer 29.98 inches. Wind northwest 25 kts. Air temp. 26°F. Sea temp. 29°F. All vessels got underway at about 08:30 hrs and after steering south to skirt large ice floe, set a North Westerly course for entrance to Byam Martin Channel. 09:00 hrs Cape Gillman brg. 343°(T) distance 8.3 miles. The object of this manoeuvre is to get with helicopter range of Rae Point, where supplies for all ships are waiting. Ice conditions 5/10 young. 3/10 multi-year, 1/10 new ice with 10/10 snow covered. 11:00 hrs Rae Point brg. 012'(T) distance 12.3 miles. Course altered to 000°(T) base course.

Noon position October 14th Lat. 75.02'N Long 105.32'W. Fine and clear. Barometer 30.03 inches. Wind northwest 25 kts. Air temp. 18°F. Sea temp. 29°F. Distance run for watch 30 miles. Distance run noon to noon 56 miles. 12:55 hrs with Robertson Point brg. 315°(T) distance 4.8 miles C.C.G.S. *John A. Macdonald* and other ships stopped awaiting helicopter to bring supplies from Rae Point.

At 13:50 hrs this operation was completed and T.S. *Manhattan* came round to a course of 122°(T) and at 14:45 hrs T.S. *Manhattan* informs us

that she is proceeding to position Lat. 74.55'N Long 102.30'W to test in an ice floe. At 15:10 hrs in position Lat. 74.59'N Long 105.12'W T.S. *Manhattan* coming round to a base course of 090°(T).

16:00 hrs position Lat. 74.55.3'N Long 104.37'W. Overcast and clear. Barometer 30.03 inches. Wind Lt. Airs Air temp. 18°F. Sea temp. 29°F. Ice conditions from 12:00 - 15:00 hrs 4/10 new ice, 5/10 young polar ice. 15:00 - 16:00 hrs 8/10 multi-year, 1/10 new ice, 10/10 snow covered. Distance run for watch 27 miles. All vessels proceeded on a base course of 090°(T) approximately 13 kts. 17:00 hrs Cape Gillman brg. 010°(T) distance 8.m [*sic*] miles. 18:00 hrs Langley Point brg. 350°(T) distance 25.0 miles.

19:00 hrs position Lat. 74.43 ½'N Long 102.39'W. At 19:46 hrs all vessels stopped for the night.

20:00 hr position Lat.74.44'N Long 102.22'W. Fine and clear. Ice conditions 16:00 - 18:00 hrs 2/10 multi-year, 1/10 1st year, 9/10 grey/white, 9/10 grey and 1/10 new ice. 18:00 - 20:00 hrs. 2/10 multi-year, grey/white, 2/10 grey, 2/10 new with 1/10 ridging, 1/10 hummocking. Barometer 29.85 inches. Wind west northwest 12 kts. Air temp. 17°F. Sea temp. 24°F. All vessels were stopped during the 8 - 12 watch.

15 October

00:00 hrs October 15, position Lat. 74.43 ½'N Long 102.22'W. Barometer 29.85 inches. Wind northwest 15 kts. Air temp. 11°F. Clear and stormy sky. All were stopped throughout watch and a slight south easterly drift experienced. 04:00 hrs position Lat. 74.43'N Long 102.26'W. Light snow and cloudy. Barometer 29.78 inches. Wind northwest 20 kts. Air temp. 6°F. Ice conditions 3/10 multi-year, 4/10 grey/white, 1/10 grey, 2/10 new ice. No change in position or ice conditions at 08:00 hrs. Barometer 29.67 inches. Wind northwest 25 kts. Air temp. 4°F. Partly cloudy and snow flurries.

At 09:00 hrs all vessels got underway on a south easterly course and then turned eastwards. 09:50 hrs position by Satellite Navigator Lat. 74.32'N Long 102.13'W from 10:24 - 10:49 hrs. T.S. *Manhattan* stopped to undergo minor trials. An average speed of between 7 - 9 kts, was maintained for the early hours of the watch but at 11:30 hrs T.S. *Manhattan* was

stopped is the ice. Ice conditions 8/10 young, 1/10 new ice, 1/10 first year, 10/10 snow covered.

Noon position October 15th, Lat. 74.31'N Long 101.27'W. Barometer 29.76 inches. Wind northwest 18 kts. Air temp. 2°F. Overcast, fog. Distance run noon to noon 90 miles.

At 12:55 hrs T.S. *Manhattan* informed all ships that she was stopped and would wait for weather conditions to improve so an ice reconnaissance could be flown. By 13:55 hrs T.S. *Manhattan* had decided to turn to port and try and come around on a westerly course requesting the assistance of C.C.G.S. *John A. Macdonald* and U.S.C.G.C. *Staten Island.* In answer to the request C.C.G.S. *John A. Macdonald* worked at the ice on the starboard quarter of T.S. *Manhattan* whilst U.S.C.G.C. *Staten Island* worked the port quarter. C.C.G.S. *John A. Macdonald* after clearing the starboard quarter commenced working on the port side and ahead of the tanker. T.S. *Manhattan* after backing and charging three times managed to turn on a 270°(T) course at approximately 15:00 hrs. At 15:35 hrs T.S. *Manhattan* came around to a 180°(T) course and at 15:50 hrs stopped to take ice samples and measurements. Ice conditions from 12:00 - 15:00 hrs 8/10 multi-year, 2/10 grey/white, 7/10 hummocking and ridging. 15:00 - 16:00 hrs 5/10 multi-year 2/10 new ice, 2/10 grey/white ice easing and vessels move on a southerly course.

16:00 hrs position Lat. 74.23.7'N Long 101.34'W. Cloudy and clear. Barometer 29.77 inches. Wind northwest 20 kts. Air temp. 3°F. Distance run 7 miles. At 16:10 hrs all vessels were underway on a southeasterly course and at 17:00 hrs in position Lat. 74.19'N Long 101.19'W, course was altered to 325°(T) then at 18:00 hrs in position Lat. 74.24'N Long 101.35'W, approximately the same position they had been at noon.

At 19:20 hrs position Lat. 74.30'N Long 101.30'W. Overcast, blowing snow. Barometer 29.70 inches. Wind northwest 30 kts. Air temp. 7°F. Sea temp. 29°F. Ice conditions from 16:00 to 19:00 hrs 3/10 multi-year, 1/10 first year, 2/10 grey/white, 3/10 white, 1/10 new with 1/10 - 2/10 ridging and hummocking. 19:00 hrs 8/10 multi-year, 1/10 grey, 1/10 new, 1/10 to 2/10 ridging and hummocking. All ships were stopped during the hours of darkness.

16 October

00:00 hrs October 16th Lat. 74.30'N Long 101.30'W. Barometer 29.85 inches. Wind northwest 30 kts. Air temp. 7°F. All operations ceased during the hours of darkness.

04:00 hrs position Lat. 74.32'N Long 101.34'W. Cloudy and clear. Light snow. Barometer 29.92 inches. Wind southwest 25 kts. Air temp. 8°F. Ice conditions 7/10 multi-year, 2/10 grey/white, 1/10 new ice under heavy pressure.

08:00 hrs Lat. 74.28 ½'N Long 101.34'W. Overcast. Barometer 29.92 inches. Wind northwest 25 kts. Air temp. 9°F. All vessels got underway at 08:28 hrs. and proceeded on a base course of 045°(T) at approximately 5 kts. until 09:28 hrs when T.S. *Manhattan* carried out a test of a 1.5 miles range at a speed of 4 kts. As we have onboard a National Film Board crew making a documentary on ice-breaking C.C.G.S. *John A. Macdonald* made an ice-breaking pass alongside the T.S. *Manhattan* at the time. Then both ships waited for U.S.C.G.C. *Staten Island* to catch up as she had been making rough going since 09:30 hrs.

Noon position October 16th Lat. 74.30'N Long 101.20'W. Cloudy and clear. Wind west northwest 20 kts. Barometer 29.80 inches. Air temp. 7°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 2/10 grey/white, 1/10 new with 10/10 snow covered under heavy pressure. Distance run for watch 6 miles. Distance run noon to noon 25 miles.

At 12:45 hrs U.S.C.G.C. *Staten Island* caught up to T.S. *Manhattan* and the tanker got underway with C.C.G.S. *John A. Macdonald* astern of *Staten Island*. By 13:10 hrs. U.S.C.G.C. Staten Island became stuck and

C.C.G.S. *John A. Macdonald* tried to pass down her port side, but was unable to do so. In order to find easier ice conditions C.C.G.S. *John A. Macdonald* came astern and altered course more to port. By 14:00 hrs C.C.G.S. *John A. Macdonald* was clear of U.S.C.G.C. *Staten Island* and was attempting to catch up with T.S. *Manhattan*. During the 12 - 4 watch pressure was increasing all the time, and by 15:05 hrs C.C.G.S. *John A. Macdonald* could make no headway at all. T.S. *Manhattan* was informed of the situation and attempted to turn round to assist both ice-breakers. Ice conditions 7/10 multi-year, 2/10 grey/white, 1/10 new ice under heavy pressure with 5/10 ridging and hummocking.

16:00 hrs position Lat. 74.29'N Long 101.11'W. Light snow, poor visibility. Barometer 29.80 inches. Wind north northwest 20 kts. Air temp. 3°F. Distance run for watch 2 miles. T.S. *Manhattan* returned to the vicinity and became stuck quite close to C.C.G.S. *John A. Macdonald*. In the meanwhile U.S.C.G.C. *Staten Island* had found a area of lesser pressure and was maneuverable. Concerted attempts were to back down towards T.S. *Manhattan* but the pressure was too great. At 17:47 hrs all operations ceased for the night and would begin as soon as pressure eased.

20:00 hrs position Lat. 74.27'N Long 101.07'W. Overcast and snow. Barometer 29.78 inches. Wind northwest 20 kts. Air temp. 4°F. All ships stopped for the 8 - 12 watch. Pressure was very heavy with ice conditions 7/10 multi-year, 2/10 grey/white, 1/10 new ice with continuous snow falling throughout watch.

17 October

00:00 hrs October 17th position Lat. 74.28'N Long 101.07'W. Wind northwest 25 kts. Barometer 29.62 inches. Air temp. 3°F. Sea temp. 2°F. All ships stopped in ice for the 12 - 4 watch with conditions much the same.

04:00 hrs position Lat. 74.28'N Long 101.07'W. Light snow. Barometer 29.72 inches. Wind northwest 25 kts. Air temp. 4°F. Ice conditions 7/10 multi-year, 1/10 new ice, 2/10 grey/white under heavy pressure.

08:00 hrs position Lat. 74.27.7'N Long 101.124'W. Partly cloudy and clear. Barometer 29.70 inches. Wind north by west 11 kts. Air temp. 7°F. Sea temp. 5°F. At 08:28 hrs all vessels attempted to breakout of ice floe and with all systems in operations, little headway was made. At 10:36 hrs after flying to T.S. *Manhattan* to discuss the present situation it was decided that T.S. *Manhattan* should break out if it was possible and see if it was possible and see if pressure would ease off C.C.G.S. *John A. Macdonald* as she passed close-by, both ships were only about 900 feet from each other. At 11:46 hrs I returned to C.C.G.S. *John A. Macdonald* and prepared to try and break free once again.

Noon position October 17th Lat. 74.274'N Long 101.124'W. Fine and clear. Distance run noon to noon 4 miles. Barometer 29.79 With all 9 inches. Wind north northwest 15 kts. Air temp. -5°F. Sea temp. 29°F. With all systems activated C.C.G.S. *John A. Macdonald* tried to free herself from 12:30 hrs. to 13:15 hrs but no progress was made.

At 14:23 hrs T.S. *Manhattan* was underway and her watering down system proved very successful. This is simply water being pumped out of cargo manifold on deck over the vessel's side to lessen skin friction with the ice. Fortunately a lead had developed on the starboard side close to *Manhattan* and the tanker managed to break free into this load. From 14:30 hrs onward C.C.G.S. *John A. Macdonald* with heeling system in operation kept battering away at the floe. It was obvious that C.C.G.S. *John A. Macdonald* was jammed in between two ice floes under pressure and the T.S. *Manhattan* did not pass close enough to have any effect on the ice jammed in around us. The ice around us was about 10 feet thick and with constant charging a crack was opened up on the starboard bow.

16:00 hrs position Lat. 74.27'N Long 101.10'W. Fine and clear. Barometer 29.83 inches. Wind north by west 15 kts. Air temp. 0°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 2/10 grey/white and 1/10 new ice. C.C.G.S. *John A. Macdonald* finally freed herself at 16:24 hrs and took station astern of T.S. *Manhattan* and 13:31 hrs altered course to the north.

17:00 hrs position Lat. 74.32'N Long 101.07 ½ 'W. At 17:55 hrs in position Lat. 74.38'N Long 101.21'W, altered course to 045°(T) and a good speed was made. At 18:20 hrs altered course to 090°(T).

19:00 hrs position Lat. 74.41'N Long 100.57'W. 19:47 hrs all operations cease for the night. Ice conditions 8/10 young, 2/10 new ice with no pressure.

20:00 hrs position Lat. 74.40'N Long 100.46'W. Fine and clear. Barometer 29.80 inches. Wind northerly 12 kts. Air temp. 5°F. Distance run for watch 21 miles. All vessels stopped for the night and a slight westerly drift was experienced.

18 October

00:00 hrs October 18th position Lat. 74.40'N Long 100.54'W. Fine and clear. Barometer 29.90 inches. Wind northwest 10 kts. Air temp. 7°F. Sea temp. 29°F. All vessels stopped in the ice for the night.

04:00 hrs position Lat. 74.40'N Long 100.56'W. Fine and clear. Barometer 29.88 inches. Wind northwest by west 13 kts. Air temp. 8°F. Sea temp. 29°F. All vessels got underway at 08:46 hrs and at 08:55 hrs C.C.G.S. *John A. Macdonald* proceeded to relieve pressure on starboard side of T.S. *Manhattan* with U.S.C.G.C. *Staten Island* working on port side. By 09:30

hrs tanker was freed but stopped again at 09:35 hrs C.C.G.S. *John A. Macdonald* eased the pressure on the port side. T.S. *Manhattan* got underway at 09:45 hrs and we took up station astern four to five cables. 10:00 hrs position Cape Cockburn brg. 018°(T) distance 21.8 miles. All ships maintained an easterly course at a good speed.

11:00 hrs Cape Cockburn brg. 345°(T) distance 20 miles. At 11:15 hrs T.S. *Manhattan* stopped to make tests in ice floes. Ice conditions 9/10 young 10/10 new with 10/10 snow covered.

Noon position October 18th Lat. 74.41 ½'N Long 100.19'W. Fine and clear. Barometer 29.85 inches. Wind north 10 kts. Air temp. 7°F. Sea temp. 29°F. Distance run for watch 11 miles. Distance run noon to noon 32 miles. All vessels were stopped from noon to 15:20 hrs. The T.S. *Manhattan* got underway once again on an easterly course looking for another floe to make tests. Ice conditions 8/10 young ice, 1/10 new ice, 1/10 first ice, young ship to the south. Multi-year giant floes.

16:00 hrs. position Lat. 74.42'N Long 99.57'W. Fine and clear. Barometer 29.88 inches. Wind northeast 12 kts. Air temp. 6°F. Sea temp. 29°F. At 16:00 hrs T.S. *Manhattan* became stuck in ice floe and asked for assistance, with U.S.C.G.C. *Staten Island* working on port side and *John A. Macdonald*

Working on starboard side, tanker was freed by 16:13 hrs and then proceeded on a northerly course and by 16:53 hrs came around to easterly course. 17:00 hrs Cape Cockburn brg. 327°(T) distance 15.6 miles. This course was maintained until 18:30 hrs when all ships stopped for the night with Garrett Island brg. 130°(T) distance 6 miles. Ice conditions 7/10 grey, 3/10 new ice with light pressure.

20:00 hrs position Lat. 74.49.2'N Long 98.38'W. Fine and clear. Barometer 29.80 inches. Northeast 18 kts. Air temp. 10°F. Sea temp. 29°F. All vessels remained stopped for the 8 - 12 watch.

19 October

00:00 hrs October 19th position Lat. 74.49'N Long 98.44'W. Fine and clear. Barometer 29.94 inches. Wind northeast 24 kts. Air temp. 12°F. Sea temp. 28°F. A slight westerly drift was experienced but otherwise all ships were stopped in ice.

04:00 hrs position Lat. 74.49'N Long 98.44'W. Fine and clear. Barometer 29.96 inches. Wind northeast 10 kts Air temp. 3°F. Sea temp. 29°F. Ice conditions 6/10 grey, 4/10 new ice with 10/10 snow covered.

08:00 hrs position Lat. 74.49'N Long 98.44'W. Fine and clear. Barometer 29.49 inches. Wind northerly 7 kts. Air temp. 5°F. Sea temp. 29°F. At 08:39 hrs T.S. *Manhattan* got underway and proceeded on an easterly course for about four miles then stopped to make tests on an ice island. Approximate position of ice island north tip of Garrett Island brg. 125°(T) Distance 6.3 miles. Ice conditions 6/10 grey, 4/10 new ice with 10/10 snow covered.

Noon position October 19 Lat. 74.50'N Long 98.30'W. Fine and clear. Barometer 29.99 inches. Wind north northeast 8 kts. Air temp. 14°F. Sea temp. 29°F. Distance run for watch 4 miles. Distance run noon to noon 36 miles. After making tests and measurements of ice island (500' X 1200' X 50") and later it was calculated to weigh 350,000 tons. T.S. *Manhattan* charged ice island at very slow speed. The tanker penetrated with a speed of between two to three knots had precisely the same result and it was reported that the tanker's hull between bow and bridge "Whipped" approx. 4 to 6 feet. In fact, it was reported later, that this was the first time any gauge and recording instruments fitted in the tanker had made any readings. Nevertheless at 14:30 hrs. T.S. *Manhattan* completed tests and proceeded on a 180°(T) course between Garrett Island and Lowther Island. Ice conditions 6/10 grey/white, 3/10 grey and 1/10 first year.

16:00 hrs position Lat. 74.22 ½'N Long 97.56'W. Cloudy and clear. Barometer 30.00 inches. Wind northeast by north 8 kts. Air temp. 13°F. Sea temp. 29°F.

T.S. *Manhattan* proceeded at a good speed until 17:30 hrs when all operations stopped for the night. U.S.C.G.C. *Staten Island* had problems with pressure closing the track behind C.C.G.S. *John A. Macdonald* and by 17:33 hrs she was eight and half miles astern of T.S. *Manhattan*. By 18:40 hrs U.S.C.G.C. *Staten Island* had caught up and went alongside T.S. *Manhattan* to refuel. Ice conditions 16:00 to 17:30 hrs 9/10 young ice, 1/10 first year. All ships were stopped in 7/10 multi-year, 2/10 young, 1/10 new ice under pressure and this area will be used for testing purposes tomorrow.

20:00 hrs position Lat. 74.23 ½'N Long 97.50'W. Fine and clear. Scattered clouds. Barometer 29.90 inches. Wind northwest 4 kts. Air temp. 12°F. Sea temp. 29°F. All vessels stopped for the hours of darkness.

20 October

00:00 hrs October 20th position Lat. 74.23'N Long 97.54'W. Overcast and clear. Barometer 29.99 inches. Wind northwest 11 kts. Air temp. 10°F. Sea temp. 29°F. All vessels stopped for the hours of darkness.

04:00 hrs position Lat. 74.23 ½'N Long 97.52'W. Fine and clear. Barometer 29.83 inches. Wind northwest 18 kts. Air temp. 7°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 2/10 young, 1/10 new.

08:00 hrs position Lat. 74.23 ½'N Long 97.52'W. Overcast and clear. Barometer 29.94 inches. Wind northwest by west 10 kts. Air temp. 8°F. Sea temp. 29°F. Engines were ordered for 09:45 hrs and course was set to pass south of Lowther Island and then towards northwest of Griffiths Island. A rendezvous had been arranged with C.C.G.S. *Louis S. St. Laurent* in order to transfer mail and passengers. Good speed was made through 7/10 grey/white, 1/10 grey, 1/10 new ice, 1/10 first year with 8/10 snow covered. 11:00 hrs Lowther Island brg. 334°(T) distance 5.1 miles.

Noon position October 20 Lat. 74.31'N Long 98.44'W. Fine and clear. Barometer 29.93 inches. Wind northwest 15 kts. Air temp. 7°F. Sea temp. 29°F. Distance run for watch 20 miles. Distance run noon to noon 56 miles. At 12:20 hrs C.C.G.S. *John A. Macdonald* stopped in position Somerville Point brg. 034°(T) distance 12.2 miles and at 12:43 commenced transferring passengers and mail with C.C.G.S. *Louis S. St. Laurent* names of passengers: Mr. S. Beauchemin, Mr. B. Cosselin, Mr. A.L. Dupont.

At 14:15 hrs all operations completed and C.C.G.S. *John A. Macdonald* underway and returning towards T.S. *Manhattan* and U.S.C.G.C. *Staten Island.*

15:00 hrs position Lowther Island brg. 291°(T) distance 7.4 miles. 16:00 hrs position Lat. 74.26'N Long 97.34'W. Snow flurries, cloudy. Ice conditions 6/10 grey/white, 1/10 first year, 2/10 grey, 1/10 new ice. 16:30 hrs C.C.G.S. *John A. Macdonald* rejoined T.S. *Manhattan* and U.S.C.G.C. *Staten Island* and transferred ships mail by helicopter.

At 16:50 hrs. All ships got underway after T.S. *Manhattan* was freed by U.S.C.G.S. *Staten Island* to circumnavigate the test floe and at 17:23 hrs all

operations ceased for the night. Ice conditions at that time 7/10 multi-year, 2/10 young and 1/10 new ice.

20:00 hrs Lat. 74.23 ½'N Long 97.34'W. Fine and clear. Barometer 29.93 inches. Wind northwest 9 kts. Air temp. 9°F. Sea temp. 29°F. All ships stopped in ice for the hours of darkness.

21 October

00:00 hrs October 21st position Lat. 74.23'N Long 97.34'W. Fine and clear. Barometer 29.98 inches. Wind north 9 kts. Air temp. 2°F. Sea temp. 29°F. All ships stopped in the ice.

04:00 hrs position Lat. 74.23.2'N Long 97.33'W. Fine and clear. Barometer 30.03 inches. Wind north northwest 10 kts. Air temp. 1°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 2/10 young and 1/10 new ice.

08:00 hrs position Lat. 74.23 ½'N Long 87.33'W. Fine and clear. Barometer 30.03 inches. Wind north by west 13 kts. Air temp. 3°F. Sea temp. 29°F. At 09:32 hrs C.C.G.S. *John A. Macdonald* was underway and relieved pressure off T.S. *Manhattan's* starboard side and at 09:44 hrs C.C.G.S. *John A. Macdonald* stopped to make minor adjustment to engines and shafts. At 10:40 hrs fully operational again.

Noon position October 21, Lat. 74.23'N Long 97.28'W. Fine and clear. Barometer 30.10 inches. Wind northwest 15 kts. Air temp. 4°F. Sea temp. 29.6°F. Distance run noon to noon 29 miles. Ice conditions 7/10 multi-year, 1/10 grey/white, 1/10 grey, 1/10 new, 1/10 ridging and 1/10 hummocking.

At 12:48 hrs. C.C.G.S. *John A. Macdonald* got underway and cleared the ice coming from under T.S. *Manhattan* stern and by 12:55 T.S. *Manhattan* was underway on an easterly course. At 13:40 hrs T.S. *Manhattan* altered course to 140°(T) at 8.0 miles. C.C.G.S. *John A. Macdonald* stopped from 14:30 hrs to 15:30 hrs whilst T.S. *Manhattan* manoeuvred to make a right angled approach to the floe. At 15:30 hrs after completion of test T.S. *Manhattan* informed us that she intended to proceed to the southwest of Lowther Island.

16:00 hrs position Lat. 74.18.8'N Long 87.48'W. Cloudy and clear. Barometer 30.15 inches. Wind west northwest 13 kts. Air temp. 4°F. Ice conditions 7/10 multi-year, 1/10 grey/white, 1/10 new ice, 1/10 ridging, /10 hummocking. At 16:05 hrs all vessels reversed course and followed the

original track. Course was altered to 280°(T). 17:00 hrs with Gaurdeau Point brg. 320°(T) distance 2.4. miles. At 17:30 hrs stopped in area where ice tests will be carried out tomorrow. Gourdeau Point brg. 058°(T) distance 2.1 miles.

20:00 hrs position Lat. 74.26 ½'N Long 97.48'W Fine and clear. Barometer 30.10 inches. Wind north west 10 kts. Air temp. 9°F. All vessels stopped during the 8 - 12 watch.

22 October

00:00 hrs October 22 position Lat. 74.26 ½'N Long 97.48'W. Barometer 30.15 inches. Wind west northwest 14 kts. Air temp. 9°F. Sea temp. 29°F. Ice conditions 7/10 multi-year, 1/10 grey/white, 1/10 grey, 1/10 new ice, 1/10 ridging and 1/10 hummocking.

04:00 hrs position Lat. 74.26.1'N Long 97.47'W. Cloudy and clear. Barometer 30.11 inches. Wind west 13 kts. Air temp. 7°F. Sea temp. 29°F. All vessels stopped during the 4 - 8 watch.

08:00 hrs position Lat. 74.25'N Long 97.40'W. Overcast and snow. Barometer 30.17 inches. Wind northwest by north 19 kts. Air temp. 6°F. Sea temp. 29°F. Ships helicopter collected mail from all ships and returned to C.C.G.S. *John A. Macdonald* and 09:44 hrs proceeded to rendezvous with C.C.G.S. *Louis S. St. Laurent*. The track took us round the south side of Lowther Island and then north eastwards to meet C.C.G.S. *Louis S. St. Laurent*. C.C.G.S. *John A. Macdonald* stopped in position east tip Lowther Island brg. distance 8.2 miles. By 11:58 hrs transfer of mail had been carried out and course was set to return to T.S. *Manhattan*.

Noon position October 22 Lat. 74.30 ½'N Long 97.34'W. Fine and clear. Barometer 30.10 inches. Wind northwest 20 kts. Air temp. 5°F. Sea temp. 29°F. Ice conditions 6/10 grey/white, 4/10 grey with a trace of new ice. …

Vessels proceeded on a base course of 240°(T) back towards *Manhattan's* position. 13:00 hrs position Lowther Island east tip brg. 317°(T) distance 5.5 miles. At 13:25 hrs C.C.G.S. *John A. Macdonald* rejoined T.S. *Manhattan* and stopped while T.S. *Manhattan* made tests.

At 15:28 hrs T.S. *Manhattan* got underway on a barge course of 280°(T) proceeding to a point 5 miles north of Young Island. Ice conditions 2/10 multi-year, 1/10 first year, 2/10 grey/white, 4/10 grey, 1/10 new ice.

16:00 hrs position Lat. 74.23'N Long 97.36'W. Cloudy and clear. Barometer 30.09 inches. Wind northwest 18 kts. Air temp. 4°F. Sea temp. 29°F. C.C.G.S. *John A. Macdonald* tied up alongside T.S. *Manhattan*. All operations ceased for the night. Position Gourdreau Point brg. 074°(T) distance 9.0 miles. Ice conditions 1/10 first year, 7/10 grey/white, 1/10 grey and 1/10 new.

20:00 hrs position Lat. 74.25.9'N Long 98.13'W. Overcast and clear. Barometer 30.08 inches. Wind northwest by west 20 kts. Air temp. 5°F. Sea temp. 29°F. C.C.G.S. *John A. Macdonald* tied up port side to starboard side of T.S. *Manhattan*.

23 October

00:00 hrs October 23rd position Lat. 74.24'N Long 98.13'W. C.C.G.S. *John A. Macdonald* made fast alongside T.S. *Manhattan* all night. 04:00 hrs position Lat. 74.22 ½'N Long 98.06'W. Cloudy and clear. Barometer 30.15 inches. Wind northwest 30 kts. Air temp. 5°F. Sea temp. 29°F. Ice conditions 1/10 first year, 7/10 grey/white, 1/10 grey, 1/10 new ice.

08:00 hrs position Lat. 74.22'N Long 98.03'W. Overcast and clear. Barometer 30.10 inches. Wind northwest 27 kts. Air temp. 4°F.

At 08:52 hrs C.C.G.S. *John A. Macdonald* cleared T.S. *Manhattan* and stopped close by waiting for the tanker to get underway. At 09:20 hrs all ships got underway and C.C.G.S. *John A. Macdonald* took station astern of T.S. *Manhattan* and proceeded on a base course of 210°(T). At 09:50 hrs all ships stopped, waiting for better visibility. 10:00 hrs position Palmerston Point brg. 159°(T) distance 14.2 miles. Visibility improved by 11:08 hrs and convoy got underway on a 270°(T) course.

Noon position October 23rd Lat. 74.15'N Long 98.02'W. Overcast and clear. Wind northwest 25 kts. Air temp. 6°F. Distance run noon to noon 38 miles. Ice conditions 7/10 multi-year, 1.10 new ice, 1/10 grey with 9/10 snow covered. At 12:50 hrs *Manhattan* decided to come around to a course of 090°(T) to a position Long 98°W. then steer north. This change of plans was caused by unsatisfactory ice conditions and soundings indicate that it would be advisable to keep the tanker in deeper water.

13:00 hrs Palmerston Point brg. 122°(T) distance 11.0 miles. From 13:16 hrs to 13:50 hrs stopped waiting for T.S. *Manhattan* to come around to 090°(T). The tanker did experience some difficulty in turning through

the mush-ice which was under pressure. 14:00 hrs Palmerston Point brg. 123°(T) distance 10.6 miles. 14:25 hrs altered course to 037°(T). 15:00 hrs Palmerston Point brg. 165°(T) distance 10.8 miles. T.S. *Manhattan* altered course to 000°(T). Ice conditions 1/10 first year, 7/10 grey/white, 1/10 grey, /10 new ice.

16:00 hrs position Lat. 74.27'N Long 97.57'W. Cloudy and clear. Barometer 30.12 inches. Wind north northwest 28 kts. Air temp. 5°F. Both ships were proceeding on a base course of 350°(T) towards Garret Island and between 16:40 and 16:50 hrs T.S. *Manhattan* carried out stern power tests. 17:00 hrs Garret Island southwest tip brg. 348°(T) distance 10.8 miles. At 15:45 hrs both ships stopped for the night in position Garret Island southwest tip brg. 335°(T) distance 4.7 miles. U.S.C.G.C. *Staten Island* had dropped astern due to mush-ice under pressure but by 20:00 hrs had rejoined the convoy.

20:00 hrs position Lat. 74.39.5'N Long 98.11'W. Overcast and snow. Ice conditions 2/10 first year, 6/10 grey/white, 1/10 grey, 1/10 new ice. Barometer 30.03 inches. Wind northwest 17 kts. Air temp. 4°F. All vessels stopped for the night.

24 October

00:00 hrs October 24 position Lat. 74.39'N Long 98.12'W. Overcast, snow flurries. Barometer 30.15 inches. Wind northwest 10 kts. Air temp. 8°F. Sea temp. 29°F. Ice conditions 6/10 grey/white, 2/10 first year and 1/10 grey ice.

04:00 hrs position Lat. 74.33.2'N Long 98.15'W. Overcast and clear. Barometer 30.02 inches. Wind north 16 kts. Air temp. 3°F. All vessels stopped in ice.

08:00 hrs position Lat. 74.38'N Long 98.15'W. Overcast and clear. Barometer 30.01 inches. Northeast by north 4 kts. Air temp. 2°F. Sea temp. 29°F.

T.S. *Manhattan* got underway at 09:15 hrs both ships proceeded around to the east side of Garret Island and stopped at 10:32 hrs position east tip of Garret Island brg. 269°(T) at 2.4 miles. At 11:35 hrs T.S. *Manhattan* charged Ice Island with very little penetration and no results were issued by T.S. *Manhattan*.

Noon position October 24th Lat. 74.45 ½'N Long 97.58'W. Fine and clear. Barometer 29.98 inches. Wind northeast 7 kts. Air temp. 8°F. Sea temp. 29°F. Distance run noon to noon 47 miles. Ice conditions 3/10 first year 12" to 15" thick, 7/10 grey/white 8" to 10" thick. At 12:35 hrs T.S. *Manhattan* made second test run at Ice Island and all tests were completed at 12:45 hrs. Set course 043°(T) for MacDougall Sound to a position 5 miles west of Truro Island. At 14:10 hrs C.C.G.S. *John A. Macdonald* detached from T.S. *Manhattan* and proceeded to Resolute Bay to pick up passengers and mail.

15:00 hrs Browne Island brg. 113°(T) distance 6.8 miles. 15:42 hrs Browne Island east tip brg. 210°(T) at 1.4 miles.

16:00 hrs position Lat. 74.45'N Long 96.06'W. Cloudy and clear. Barometer 29.82 inches. East northeast 6 kts. Air temp. 2°F. Ice conditions 8/10 new ice, 2/10 grey ice with moderate pressure. 17:00 hrs Shermgham Point brg. 334°(T) distance 2.8 miles. Alongside C.C.G.S. *Louis S. St. Laurent* to transfer one passenger and mail. 17.05 hrs. underway returning to T.S. *Manhattan*. Various course steered through ice floes and good speed was made. 18:00 hrs north tip Browne Island brg. 102°(T) distance 9.6 miles. 19:59 hrs stopped. All operations cease for the night.

20:00 hrs position Lat. 74.52'N Long 98.05'W. Overcast with intermittent snow. Barometer 29.70 inches. Calm. Air temp. 29°F. Ice conditions 8/10 new ice, 2/10 grey with moderate pressure. Stopped in ice 12 miles east of T.S. *Manhattan's* position.

25 October

00:00 hrs October 25th position Lat. 74.53'N Long 98.02'W. Snowing. Barometer 29.53 inches. Wind southeast by south 9 kts. Air temp. 4°F. Sea temp. 29°F. Ice conditions 8/10 new ice 2/10 grey ice. No change in position.

04:00 hrs position Lat. 74.53 ½'N Long 98.01'W. Overcast and snow. Barometer 29.76 inches. Wind southeast 12 kts. Air temp. 6°F. Sea temp. 29°F. C.C.G.S. *John A. Macdonald* stopped in ice 12 miles east of T.S. *Manhattan.*

08:00 hrs position Lat. 74.54'N Long 98.01'W. Overcast and snow. Barometer 29.36 inches. Wind southeast 10 kts. Air temp. 8°F. Sea temp. 29°F. Ice conditions 8/10 grey, 1/10 grey/white and 1/10 new ice. At 08:35

hrs C.C.G.S. *John A. Macdonald* got underway to close with T.S. *Manhattan*. 09:00 hrs Cape Capel brg. 001°(T) distance 6.6 miles. Stopped between 09:41 to 11:20 hrs whilst T.S. *Manhattan* undergoes high speed test trials. Passenger and mail transferred to T.S. *Manhattan* and U.S.C.G.C. *Staten Island*. C.C.G.S. *John A. Macdonald* waiting for T.S. *Manhattan* to start ice test.

Noon position October 25th Lat. 74.53'N Long 98.42'W. Cloudy and clear. Wind east southeast 8 kts. Air temp. 6°F. Sea temp. 29°F. Distance run noon to noon 107 miles. Ice conditions 8/10 grey, 1/10 grey/white and 1/10 new ice. C.C.G.S. *John A. Macdonald* close to T.S. *Manhattan* commenced tests. 14:53 hrs stopped. Moore Point brg. 016°(T) distance 4.6 miles. T.S. *Manhattan* still carrying out tests. Awaiting permission to go alongside tanker to take fuel.

16:00 hrs position 74.53 ½'N Long 98.54'W. Cloudy and clear. Barometer 29.52 inches. Wind northeast by north 10 kts. Air temp. 4°F. Sea temp. 29°F. 17:45 hrs all tests completed. C.C.G.S. *John A. Macdonald* tied up on starboard side of T.S. *Manhattan* 19:15 hrs commence taking fuel.

20:00 hrs position Lat. 74.49.8'N Long 98.55'W. Overcast and clear. Ice conditions 8/10 grey/white and 1/10 grey and 1/10 new ice. Lt. Airs. Barometer 29.50 inches. Air temp. 0°F. Sea temp. 29°F.

All vessels remained stopped in ice. C.C.G.S. *John A. Macdonald* taking bunker from T.S. *Manhattan*.

26 October

00:00 hrs October 26th position Lat. 74.50'N Long 98.53'W. Fine and clear. Barometer 29.66 inches. Wind calm. Air temp. 1°F. Sea temp. 29°F. No change in position.

04:00 hrs position Lat. 74.50.2'N Long 98.57'W. Fine and clear. Barometer 29.71 inches. Light Airs. Air temp. 1°F. No change in position

08:00 hrs position Lat. 74.50'N Long 98.57'W. Partly cloudy and clear. At 08:24 hrs C.C.G.S. *John A. Macdonald* stopped taking fuel and cleared tanker, taking station astern.

At 09:07 hrs T.S. *Manhattan* got underway and steamed south on the west side of Garrett Island looking for suitable ice floes to make another ice test. 10:00 hrs south tip of Garrett Island brg. 075°(T) at 5.3 miles course

180°(T) 10:34 hrs stopped for ice tests, Garrett Island brg. 049°(T) distance 7.2 miles. 11:49 hrs ice party returned to T.S. *Manhattan* and ice tests completed, T.S. *Manhattan* continued to steam south.

Noon position October 26, Lat. 73.34'N Long 98.40'W. Dense fog. Barometer 29.76 inches. Light Airs/ Air temp. 6°F. Sea temp. 28.8°F. Ice conditions 1/10 grey. Distance run noon to noon 29 miles. 13:00 hrs Garrett Island (South Tip) brg. 062°(T) distance 9.0 miles. T.S. *Manhattan* commenced ice tests in floe. 13:24 hrs Garrett Island brg. 065°(T) distance 11.2 miles T.S. *Manhattan* was steering a course of 000°(T).

16:00 hrs position Lat. 74.44.3'N. Foggy, light snow. Barometer 29.74 inches. Wind east southeast 8 kts. Air temp 2°F. Ice conditions 2/10 grey/white, 1/10 first year and 1/10 grey.

From 16:16 hrs to 16:50 hrs all ships were stopped while T.S. *Manhattan* concluded ice tests. 17:00 Garrett Island northwest Tip brg. 105°(T) distance 9.2 miles. 17:20 hrs altered course to 090°(T). 18:00 hrs north Tip Garrett Island brg. 159°(T) distance 6.0 miles. 19:47 hrs all operations cease for the night.

20:00 hrs position Lat. 74.50.2'N Long 97.11 ½'W. Cloudy and clear. Barometer 29.65 inches. Wind east southeast 10 kts. Air temp. 29.8°F. Stopped in ice twelve miles west of Browne Island.

27 October

04:00 hrs position Lat. 74.51.8'N Long 97.11'W. Fine and clear. Barometer 29.56 inches. Wind east southeast 12 kts. Air temp. 1°F. Ice conditions 6/10 grey, 3/10 grey/white. All vessels stopped twelve miles west of Browne Island. 07:45 hrs all vessels underway on a base course of 135°(T).

08:00 hrs position Lat. 74.51.8'N. Overcast and intermittent snow flurries. Barometer 29.53 inches. Wind northeast 10 kts. Air temp. 3°F. Sea temp. 29.8°F. 09:00 hrs south Tip of Browne Island brg. 035°(T) distance 5.1 miles. 09:30 Altered course 082°(T). 10:40 hrs altered course 113°(T). 11:00 hrs Cape Marty's brg. 077°(T) at 3.5 miles. 11:40 hrs. F.W.E. off Resolute Bay. Sight Point brg. 352°(T) distance 2.4 miles. Commence landing passengers and mail. Name of passenger disembarked: Lieutenant Commander E.B. Stolee.

Noon position October 27th Lat. 74.37.7'N Long 94.53.6'W. Clear and gusty. Barometer 29.59 inches. Wind easterly 24 kts. Air temp. 3°F. Sea temp. 28.8°F. Distance run noon to noon 76 miles. Ice conditions 2/10 grey/white, 5/10 grey and 3/10 new ice.

12:00 - 14:05 hrs landing passengers and mail and at 14:19 hrs all ships underway and proceeding to Beechey Island steering 115°(T). 15:00 hrs Assistance Bay brg. 061°(T) distance 5.9 miles. Altered course to 087°(T) and good speed was maintained 10 kts.

16:00 hrs position Lat. 74.35.2'N Long 98.54'W. Cloudy and clear. Barometer 29.67 inches. Wind east 24 kts. Air temp. 12°F. Steady progress was maintained on 187°(T) until 17:22 hrs at which time C.C.G.S. *John A. Macdonald* became stuck. C.C.G.S. *John A. Macdonald* freed herself at 17:40 hrs with aid of C.C.G.S. *Louis S. St. Laurent* and continued towards Beechey Island. At 17:50 hrs U.S.C.G.C. *Staten Island* had total power failure, but it was restored at 17:57 hrs.

18:00 hrs Cape Hotham brg. 295°(T) distance 11 ½ miles. 19:00 hrs Cape Riddle brg. 060°(T) distance 7.0 miles. At 19:26 hrs Beechey Island 3.8 miles, all ships stopped awaiting daylight. C.C.G.S. *Louis S. St. Laurent* detached.

20:00 hrs position Lat. 74.40'N Long 92.05'W. Cloudy and clear. Barometer 29.66 inches. Wind northeast 19 kts. Air temp. 14°F. Ice conditions 1/10 grey, 4/10 grey/white and 1/10 new. All ships stopped in ice.

28 October

00:00 hrs October 28th position Lat. 74.40'N Long 92.07'W. Fine and clear. Barometer 29.81 inches. Wind east by south 10 kts. Air temp. 12°F. All vessels stopped in ice throughout watch.

04:00 hrs position Lat. 74.40'N Long 92.06'W. Blight snow flurries, overcast and clear. Barometer 29.80 inches. Wind east by north 10 kts. Air temp. 12°F. Stopped in ice of Beechy Island. Ice conditions 5/10 grey/white, 4/10 grey, 1/10 new ice.

08:00 hrs position Lat. 74.40'N Long 92.06'W. Light snow flurries. Barometer 29.92 inches. Wind east by north 10 kts. Air temp. 12°F. Several parties from the three ships went ashore to visit Franklin's Cairn and to

leave a canister with a notice recording the event. All parties returned to the respective ships by noon.

Noon position October 28th Lat. 74.37 ½'N Long 92.40'W. Overcast and clear. Barometer 29.96 inches. Wind northeast 9 kts. Air temp. 12°F. Sea temp. 29°F. Distance run noon to noon 37 miles. Ice conditions 5/10 grey/white, 4/10 grey and 1/10 new ice.

At 12:32 hrs all ships got underway and proceeded towards Resolute, Helicopters from T.S. *Manhattan* and U.S.C.G.C. *Staten Island* flew ahead to check if any mail had been received by the base for the ships. At 14:00 hrs all ships hove to in ice, awaiting return of helicopters. Cape Hotham brg. 281°(T) distance 14.2 miles. Ice conditions 5/10 grey/white, 4/10 grey and 1/10 new.

16:00 hrs position Lat. 74.37 ½'N Long 92.40'W. Overcast and clear. Barometer 30.00 inches. Wind north northwest 13 kts. Air temp. 13°F. Sea temp. 29°F. At 17:15 hrs all ships got underway on a course of 160°(T). Progress was steady through 5/10 grey/white ice, 4/10 grey and 1/10 new ice. 18:00 hrs Cape Riddle brg. 034°(T) distance 13.8 miles. At 18:20 hrs T.S. *Manhattan* ran into 2/10 multi-year ice, 6/10 grey/white ice and 2/10 grey ice and became stuck. Tanker freed herself by 18:49 hrs and altered course to 080°. At 19:00 hrs Cape Riddle brg. 016°(T) distance 15.4 miles, ice conditions 6/10 grey/white ice, 3/10 grey ice, 1/10 new ice and at 19.15 hrs altered course to 090°(T).

20:00 hrs position Lat. 74.27 ½'N Long 91.31'W. Light snow flurries. Barometer 30.05 inches. Wind northwest 10 kts. Air temp. 17°F. Sea temp. 29°F. All ships made good progress on an easterly course through Lancaster South. 21:00 hrs Wallis Point brg. 013°(T) distance 11.4 miles. 23:00 hrs Cape William Herschel brg. 353°(T) distance 11 ½ miles. Ice conditions 7/10 grey/white 6" - 9", 2/10 grey 4" - 5", 1/10 new ice 0" - 3".

29 October

00:00 hrs October 29th position Lat. 74.21'N Long 88.36'W. Barometer 29.94 inches. Wind northerly 20 kts. Air temp. 11°F. Sea temp. 29°F. Ice conditions 7/10 grey/white 6" - 9", 2/10 grey 5" - 9", 1/10 new 0" - 3". All vessels proceeded on a base course of 088°(T) throughout the 12 - 4 watch with various alterations made to avoid growlers.

02:00 hrs position 74.20.8'N Long 86.50'W. At 03.10 hrs T.S. *Manhattan* informed all ships that a course of 088°(T) would be maintained and in position Lat. 74.20 ½'N Long 82.00'W. Course would be set for Navy Board Inlet

04:00 hrs position Lat. 74.20.8'N Long 85.43'W. Cloudy and clear. Ice conditions 5/10 grey/white, 4/10 grey and 1/10 new ice. Barometer 29.84 inches. Light airs. Air temp. 10°F.

From 04:00 hrs to 05:15 hrs T.S. *Manhattan* was backing and charging in a large multi-year floe and gained about 200 feet at each charge. The ice in this floe was fifteen feet thick. 05:00 hrs Cape Bullen brg. 052°(T) distance 15.3 miles. By 05:52 hrs T.S. *Manhattan* had broken clear of ice floe and current ice conditions were 8/10 grey/white, 1/10 grey and 1/10 new ice. 07:00 hrs Cape Bullen brg. 356°(T) distance 8.8 miles. At 07:42 hrs T.S. *Manhattan* encountered heavy multi-year floe and decided to wait until daylight to assess ice conditions.

08:00 hrs positions Lat. 74.21.2'N Long 84.32'W. Cloudy and clear. Barometer 29.78 inches. Wind northwest 12 kts. Air temp. 11°F. Ice conditions large polar floe.

All vessels were stopped until 10:55 hrs when ice reconnaissance were carried out. All ships proceeded on a southerly course. Ice conditions 6/10 multi-year 7" - 10", 1/10 first year 12" - 15", 2/10 grey/white 6" - 10" and 1/10 grey 4" - 6". At approximately 11:40 hrs T.S. *Manhattan* hit a bergy bit with such force that the tanker literally bounced off. This was undoubtedly the heaviest piece of ice that T.S. *Manhattan* had encountered throughout the operation. The tanker had no trouble in breaking it with the result that large pieces of ice were found on the main deck.

Noon position October 29th Lat. 74.11 ½'N Long 84.18'W. Fine and clear. Barometer 29.79 inches. Wind westerly 10 kts. Air temp. 10°F. Distance run noon to noon 159 miles.

T.S. *Manhattan* stopped for half an hour to carry out hull inspection after hitting this growler, but at 12:45 hrs was underway once again. 13:00 hrs the first two hours of the watch at 14:00 hrs with Cape Crawford brg. 207°(T) distance 27 miles, the progress became easier with ice conditions 3/10 multi-year, floes 7" - 16" thickness.

16:00 hrs position Lat. 74.02 ½'N Long 83.28'W. Overcast and clear. Barometer 29.74 inches. Wind west northwest 14 kts. Air temp. 11°F. from 16:00 hrs to 17:20 hrs 1/10 multi-year, 1/10 first year, 5/10 grey/white, 1/10 grey, 1/10 new ice with slight pressure. 17:00 hrs position Cape York brg. 168°(T) distance 15.8 miles. From 17:20 hrs ice conditions were 4/10 multi-year, 1/10 first year, 4/10 grey/white, 1/10 grey, with pressure becoming heavy due to westerly winds blowing at 28 kts. From 18:15 hrs to 19:45 hrs all ships were making very slow progress and at 19:45 hrs C.C.G.S. *John A. Macdonald* stopped to let U.S.C.G.C. *Staten Island* catch up but eventually became stuck herself.

20:00 hrs position Lat. 73.51'N Long 81.53'W. Cloudy and light snow. Barometer 29.66 inches. Wind west northwest 25 kts. Air temp. 10°F. Ice conditions 4/10 multi-year, 1/10 first year, 4/10 grey/white, 1/10 grey. At 20:35 hrs all ships stopped for the night as ice conditions and pressure were too great to maneuver or make any headway. By 21:05 hrs strong easterly drift was observed and ships position was checked frequently.

30 October

00:00 hrs position Lat. 73.47'N Long 81.33'W. Overcast, snow flurries. Barometer 29.72 inches. Wind northwest 28 kts. Air temp. 6°F. By 00:00 hrs it was obvious that the ships were down on the land and engines were ordered to counteract the drift. 00:58 hrs C.C.G.S. *John A. Macdonald* underway and by 02:02 hrs was free and heading north close astern of T.S. *Manhattan*. 02:30 hrs. with Bluff Head brg. 281°(T) distance 5.8 miles. T.S. *Manhattan* encountered heavy ice floe and after approximately one hour of trying to break out, it was decided to stop and wait until daylight in order to assess ice conditions. Estimated drift of vessels was 100°(T) distance 1.8 knots.

04:00 hrs position Lat. 73.44'N Long 81.08'W. Cloudy with light snow. Barometer 29.86 inches. Wind westerly 20 kts. Air temp. 2°F. At 05:45 hrs C.C.G.S. *John A. Macdonald* got underway and steamed closer to T.S. *Manhattan*. From 05:45 hrs to 07:17 hrs T.S. *Manhattan* was stuck and tried constantly to free herself. By 17:00 hrs T.S. *Manhattan* was underway, but at 07:17 hrs had to wait for U.S.C.G.C. *Staten Island* which had become stuck.

08:00 hrs position Lat. 73.47'N Long 80.43'W. Cloudy with light snow. Barometer 29.78 inches. Wind west 22 kts. Air temp. 5°F. Sea temp. 22°F.

Ice conditions 4/10 multi-year, 1/10 first year, 4/10 grey/white and 1/10 grey. At 08:55 hrs U.S.C.G.C. *Staten Island* took up station astern of C.C.G.S. *John A. Macdonald* and course as set for Navy Board Inlet. 09:30 hrs first Cape east of entrance to Board Inlet brg. 150°(T) distance 4.2 miles. At this position T.S. *Manhattan* sent off helicopter

For ice reconnaissance and at 10.30 hrs the decision to inspect the entrance to Navy Board Inlet more closely was made. 11:00 hrs with First Cape east of Navy Board Inlet brg. 173°(T) distance 2.6 miles and at 11:15 hrs. the decision was made to turn eastwards and abandon the passage through Navy Board Inlet.

Noon position October 30th Lat. 73.47.3'N Long 82.21'W. Overcast, light fog. Barometer 24.81 inches. Wind westerly 23 kts. Air temp. 3°F. Sea temp. 29°F. Distance run noon to noon 85 miles. Ice conditions 3/10 multi-year. 10' to 15' thick, 2/10 first year 14" to 17", 4/10 grey/white 8" to 10" grey/white 8" to 10", 1/10 new ice 4" to 5" under pressure and heavy ridging. From 12:00 hrs to 14:00 hrs good progress was maintained on an easterly course.

14:00 hrs position Lat. 73.47'N Long 79.42'[W]. At 14:15 hrs C.C.G.S. *John A. Macdonald* was stuck in a pressure ridge but broke through under own power and steered around the floe. At 14:58 hrs all ships closed up with T.S. *Manhattan* leading.

15:00 hrs position Lat. 73.51.2'N Long 78.56'W. Ice conditions 2/10 multi-year, 6/10 grey/white, 1/10 first year, 1/10 new ice, course easterly.

16:00 hrs position Lat. 73.52.8'N Long 78.10'W. Barometer 29.84 inches. Wind west 21 kts. Air temp. 2°F. Sea temp. 29°F. Distance run for watch 35 miles. 18:00 hrs Cape Fanshowe brg. 198°(T) distance 23.6 miles.

20:00 hrs position Lat. 73.51.5'N Long 76.10'W. Overcast, light snow. Barometer 29.98 inches. Wind west 23 kts. Air temp. 2°F. Sea temp. 29°F. Ice conditions 2/10 multi-year, 2/10 first year, 4/10 grey, 1/10 grey/white. Course easterly. Distance 35 miles.

22:00 hrs Cape Fanshaw brg. 245°(T) distance 37 miles. Ice conditions 3/10 grey 5", 5/10 grey/white 8" to 11", 1/10 new 1/10 first year 14"to 17" and trace of multi-year ice under slight pressure.

31 October

00:00 hrs October 31st position Lat. 73.51 ½'N Long 74.25'W. Continuous snow. Barometer 29.84 inches. Wind northwest 17 kts. Air temp. 2°F. Sea temp. 29°F. Course 090°(T). Distance run for watch 34 miles. All vessels proceeding on a course of 090°(T) through the 12 - 4 watch and made good progress. Ice conditions were good and pressure was light.

02:00 hrs position Lat. 73.52'N Long 73.10'W. Ice conditions 1/10 multi-year, 4/10 grey/white, 3/10 grey, 1/10 new. 04:00 hrs position Lat. 73.52'N Long 72.00'W. Light snow, barometer 29.84 inches. Wind west by north 20 kts. Air temp. 3°F. Distance run for watch 40 miles. A course of 090°(T) was made until 06:55 hrs when course was altered to 140°(T) in position Lat. 73.50'N. Ice conditions 9/10 grey/white with a trace of new ice.

08:00 hrs position Lat. 73.40'N Long 69.20'W. Cloudy and clear. Barometer 29.90 inches. Wind west 16 kts. Air temp. 6°F. Sea temp. 29.6°F. Distance run for watch 48 miles. Course 140°(T).

10:00 hrs Lat. 73.17'N Long 65.33'W. Ice conditions 2/10 grey/white, 5/10 grey, 3/10 new under no pressure.

Noon position October 31st Lat. 72.56'N Long 67.36'W. Cloudy and clear. Barometer 30.06 inches. Wind westerly 10 kts. Air temp. 6°F. Distance run for watch 52 miles. Distance run noon to noon 244 miles.

14:00 hrs position Lat. 72.34 ½'N Long 66.38'W. Ice conditions 1/10 grey/white, 7/10 new. 16:00 hrs: position Lat. 72.13'N Long 65.36'N. Overcast and clear. Barometer 30.10 inches. Wind west northwest 7 kts. Air temp. 6°F. Distance run for watch 56 miles. Course 140°(T).

18:00 hrs position Lat. 71.50'N Long 64.40'W. Ice conditions 1/10 grey/white, 7/10 grey, 1/10 new ice.

20:00 hrs position Lat. 71.17 ½'N Long 63.36'W. Cloudy and clear. Barometer 30.03 inches. Wind west northwest 8 kts. Air temp 6°F. Distance run for watch 64 miles. Course 140°(T).

22:00 hrs position Lat. 71.05'N Long 62.53'W. Ice conditions 2/10 grey/white, 5/10 grey, 3/10 new ice.

1 November

00:00 hrs November 1st position Lat. 70.42'N long 62.00'W. Overcast and clear. Barometer 36.15 inches. Calm. Air temp. 8°F. Distance run for watch 53 miles. All vessels maintained a 140°(T) course throughout the 12 - 4 watch at a speed averaging 14.5 kts. Only traces of newly formed ice were present.

04:00 hrs position Lat. 70.00'N Long 60.10'W. Light snow. Barometer 30.03 inches. Wind north 13 kts. Air temp. 6°F. Sea temp. 29°F. At 04:45 hrs all ships altered course to 166°(T).

05:00 hrs position 69.43'N Long 59.52'W. Vessels in open water throughout watch and averaging fifteen kts. 08:00 hrs position Lat. 68.58'N Long 59.08'W. Overcast with intermittent snow. Barometer 30.15 inches. Wind northerly 7 kts. Air temp. 17°F. At 09:00 hrs.

Captain T. Pullen, D.O.T. Adviser onboard the T.S. *Manhattan* came aboard C.C.G.S. *John A. Macdonald* to pass on information concerning ceremonies on arrival in Halifax and to inform me that T.S. *Manhattan* would now proceed independently towards the Greenland Coast for further speed trials. After messages of good wishes and with the intention of meeting again before arrival in Halifax, C.C.G.S. *John A. Macdonald*, in company with *Staten Island* set course for the Belle Isle Strait.

T.S. *Manhattan* 10:30 hrs Lat. 68.40'N Long 58.30'W. November 1st. The voyage to the Belle Isle Strait was without incident and at 11:20 hrs November 4th we parted company with U.S.C.G.C. *Staten Island* which proceeded towards New York.

At 14:00 hrs C.C.G.S. *John A. Macdonald* anchored in Forteau Bay - position Lat. 51.27.9'N Long 56.56.2'W to await T.S. *Manhattan* and maintain schedule.

6 November

At 07:54 hrs. November 6th C.C.G.S. *John A. Macdonald* got underway to rendezvous with T.S. *Manhattan* and C.C.G.S. *Louis S. St. Laurent*. Again it was decided to proceed independently and join forces once again for the arrival in Halifax.

8 November

At 13:00 hrs November 8th C.C.G.S. *John A. Macdonald* entered harbour, where she was accorded a magnificent welcome from Hon. Donald Jamieson, Minister of Transport, and high ranking Officials of both federal and provincial governments. At 13:17 hrs C.C.G.S. *John A. Macdonald* berthed at Pier 20, Halifax, after successfully completing the double crossing of the Northwest Passage and assisting the first commercial vessel in history to make this epic voyage.

Further Reading

Appleton, Thomas E. *Usque Ad Mare: A History of the Canadian Coast Guard and Marine Services*. Ottawa: Department of Transport, 1968.

Arctic Waters Pollution Prevention Act. R.S., c. 2 (1st Supp.), s. 1, 1970.

Baker, H. Charles. "Northwest Passage: Voyage of the Manhattan." *Ocean Industry* Vol. 4, no. 8 (August 1969).

Berger, Thomas. *Northern Frontier, Northern Homeland: The Report of the Mackenzie Valley Pipeline Inquiry*. Ottawa: Supply and Services Canada, 1977.

Clark. Karin, *Breaking Ice with Finesse: Oil and Gas Exploration in the Canadian Arctic.* Calgary: Arctic Institute of North America, 1997.

Coates, Ken, P. Whitney Lackenbauer, Bill Morrison, and Greg Poelzer. *Arctic Front: Defending Canada in the Far North*. Toronto: Thomas Allen, 2008.

Coates, Peter A. *The Trans-Alaska Pipeline Controversy: Technology, Conservation, and the Frontier.* Fairbanks: University of Alaska Press, 1993.

Coen, Ross. *Breaking Ice for Arctic Oil: The Epic Voyage of the SS Manhattan through the Northwest Passage.* University of Alaska Press, 2014.

Dosman, Edgar. *The National Interest: The Politics of Northern Development 1968-75*. Toronto: McClelland and Stewart, 1975.

Dosman, Edgar. "The Northern Sovereignty Crisis." *The Arctic in Question,* ed. Edgar Dosman. Toronto, 1976.

Elliot-Meisel, Elizabeth B. *Arctic Diplomacy: Canada and the United States in the Northwest Passage*. New York: Peter Lang Publishing Ltd., 1998.

Eyre, Kenneth, "Forty Years of Military Assertion in the Canadian North, 1947-87," *Arctic,* Vol 40, no.40 (December 1987).

Grant, Shelagh D. *Polar Imperative: A History of Arctic Sovereignty in North America*. Vancouver: Douglas & McIntyre, 2010.

Griffiths, Franklyn, Rob Huebert, and P. Whitney Lackenbauer. *Canada and the Changing Arctic: Sovereignty, Security and Stewardship*. Waterloo: Wilfrid Laurier University Press, 2011.

Headland, R. K. "Ten Decades of Transits of the Northwest Passage." *Polar Geography* Vol. 33, nos. 1–2 (March–June 2010).

Helfferich, Merritt R. "The Cruise of the Manhattan." *Alaska Geographic* Vol. 1, no. 1 (1972).

Jones, Gordon H. "Economic Development – Oil and Gas." *A Century of Canada's Arctic Islands, 1880-1980*, ed. Morris Zaslow. Ottawa: Royal Society of Canada, 1981.

Kirkey, Christopher. "The Arctic Waters Pollution Prevention Initiatives: Canada's Response to an American Challenge." *International Journal of Canadian Studies* Vol. 13 (1996).

Kirton, John and Don Munton, "Protecting the Canadian Arctic: The *Manhattan* Voyages, 1969-1970," in *Canadian Foreign Policy: Selected Cases* ed. Kirton and Munton. Toronto: Prentice-Hall, 1992.

-----. "The *Manhattan* Voyages and Their Aftermath." In *Politics of the Northwest Passage*, ed. Franklyn Griffiths. Montreal & Kingston: McGill-Queen's University Press, 1987.

Lackenbauer, P. Whitney and Elizabeth Elliot-Meisel, Eds. *"One of the Great Polar Navigators": Captain T.C. Pullen's Personal Records of Arctic Voyages, Volume 1: Official Roles,* Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 12. Calgary and Waterloo: Centre for Military, Strategic and Security Studies/Centre on Foreign Policy and Federalism/Arctic Institute of North America, 2017.

Lackenbauer, P. Whitney and Peter Kikkert, eds. *The Canadian Forces and Arctic Sovereignty: Debating Roles, Interests and Requirements, 1968-1974*. Waterloo: Wilfrid Laurier University Press, 2010.

Lajeunesse, Adam. "Claiming the Frozen Seas: The Evolution of Canadian Policy in the Arctic Waters." *Canada and Arctic Sovereignty and Security: Historical Perspectives. Journal of Military and Strategic Studies*. P. Whitney Lackenbauer ed. Calgary: University of Calgary Press, 2010.

-----. *Lock, Stock, and Icebergs: The Evolution of Canada's Arctic Maritime Sovereignty.* Vancouver: University of British Columbia Press, 2016.

Lehane, Brendan. *The Northwest Passage*. Alexandria, VA: Time-Life Books, 1981.

MacDonald, Edwin A. *Polar Operations*. Annapolis, MD: U.S. Naval Institute, 1969.

Maginley, Charles D. *The Canadian Coast Guard, 1962-2002*. St. Catharines: Vanwell, 2003.

Maginley, Charles D., and Collin, Bernard. *The Ships of Canada's Marine Services*. St. Catharines: Vanwell, 2001.

McDorman, Ted. *Salt Water Neighbors: International Ocean Law Relations between the United States and Canada*. Oxford: Oxford University Press, 2009.

Meren, David and Bora Plumptre. "Rights of Passage: The Intersecting of Environmentalism, Arctic Sovereignty, and the Law of the Sea, 1968-82," *Journal of Canadian Studies* Vol. 47, no. 1 (Winter, 2013).

Nalder, Eric. *Tankers Full of Trouble: The Perilous Journey of Alaskan Crude*. New York: Grove Press, 1994.

Page, Robert. *Northern Development: The Canadian Dilemma*. Toronto: McClelland and Stewart, 1986.

Pullen, Thomas C. "Expanded Arctic Shipping: Canadian Challenge." *Sentinel,* Vol. 7, no. 2 (1971).

Pullen, Thomas C., and Charles Swithinbank. "Transits of the Northwest Passage, 1906–90." *Polar Record,* Vol 27, no. 163 (October 1991).

Rowley, Graham. "Bringing the Outside Inside." In *Politics of the Northwest Passage.* Franklyn Griffiths ed. Kingston, ON: McGill-Queen's University Press, 1987.

Smith, William D. *Northwest Passage*. New York: American Heritage Press, 1970.

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

Strohmeyer, John. *Extreme Conditions: Big Oil and the Transformation of Alaska*. Anchorage: Cascade Press, 1997.

Swithinbank, Charles. *Forty Years on Ice: A Lifetime of Exploration and Research in the Polar Regions*. Sussex: The Book Guild, 1998.

Swithinbank, C. W. M. "Second Arctic Voyage of SS *Manhattan*, 1970." *Polar Record,* Vol. 15, no. 96 (September 1970).

Trudeau, Pierre and Ivan Head, *The Canadian Way: Shaping Canada's Foreign Policy 1968-1984*. Toronto: McClelland & Stewart, 1995.

Wang, E.B. "Research Note: The Role of Canadian Armed Forces in Defencing Sovereignty." P. Whitney Lackenbauer Ed. *Journal of Military and Strategic Studies* Vol. 11, no. 3 (Spring, 2009).

Yergin, Daniel. *The Prize: The Epic Quest for Oil, Money, and Power.* New York: Simon & Schuster, 1991.

Zellen, Barry Scott, *On Thin Ice: The Inuit, the State, and the Challenge of Arctic Sovereignty*. Lanham: Rowman & Littlefield, 2009.

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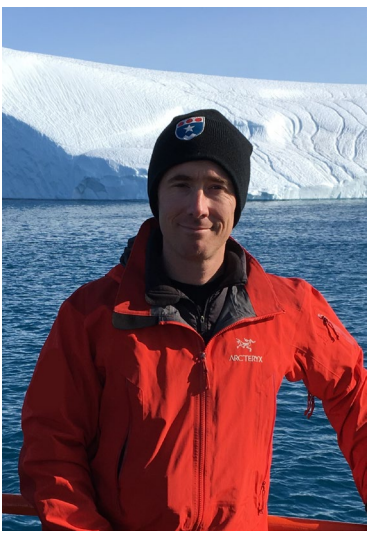

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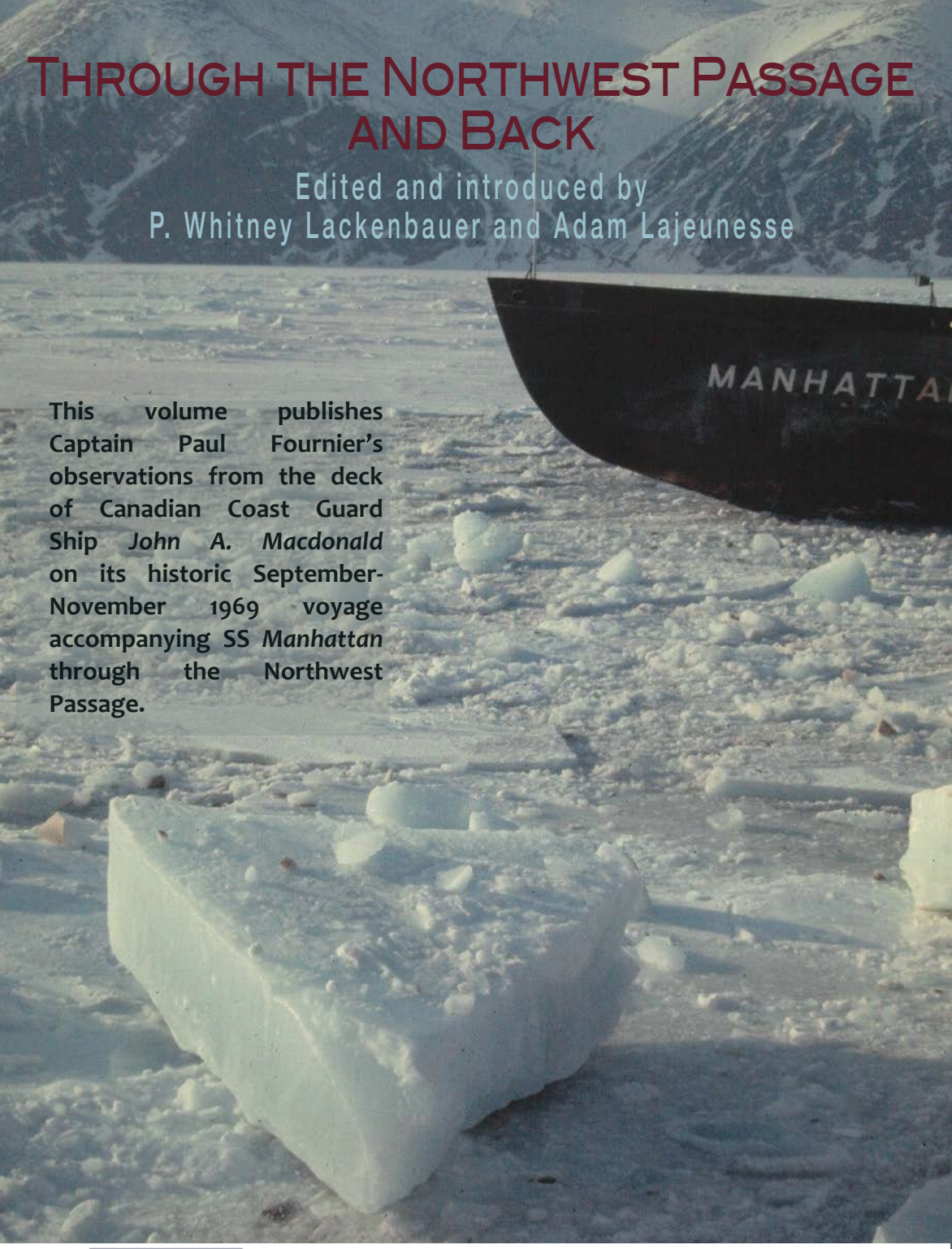
Through the Northwest Passage and Back

Edited and introduced by
P. Whitney Lackenbauer and Adam Lajeunesse



This volume publishes Captain Paul Fournier's observations from the deck of Canadian Coast Guard Ship *John A. Macdonald* on its historic September-November 1969 voyage accompanying SS *Manhattan* through the Northwest Passage.

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