

SHIPPING IN THE ARCTIC: what are the challenges?

Interest in Arctic shipping among industry, governments and researchers is increasing, as indicated by a 20-percent spike in attendance at the 2011 Arctic Shipping North America conference held in St. John's, where there were 180 participants, compared to the 2010 conference in Montreal, in which 150 people attended.

Although the summer shipping season has been lengthening due to climate change, the reduction in ice has not been consistent and winter conditions are unpredictable year to year, reported Thomas Paterson, Vice-President, Owned Fleet & Business Development, Fednav Limited of Montreal, in his keynote address. Referencing Fednav's 50 years of Arctic operations, he noted that the voyage from Quebec to Deception Bay took eight days in 2010 compared to 21 days in 2008 "when it consumed more fuel than any other voyage." He added that while the media is touting ice-free shipping, the odd growler, bergy bit, or multi-year ice floe is "the piece of ice between you and severe damage, or sinking off the coast of Greenland or Baffin Island." Summer fog is still a huge factor in navigation, Paterson said, and the open-water season remains very short, requiring proper tonnage and properly trained people.

Mr. Paterson estimated a New York to Shanghai transit would take a total of 32 days via the Panama Canal, and 31 days via the Northwest Passage despite the fact that the latter is 1,700 nautical miles shorter. The steaming time along the Northwest Passage is significantly shorter due to the presence of ice and fog. The cost differential between the Northwest Passage, taking into account additional insurance premiums estimated at US\$200,000 to \$300,000, and the Panama Canal's \$125,000 toll fee is US\$75,000 to \$175,000. He added that there is also a possibility of damage and associated unknown costs via the northern route. The voyages would start off at 14.5 knots, but the northern route would likely require slowing down to under seven knots for significant parts of the transit, particularly for non-ice-class vessels. Another disincentive for going via the Northwest Passage is that the cost of ship repairs in the U.S. or Canada is significantly higher than they would be in Europe or the Far East. For these reasons, he doesn't see the northern route being economically viable for through traffic anytime soon.

Paterson hailed the Baffinland iron ore project as "the largest project of its kind in Arctic waters" with the final green light expected in the January-to-April 2012 timeframe. "This will be a huge step forward in the Arctic," he said. Fednav, along with mine developer ArcelorMittal and Baffinland Iron Ore, are in discussions with the major Korean shipyards with the intent of ordering seven ore carriers. The 330-metre vessels, with a 20-metre draught are each capable of carrying about 200,000 metric tons and would transport 18 to 20 million tons of iron ore per year. The passage to Europe includes about 900 miles of heavy Arctic ice, including 60 to 70 miles of landfast ice, reaching thicknesses in excess of 1.7 metres. The ice classes of the vessels are DNV ICE-17 and IACS PC4. Due to the evolution of technology, the capability of the vessels and the accumulated experience of highly skilled crews, Paterson said a transit to the mine would take 10 to 12 days in the winter.

While acknowledging the Canadian government's commitment to the Arctic, especially on the sovereignty front, he pointed out some shortcomings:

- 1) The Canadian icebreaker fleet is ageing, and there is a need for the Government to proactively invest in new vessels. \$750 million is currently earmarked for the construction of a replacement for Canada's heaviest icebreaker, the Louis St. Laurent, and that ship will not be delivered until at least 2017, by which time the remaining fleet will be more than 30 years old;
- 2) The Canadian government needs to improve the availability of bathymetric / hydrographic information that enhances the safety of navigation in the remote waters of Canada's North. "Industry expects that a country like Canada can produce modern, reliable charts throughout the Arctic routes that stand up to the scrutiny of the insurance world," he said; and

- 3) It would be more productive if the U.S. were to ratify UNCLOS, the current stalemate being counterproductive to the development of Arctic shipping.

Christopher Wright, President, The Mariport Group of Digby, Nova Scotia, chaired a panel discussion entitled "Shipping in the Arctic: what are the challenges?" He noted that the number of days of open-zone accessibility at Peel Sound, the gatekeeper of the eastern

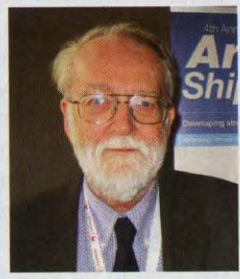


The Canadian Coast Guard ship Louis S. St-Laurent

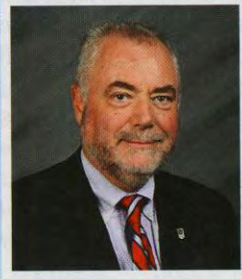
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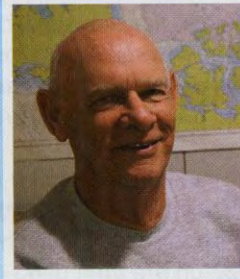
Thomas Paterson
Vice-President, Owned Fleet
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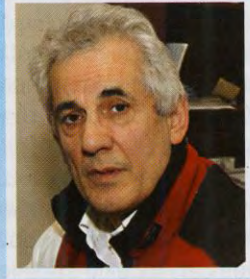
Christopher Wright
President
The Mariport Group



Graham Curren
Director, Marine Business
Development
Irving Transportation Services



Patrick Toomey
Ice Navigation Specialist
Isbjorn International



Jerry Ward
Chief Executive Officer
Baffin Fisheries Coalition

Arctic and entrance to the Northwest Passage, has increased from 22 days in the 1980s to 44 days in 2010.

With regard to charting, Wright offered kudos to Fednav and Baffinland for finding a deep-draught route to the Davis Strait from Steensby Inlet that can accommodate a 20-metre draught vessel, and noted that current charting does not suggest that such a channel is feasible.

In terms of access through the southern Northwest Passage route, the limit is in Dolphin and Union in the western Arctic, "where the bathymetry really doesn't give us confidence there is anything reasonable there for more than an 11- or 12-metre vessel," he said. He added that Fednav had located a 15-metre channel through Cache Point Channel that isn't evident from the charts. "There's a lot of work the Canadian Hydrographic Service needs to do," Wright observed.

Resource development to tax supply system

Graham Curren, Director of Marine Business Development for Irving Transportation Services of Saint John, New Brunswick, emphasized both the challenges of Arctic shipping and the opportunities posed by extensive resource development. "There are no roads and minimal port facilities," he said, "and there's ice coverage most of the year." He quoted former Prime Minister Mackenzie King: "If some countries have too much history, we have too much geography."

Since ice chokes off access to the harbours in winter, cargoes for marine sealift are typically brought in by

freighter, which requires carrying small barges and tugs on the vessels, setting up a ramp system, and offloading by ro-ro. Shipments to mine sites typically require the costly and time-consuming process of breaking down the load for embarkation and then reassembling on location. It takes five to six weeks for a roundtrip cycle on a sealift run, with just 12 days of actual steaming

time. Year-round operations at Voisey's Bay and potentially Baffinland are the exceptions.

With drilling rig and associated support packages costing in excess of \$1 million per day, ice management is critical. Irving Transportation's Atlantic Towing redirects icebergs using either a bow thruster or cannon deflection, or uses a floating towline to change

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their trajectory. One of the best methodologies today, Curren said, is the Fifi (firefighting) system, in which a water cannon is used to deflect the vessel. An 80-metre vessel driving alongside a bergy bit or growler and blasting it with 7,200 cubic metres of water per hour would propel it at a speed of 6 knots.

Curren also noted that inventory-carrying costs on a commercial basis are extremely high in the North, because there's a narrow window of opportunity in which communities can receive supplies, which are then used over a long period of time. "Having deepwater port facilities in the Canadian Arctic has to be an eventual goal," Curren concluded, since a year-round distribution centre would make inventory costs manageable. He added that Baffinland would be "a great start." He foresees "very significant growth" in resource exploitation in the North taxing the existing supply system, particularly with oversized cargoes, and expects the use of air cushion and airship technologies to improve and extend the shipping season.

Canadian government blasted for inaction

"The major problem is getting the Canadian government to make up its mind whether they really want to use the Northwest Passage or not," said Captain Patrick Toomey, Ice Navigation Specialist for Isbjorn International of

Kingston, Ontario. He echoed Paterson's criticism of the Canadian government's inaction with regard to the icebreaker fleet. "As far as I'm aware, the Canadian government has no plan to have any significant number of polar-class icebreakers of any kind in the next few years, maybe even 25 years down the line," he said, in contrast to the proactive stance of the Russian government.

Dr. Mikhail Grigoriev, Director, GECON of St. Petersburg and Moscow, Russia, said that three new icebreakers are planned to be built by 2021. "We will have a critical number of four nuclear icebreakers in the Arctic that can support the trend (of hydrocarbon development). A lot of projects, especially Yamal LNG, will be realized."

Captain Toomey said that aids to navigation are another critical piece of infrastructure the Canadian government has not been investing in, and he also decried the unreliability of communications. "Bandwidth is pitiful," he said. "Most commercial satellite communications have blank space in the Arctic." The last time he was in Pond Inlet, Nunavut in August 2011, he could access the Internet only by Iridium mobile telephone, but there was no access to public voice or data communications. This situation continued until he reached Nome, Alaska.

Regarding the lack of port infrastructure, he said, "If you have a port, people will come. If you don't, you're never going



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to get anywhere." This summer, he watched the Woodward tanker Tuvaq back into a berth in Pond Inlet, drop anchor, and deploy a pipeline to shore. "I saw this same procedure in 1968," he said. "Nothing has changed. How come in 40 years we haven't found a better way? They're still tying up using bollard on the beach. It's the only way to land fuel products."

Captain Toomey's final point was that he has piloted ships sailing to Antarctica, in similar conditions than would be faced in the Arctic, "where the crew haven't had the faintest idea what's going on" in terms of ice conditions because they never had formal training in ice. He recommends mandatory training of ice navigators, certified to international standards.

Arctic fisheries

Jerry Ward, CEO at Baffin Fisheries Coalition (BFC) in Nunavut, pointed out that Nunavut accounts for 40 per cent of Canada's coastline and has 25 communities, only one of which is inland. "There's no road system connecting any of the communities," he said, "and there's no offloading because there are no docking facilities. The federal government has neglected its responsibility to put infrastructure in place in Nunavut and in northern areas in general."

The East Baffin turbot and shrimp fishery is Canada's only growth fishery, said Ward. Over the last 10 years, he has seen the fishing season extended by two months. He echoed Paterson in regards to uncertainty – one year, the fishing season starts in February, but the next year it may be June. He noted there is inadequate Coast Guard coverage to meet the needs of the extended harvesting season. BFC owns three factory freezer vessels between 30 and 65 metres. The port and docking facility in Nanisivik, which was developed to service the lead-zinc mine that closed in 2002, is too far away for BFC to use. There are no other port or docking facilities in Nunavut with the capacity or infrastructure to handle offshore factory freezer vessels. However, Ward said that a tremendous amount of work has been carried out in develop-

ing an infrastructure plan for marine facilities in Nunavut by Small Craft Harbours, a program of the Department of Fisheries and Oceans Canada, Transport Canada and the Government of Nunavut.

Mr. Ward added the cost to complete seven facilities on Baffin Island is estimated at over \$200 million. Considering that these seven facilities have been in the planning process since 2002-2003 and only one has been started (Pangnirtung, at a cost over \$30 million, should be completed in 2012), he wonders how many years it will take to complete the remainder of the facilities or, in fact, just to see the start of the second facility.

Challenges with bulk fuel deliveries

Christopher King, Director of Operations at Petro-Nav of Montreal, outlined the challenges of delivering bulk fuel to communities in the Arctic. Tides, as high as 40 feet in Ungava Bay, can lead to very strong currents that can turn a ship 360 degrees in 60 seconds. Most of the nav aids, which date back to the 1960s and 1970s, are day markers and there are no floating aids in the eastern Arctic. In areas such as Hudson Bay, only a single track line exists on charts, requiring the use of field sheets. "Existing charts are dated and inadequate," he added, and weather forecasts cannot

be relied upon. He's noticed a significant increase in high winds in Hudson Bay in recent years. This can account for weather delays in port, which can cancel out any advantage gained from the extended shipping season.

Self-sufficiency is the name of the game for Petro-Nav ships, which carry 8,000 feet of floating hose and deliver approximately 100,000 cubic metres (1 million litres) per year in the Arctic. Most ports take 6,000 feet of floating hose deployed over a mile off the stern. King noted that in the last two years, Petro-Nav has begun the sealift earlier in the season before the tankers arrive and before Coast Guard ships are on station. With a focus on emergency preparedness, the company has carried out 26 spill exercises since 2005, and has conducted joint training exercises with fire departments in some of the Arctic villages.

"Not fit for man nor beast"

"Not fit for man nor beast", with minus 40 degree temperatures and a 60-kilometre wind blowing steadily, is how Tim Keane, Operations Manager of Canarctic, a division of Fednav Limited, described Deception Bay in Hudson Strait in the winter. He said ever-increasing ice thickness progresses through the winter, and there are shear zones in the entrances to some of the ports with up to 10 to 15 metres of ice thickness. This can turn a



Photo: Fednav Ltd.

Arctic SHIPPING

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7-day voyage into 21 days. In the winter, it's quite a job to keep the ballast from freezing and ice adheres to the hull. "There are basically no ice charts produced for strategic purposes for the Canadian Arctic," he added. Mr. Keane recalled that in its second year of operation, the Umiak I was stuck for 10 days in Labrador, trying to navigate through "a soup of ice that was probably 10 metres thick."

Navigating in the North never follows a straight line, he said, recalling one voyage that took the M.V. Arctic nine days to travel 152 miles. He noted that Fednav's division Enfotech provides high-quality ice imagery that when overlaid on the ship's radar assists in finding the leads in pack ice. He said Fednav is fortunate to have experienced crew on board to service Baffinland and the other northern projects, and added, "The need for more ice navigators is going to be critical."

Oil spill response in the Arctic: what are the main issues for managing an oil spill response in ice-covered waters and harsh environments?

An oil spill in the Arctic is much harder to combat than in open waters due to ice interference, the cold temperature, isolated locations and limited daylight hours in winter, said Dr. Kenneth Lee, Executive Director, Centre for Offshore Oil, Gas and Energy Research, Fisheries and Oceans Canada. Dr. Lee specializes in oil spill countermeasures. He noted that most spill-response techniques have been developed for



Nunavut

Photo: Dcysiv Moment

open water conditions, and added that a lot of what is known about spills is limited to some experimental tank studies and a few large-scale field experiments.

What Dr. Lee said is needed is proof of concept, operational guidelines, and research under the environmental conditions specific to the Arctic, including field trials with oil. In 2010, Dr. Lee submitted a proposal to conduct a controlled oil spill experiment using a Canadian Coast Guard icebreaker to evaluate methods to enhance oil dispersion as a spill countermeasure strategy. However, this experiment had to be put on hold because he was called upon to consult on the Deepwater Horizon blowout in the Gulf of

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Questions asked to participants

Q: HOW DO THE ECONOMICS LOOK FOR ARCTIC SHIPPING, GOING FORWARD?

Captain Ashok Pandey, Master Mariner, Senior Instructor, Maritime Management & Nautical Science, University of Trinidad and Tobago: The navigation season is getting longer. When I was Chief Officer, I used to navigate in the Gulf of St. Lawrence, way back in 1998-1999. I used to get stuck for two or three days. I'd have to wait for an icebreaker. Then I became a Master and came back in 2007. There was not a single incident where I got stuck because the ice has been receding. The thickness is not there that much. Although we can expect multi-year ice, the trend has been receding. If we apply this to the Arctic, and project it to 2025 or beyond, we are certainly looking at credible, commercial Arctic shipping – trans-Arctic shipping, apart from destination shipping, which is already going on in the Russian Arctic. With the increase of the navigation season from three months to four months to five months, the economics of it is going to get better and better.”

Esben Flinker Noergaard, Business Development Manager, Scan-Trans Worldwide of Houston: There are some big players up here doing business (referring to Baffinlands in the Canadian Arctic), and some have been doing business here for a very long time. So of course there's feasibility, but what we need to see is: Is it feasible for us, going up here instead of going somewhere else? I definitely see big potential up here. We're going to get

some new ships here over the next year. Depending on what kind of restrictions we need for our ships, and if we can meet the requirements, I'm sure that we'll be able to come up here as soon as possible.”

Dr. Albert Aalbers, Coordinator, Maritime Research and Development, MARIN, The Netherlands: “It was new to me that there was so little expectation of having Arctic through-shipping through the Northwest or Northeast Passage, so that means that ship operations in the Arctic are largely aimed at Arctic development itself. That means mining and oil and gas. With the economic development race that's going on in China and elsewhere, almost all materials get scarce, and that is driving these mining activities in the Arctic. So, material scarcity is bringing companies to the Arctic.”

Eric Prosh, Director, Minerals & Petroleum Resources, Department of Economic Development & Transportation, Government of Nunavut: “We're at a point now where the combined mining and exploration industry in Nunavut is worth on the order of one billion dollars, depending on if a project is being constructed or going into pre-construction, and that really is only going to go up, stepwise, at this point.”

Q: WHAT IS YOUR VIEW ON THE NORTHWEST PASSAGE?

Captain Ashok Pandey: “Thomas Paterson's view was a bit pessimistic, but he was talking in the present context. I'm talking about 2020, 2030 and beyond. There are three routes:

the Prince of Wales (POW) Route, the McClure Strait Route, and the Peel Sound Passage. POW is probably the safest, as far as multi-year ice is concerned, at this point in time. Going forward, 2020, 2025, we will probably have a clear ice passage as it happened in 2007. We have to be innovative, and make sure we have the ships, the technology, and the infrastructure to actually tell the investors who are investing in Ice Class ships – which are much higher cost – and the insurance companies to come aboard. Look, we are doing business here. What you need to do is reduce the insurance cost, because at that point we will have better search and rescue capabilities – marine infrastructure such as repair facilities, etc. It will certainly make sense not to wait in the Panama Canal or the Suez Canal and pay such high transit fees through those passages, and to create a third route for the world, thereby reducing the geographical distance between the production centres of Asia and the consuming centres of Europe and North America.”

Morten Meljaender-Larsen, Segment Director, Arctic Operations and Technology, Technical Advisory Ship and Offshore, Det Norske Veritas, Norway: “The Northwest Passage is today, and in the future will be, a challenging passage even with increasing ice melting. Some claim it will be a great problem because there will be less first-year ice in the Northwest Passage, opening up for more multi-year ice drifting down and clogging up between the islands. The ice conditions will be difficult to predict and will change a lot with the weather and there will be huge seasonal and annual variations.”