Review of the Seminar

"Shipping in the Canadian Arctic: The Challenges and Opportunities"

February 2008

Company of Master Mariners of Canada

The Company of Master Mariners of Canada, Maritimes Division

"Shipping in the Canadian Arctic: The Challenges and Opportunities"
February 27, 2008
Room 1020, Kenneth C. Rowe Building,
6100 University Ave.,
Dalhousie University, Halifax, NS

0830 Meet and Greet
0845 Welcome Address – Capt. Peter Turner, *National Master – Company of Master Mariners of Canada*
Chairman-Capt. Jim Calvesbert, *Divisional Master-Company of Master Mariners of Canada*

0900 PANEL #1 – THE CHALLENGES
Moderator* – Sandra Attersley, *Metcalf & Company

- Richard MacDougall, *Director – Law of the Sea Project, DFO*
- Doug Bancroft, *Director - Canadian Ice Service*
- Martin Crawford-Brunt, *Det Norske Veritas*

0945 Discussion

Det Norske Veritas

1015 Coffee break – hosted by *American Bureau of Shipping*

1045 PANEL #2 –ECONOMICS and OPPORTUNITIES
Moderator – Dick Hodgson, *Adjunct Professor-Dalhousie University*

- Alan Johnson, *Government of Nunavut*
- Martin Karlsen, *Polar Star Expeditions*

1130 *Discussion*

1200 Lunch – hosted by *Det Norske Veritas*

1300 PANEL #3 – GOVERNMENT VIEWS
Moderator – Rod Stright, *Canadian Coast Guard Ret'd*

- Cdr Paul Dempsey, *Commandant, Naval Operations School, Maritime Command.*
- Brian LeBlanc, *Director Operational Services, Canadian Coast Guard, Central & Arctic*
- Ross MacDonald, *Manager, Special Projects & Arctic Shipping, Transport Canada,*

1345 *Discussion*

American Bureau of Shipping

1415 Coffee Break – hosted by *American Bureau of Shipping*

1445 PANEL #4 – ARCTIC SEAFARER TRAINING
Moderator – Marcel LaRoche, *Lloyd's Register*

- Lt. Chris Richter, *DND, Damage Control School*
- Capt. Chris Hearn, *Director Simulator Centre, Marine Institute, Memorial University*
- Michel Labrie, *American Bureau of Shipping*

1530 Discussion

1600 Closing Remarks – Capt. Jim Calvesbert, *Company of Master Mariners of Canada*

DALHOUSIE UNIVERSITY *Inspiring Minds*
Marine Affairs Program

The Company of Master Mariners of Canada, Maritimes Division

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February 27, 2008
Room 1020, Kenneth C. Rowe Building,
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Introductory Remarks

Capt. Peter Turner, National Master

Capt. Jim Calvesbert, Divisional Master

Panel #1: The Challenges

Martin Crawford-Brunt, Doug Bancroft, Dick MacDougall

Sandra Attersley

Presentation #1:

Richard MacDougall, Director of the Law of the Sea Project (DFO), provided a general overview on delineating Canada's continental shelf according to UNCLOS, and the challenges of collecting data in the Arctic. While the rights of the coastal state were highlighted, focus was on *Article 76* of the Convention on the Law of the Sea (the definition of the continental shelf), and the extension of Canada's continental shelf beyond the 200 nautical mile limit.

The criteria for maximizing continental shelf claims and submitting these claims to the United Nations were outlined. Compared to other nations, it was noted that Canada's submission task force is relatively compact, with the Department of Foreign Affairs assuming the lead in making submissions, while the Canadian Hydrographic Service, for example, is tasked with the more technical work.

Before Canada makes its submission to the United Nations, seismic and other surveys must be conducted to support any continental shelf claims. It was emphasised that Canada needs as much time as possible to collect accurate data, as there is little information to establish the foot of the continental slope in parts of the Arctic. Collecting this information will require continued seismic surveys.

The Arctic weather and ice conditions have also been a challenge, with research occasionally being prevented or limited due to inaccessibility. Nevertheless, progress is being made, as in September 2007, where light ice conditions permitted research in the western Arctic as far north as 77^{o}N. Current projects include a five year plan to working north of the Beaufort, conducting spot soundings at intervals of 50 miles.

In conclusion, it was emphasized that there is excellent cooperation amongst all departments involved in making the continental shelf submission. Despite challenges associated with weather, ice, and icebreaker capabilities, data collection is progressing, is being shared with interested parties, and is on track.

Presentation #2:

Doug Bancroft, director of Canadian Ice Services (CIS), spoke on the nature of changing sea ice cover in the Canadian Arctic. Highlighting many of the services and support services provided by CIS (including ship routing, icebreaking, climate monitoring and weather forecasting), his presentation involved an examination of Arctic sea ice, the projected future of Arctic sea ice, and the impacts of sea ice on Arctic shipping.
The impact of ice on the safety and economic efficiency of Arctic shipping was discussed, whereupon it was indicated that *multi-year ice* is perhaps the greatest threat to Arctic vessel traffic. Moreover, the impact of ice concentration can potentially result in shipping schedule delays. Because of this, it was suggested that an increase in destination traffic will likely be more common than an increase in transit traffic.

The current extant of Arctic ice cover was also discussed. While there has indeed been a significant decrease in Arctic sea ice since 1950, the decrease in recent years has been particularly marked. For example, unusual sea ice events in 2005, including high winds and temperatures, resulted in the breakup of the 66 km^2 Ayles ice shelf. Similarly, the record ice cover decrease in 2007, including a large fracture of ice in the Lincoln Sea, stunned the scientific community, occurring outside all projected models. This has been attributed to climate change and large scale inter-annual variability. Most recently, satellite imagery taken in January 2008 indicates a mass reduction of multi-year ice, suggesting 2008 will be a watershed year with a huge reduction in perennial ice cover. Overall, events like this are happening more frequently, with abnormally low ice conditions now occurring everywhere in the Canadian Arctic. However, there is debate over whether ice will rebuild or continue to decrease.

In conclusion, as the Arctic shipping season lengthens and traffic volume increases (due to reduced ice cover and rising resource prices), there will likely be an increased demand for marine weather and ice information. It was suggested that industry, regulators and enforcers will need to update northern marine transportation regulations and prepare for an increased risk of accidents and SAR operations. It was also suggested that, due to ice conditions, both the Transpolar and Northern Sea routes will attract Atlantic-Pacific transit shipping well before the Northwest Passage route.

Presentation #3:

Martin Crawford-Brunt, District Atlantic Manager, Det Norske Veritas, spoke on responsible shipping operations in the Canadian Arctic. His presentation outlined risk factors associated with Arctic operations, the various ice class and winterization notations, and potential avenues for effective risk mitigation.
Ice going vessels and crew must contend with a host of additional concerns not necessarily representative of vessels operating at more southerly latitudes. Extreme temperatures, light limitation, and excessive noise and vibration, for example, increase fatigue and reduce alertness and concentration. Combined, these factors can reduce overall safety and operation levels of the vessel and crew.
Additional challenges faced by ice going vessels include ensuring proper environmental stewardship, as an environmental tragedy would not only be ecologically devastating, but also very difficult to respond to. Overall, ice operations increase the amount of risk involved in shipping dramatically.

From a technical standpoint, it was indicated that the risk involved in Arctic operations can be mitigated through various class criteria, including Baltic/Arctic ice class notations, and a range of winterization notations. Moreover, human factors must also be taken into consideration when attempting to lower risk levels. These might involve improvements in indoor climate, or reductions in noise and vibration.

Overall, the major concerns indicated within this presentation included the risk of a blackout, risk of a fire, and various navigational and environmental issues. In order for these concerns to be mitigated, there must be adequate standards covering both the technological (vessel design and equipment) and human criteria. Proper risk analysis must therefore be based on experience.

Question Period

Any plans to use AUVs? Should we be going under the ice rather than hammering through it?
RM: Yes, we are looking into them. However, there are issues with getting the sound source in water and moving it along with the AUV.

How would year round operations/presence in the Arctic benefit?
DB: We rely heavily on ice observers and satellite imagery (which is essentially year round).
RM: Ice and fog make flying operations difficult and expensive. Extending summer season with icebreakers is a possibility. However, equipment tends to freeze up (cold on deck, and air guns freeze up in water).

What is the time frame to present information to the UN?
RM: We are working for 2013. It all depends upon the date you ratify UNCLOS.

Comment on IACS requirements for polar ships.

MCB: It is a slow process that takes time. It involves many class societies. Operational requirements are moving slowly.

How confident are you that you will finish on time?
RM: The real risks involved are the ice conditions/weather. If anything goes wrong you can lose an entire season (only a 6-8 week window). We also have to focus our resources on areas with returns. Where are the returns? We are working north of the Beaufort Sea. Russia is sharing information. We have a MOU with Denmark on sharing information (we are working very closely with them). There is a joint scientific interpretation of the data.

What mechanism is in place to resolve conflicting claims?
RM: UNCLOS looks at the merit of the submission. How well have you followed the rules? You can resolve ahead of time. The commission will not resolve disputes. It is up to the individual nations to decide.
Water temperature must have an effect on the ice. Is it ocean currents causing the ice to melt?
DB: It is large scale atmospheric changes. Wind driven export of multi-year ice south is the primary cause of melt.
Rapporteur Johan Shaw

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Panel #2 Economics and Opportunities

Moderator: Dick Hodgson, Adjunct Professor – Dalhousie Unive

- Alan Johnson, Government of Nunavut
- Martin Karlsen, Polar Star Expeditions

Martin Karlsen, Alan Johnson, Dick Hodgson

Preamble by Dick Hodgson:
Welcome message and anticipation of a stimulating and provocat
global parameters on **a study that is still in the planning stage a**
The exercise is not yet complete. The team spent time on the glol
to the Arctic debate. It poses the question of what is the impact o
exercise is posing the question of what is it that triggers shipping
assessment. There are four main areas of study:

01. Resource transportation – what triggers shipping in the Arctic?
02. Demand from other sources e.g. tourism
03. Re-supply e.g. oil and gas
04. Traffic/transit – don't see a great expectation of transit demand

Then there is fishing, oil and gas exploration and support, which are outside the scope of the study.

The question is "What are the impacts?"
In terms of tangible projects, there is a huge amount of activity (sorry, couldn't get the names of the two projects – something Lake?)
Cruise shipping, there is a gradual growth - quite unstructured and difficult to predict.
There is little in the way of container transit.

Point of the study is to look at the impact of Arctic shipping, at the range of the ships.

The intention is to understand the expectations of all shipping.

The scale of the ship and other factors are all considered:

- Non-persistent impacts e.g. the effect of noise, propeller action that is removed when the ship passes.
- Persistent impacts e.g. gas emissions in normal operations and the channel that is made through the ice
- Ballast water, anti-fouling paint, spills, discharges, grey water, sewage and garbage. All must be managed correctly to avoid problems.
- The impact of fishing resources
- Seismic activity

We must look at policy governance consequences. Sustainability for 2007 to 2009 does not address the Arctic and sovereignty is still to be addressed. There is the question of being proactive or reactive and how to deal with it. It is much better to be proactive. A precautionary approach should be in place.
The North West Passage policy must address some issues:

- Stimulating ships that provide no benefit to the area by determining how users can contribute to the Arctic and to the cost
- Environmental resource development
- The importance of the environment on shipping
- Cabotage policy and the difficulties in the North with Canadian flag

Policies are the biggest issue in managing the Canadian Arctic.
Ship related support in terms of prevention – Navigation aids, charts and ice pilotage. Search and rescue has no impact but is important. Vessels of opportunity, maybe looking at cruise ships sailing close in case there is a need for assistance - Arctic travel may need to be done in pairs.

Oil spill response – this still needs work. Recommend a precautionary approach. There is the question of crude oil in the Arctic – is it necessary? There is no oil allowed through the Antarctic, why not the same policy in the Arctic? This coming study will address some of these issues.

Additional remarks: Unless Canada provides icebreaker support in the Arctic, we should not aspire to become an Arctic state.

Alan Johnson - Government of Nunavut
Shipping in the Canadian Arctic: The Challenges and Opportunities
Alan provided an overview of Nunavut. He spoke of the challenges of the twenty-five communities consisting of thirty thousand people with over 60% of the population under twenty-five years old. Most communities are accessible only by air and sea as there is no infrastructure to support any transportation and subsequently with little connection between communities. There is currently a major strategic investment project ($1.2 million) to link Nunavut via Manitoba to the rest of Canada. The new road will be kept off permafrost areas and runs along Hudson Bay. This route will also be a corridor for Hydro and Polar Gas. There are only two paved runways in the North for air transport. The main sea route is east from Montreal to the Arctic and the MacKenzie route in the west.

Some of the issues that need to be addressed to provide a safe marine environment:

- There are only basic facilities for marine transport and some areas have no facilities. There is a large facility at Nanisivik that is used by the military.
- Only 20% of arctic charts have been updated – this does not allow for a safe transportation system
- There is no permanent structure for loading or for tanker mooring

The main infrastructure is for the mining of oil and gas and hydro development. The East Baffin fisheries provide 8500 tons of turbot and 75 to 100 tons of shrimp for processing. There is a seven harbour development, a $41 million investment, where the catch is off-loaded off shore and taken to the fish plant. Tourism is a very important industry, from the Arctic coast to Hudson's Bay but most of the passengers are elderly and there is no safe landing place. It is important to get help to build some infrastructure. Scheduling of cruise ships would be beneficial, as communities cannot handle large amounts of unannounced passengers. There are economic spin-off benefits to the cruise industry.
The deepwater ports in the Arctic have the potential for iron ore and gas.
Conceptual – Bathurst Inlet port and road - 50,000 ton port facility – ten mines under development that would bring in $32 billion GDP in the next twenty years.
Potential: oil and gas development with 11% Canadian oil and 20% natural gas.
This is only one of ten sedimentary basins in Nunavut.
Mineral exploration: Baffinland iron ore is 66% pure – crush and haul. This is a {$4.1 million – I think that the speaker misquoted the number which seems awfully small – Jim C.) investment opportunity.
Rankin Inlet has a gold mine.
Nunavut diamond mines are closing due to financial issues.
There is gold at Baker Lake and Hope Bay and we are also looking at uranium.
Radarsat will be helpful to monitor the effects of climate change as the Arctic ice has changed drastically between 2006 and 2008 and it is being monitored constantly.

There are Sealift challenges with vessels. Arctic adventures – can sail through the Arctic
NORDREG should be mandatory – customs issues with Norwegian passengers on vessels.
Transport strategy –investment is needed to make a viable infrastructure.

Martin Karlsen - President of Karlsen Shipping
Emerging cruise shipping in the Arctic.
The Polar Star Expeditions are certified with full in-house management and offer services in the polar regions of Antarctica and the Arctic. They are no longer a seasonal operation and are looking at year-round operations. They have expedition crews and use zodiacs that can land anywhere and don't require a full infrastructure. Communication is by radio as it is reliable and works well.
There was an increase in interest in Antarctic travel from between two and five thousand passengers to the current forty-five to fifty thousand passengers annually. There is a potential to double that number. Interest in Arctic travel is also increasing.

Polar Star expeditions follow all environmental policies now in place and see their passengers as ambassadors for the protection of the polar environment. Each ship has a crew of thirty-eight plus ten expedition staff including a doctor. The ships are scheduled and are regulated with no more than one hundred passengers at one time. On Polar Star, everything is retained on the ship and all waste is brought back to the port for disposal. The ships are certified to international standards and follow all regulation standards.

There are challenges for the cruise ships in the Canadian Arctic due to the geographic size of the region. The average tour is between ten days and two weeks with the subsequent passenger changeovers taking place in the Arctic communities such as Ikaluit or Resolute, which has airport challenges. More infrastructure is needed to support the changeover of passengers.

The infrastructure would also allow the accommodation of more ships that would be able to help each other, especially with Search and Rescue.
Video of the Antarctic
This is what we have to protect.

Further questions to the panel:
Re: SEAMOSS and Arctic weather – tour ships don't seem to provide weather information, can that be addressed? Response: Martin will look into that.
Re: Concerns about climate change and permafrost changes. Nunavut uses crypto-thermal technologies to monitor the permafrost and infrastructure.
Re: concerns about the land-sea interface with communities being in shallow areas due to the ice – all communities are at sea level. Would it be possible to move bigger shipping away from the shoreline area? Response: Alan advised that it takes council approval and local community involvement to develop infrastructure and the government has to take it all into account.
Re; What are the most popular issues with the communities? What about economic development? Response: Proper harbours for protection – small craft harbours and marinas to safeguard their vessels. The boats are out in the open when a storm comes, they could be demolished. Harbours could be developed to include sealifts for commercial opportunities and tourism.
End of session for Panel #2

Panel #3 - Government Views

Rapporteur - Aimee Gromack e-mail: am688410@da

Moderator – Rod Stright, *Canadian Coast Guard Ret*

Ross MacDonald, Brian LeBlanc, Paul Dempsey, Rod Stright

Commander Paul Dempsey, Commandant, Naval Operations School, Maritime Command:
Security & Sovereignty Challenges

Commander Dempsey discussed the rapid reduction in sea surface ice in the Arctic caused by climate change. He pointed out that the area for the freedom of navigation within Arctic waters is becoming greater (millions of square kilometers) and more accessible. The reduction of sea ice due to

climate change will cause an increase in maritime traffic, allow for increased access to resources, and increase shipping.

Shipping time will decrease as a result of the opening of Arctic waterways and will reduce thousands of kilometers in travel distances. An advantage could be realized in shipping where there is not necessarily a choke point, as there is in the Panama canal, in which hull design and construction is limited.

The four main challenges of Canadian sovereignty were highlighted: The United States-Canada bilateral disagreement of the Beaufort Sea, the law and regulations Canada wishes to apply in the Northwest Passage, and the two areas within the Lincoln Sea that are being contested by Canada and Denmark.

There are several overlapping claims among nations and there are difficulties in defining the equidistant borders which remain unresolved. The Russians want to make claim to a large portion of the Arctic to the extent that they placed a flag 3000 meters below sea level, onto the sea bed. Canada and Denmark want to make claims to extend their EEZ to the edge of the continental shelf, as permitted under UNCLOS. The brief description of these disputes demonstrates the ongoing challenges to Canada's sovereignty and economic claims in the Arctic.

Commander Dempsey then showed a conflict-environment diagram which shows how the melting of the polar cap causes increased access to resources, increased shipping, increased environmental impacts, greater security threats, sovereignty disputes and leads to the need for the government of Canada to respond pro-actively to these threats. Greater Canadian Forces (CF) involvement is critical to the mitigation of these issues and to support other agencies in doing the same. There has been and increase in the CF involvement in the Arctic since 2002 and this summer the CF will deploy two ships to the Arctic.

Operational challenges for the CF involve the distance between the deep water ports of Halifax and Nanisivik compared to other transit routes. This creates a great deal of isolation in which you must rely on the indigenous capabilities of your own platform. There is a need to improve the lack of infrastructure in the Arctic and to work with this in cooperation with the Canadian Coast Guard. During one Arctic operation, the CF had to go to Greenland to collect fuel, demonstrating a good level of cooperation between Canada and Denmark, but also demonstrating the lack of infrastructure within Canada. Other challenges involve safe navigating around icebergs in conditions of poor visibility.

Where is the Navy going with regards to the Arctic? They will continue regular deployment and there have also been announcements of the delivery of Polar Class 5 vessels in 2013. The Nanisivik deep water port will have additional operational capability by 2012 and full military capability by 2014.

Churchill and other choke point areas will be used for aircraft deployment to gain knowledge of what is occurring in the Arctic and helicopters will be used for transporting people.

There is ongoing cooperation between the CF and the Coast Guard (CG). A memorandum of understanding has been signed and will enable a the CF personnel to be deployed on CG vessels to gain an understanding of the environment they will be working in. This will also help to develop specialized skills. Development of greater choke point access in Canada's internal waters is also a possibility. The use of submarines in Canada will increase the ability of surveillance through increased information.

In summary, there are sovereignty and security issues arising as a result of climate change and melting sea ice. Greater awareness is necessary and Canada is gaining the capability to address these challenges.

Brian LeBlanc, Director Operational Services, Canadian Coast Guard, Central & Arctic: **Shipping in the Canadian Arctic: The Challenges and Opportunities**

Mr. LeBlanc gave an interesting overview of the role of the Canadian Coast Guard (CG) in the Arctic. He discussed the CG programs, the vessels (icebreakers), operations, challenges and the future for the CG in meeting these challenges.

The CG has a practical presence of the Canadian Government in the Arctic. The programs of the CG in the Arctic include ice-breaking, aiding in navigation, vessel traffic control, search and rescue, and maritime communication. The CG is the prime responder to marine spills north of 60 degrees latitude. They also facilitate northern supplies of fuel.

The CG has been very active in supporting science and specifically the UNCLOS program to map the seafloor, using the Louis S. St. Laurent which should be completed by 2012. Program objectives of the Government of Canada and other Government department, including the increasing role of Canadian security and sovereignty, are also supported by the CG.

Some of the CG vessels:

1. *The Arctic Northern Patrol Vessel*
   - purchased by the Canadian Government in 1904
2. *HMCS Labrador*
   - built by the Navy in 1954
   - turned over to the CG in 1958
   - made final Arctic voyage in 1984
3. *John A. MacDonald*
   - helped provide the S.S. Manhattan oil tanker with ice-breaking services to get it out of the Northwest Passage in 1969, which came through Canadian waters without permission
4. *Louis S. St. Laurent*
   - also escorted the S.S. Manhattan out of the ice of Baffin Bay in 1970

In 2007, there were 91 vessels in the Arctic in the shipping season: 8 CG (2 of which transited the Northwest Passage); 2 National Defense; 11 commercial cargo; 11 commercial tankers; 6 cruise ships (3 of which transited the Northwest Passage); and 11 grain vessels.

Operation Nanook 2007 was a sovereignty operation in participation with DND. Two exercises were conducted: an environmental response scenario and a security incident.

Nanisivik was mentioned for its role as a deep water port which will be used for CG operations.

The Canadian Coast Guard fleet consists of the Louis S. St. Laurent and the Terry Fox, which are bother heavy icebreakers; the Henry Larsen, Desgroseilliers, Pierre Radisson, Sir Wilfrid Laurier, Amundsen, Nahidik, Dumit, and the Eckaloo which are medium icebreakers. The fleet is aging, with all vessels over 15 years old and some over 25 years old. The fleet is smaller than in the past.

On the bright side, the CG has received government funding. In order to increase the strength and flexibility of the fleet, 16 new vessels will be added. Twelve of the new vessels will replace existing vessels when they reach the end of their life expectancies. The replacement for the Hudson is to be completed by 2012 and operational by 2013.

Some the Coast Guard's challenges and opportunities lie within their programs and services, particularly the increasing need for all of the services they provide that will come with the increase in traffic and activity in the Arctic, which the CG needs to build capacity for. The re-creation of the CG Southern division may be necessary for the North. More hydrographic charts are needed and therefore more science missions will be required under constrained resources. Change in policy in the Northwest Passage will also be required for the projected increase in shipping. Increasing shipping traffic in the cruise and ecotourism industries will pose challenges. The physical environment also poses many challenges. The CG does not have an explicit mandate to maintain sovereignty and security, but they are strategically positioned to play an important role in this in the Arctic. The CG is very well suited to provide services in the Arctic and this is an opportunity for growth.

The CG will move forward to meet these challenges through the fleet renewal process that will replace aging icebreakers with more capable icebreakers, which will increase operational capabilities. The government recently gave the CG $720 million for the construction of heavier polar icebreakers to replace the Louis S. St Laurent and the Terry Fox, which will be able to operate for up to 11 months in the Arctic. These are due for completion in 2017. The CG may move toward a more constabulary role which will require changing the role of the CG in various Acts.

Ross MacDonald, Transport Canada, Marine Safety:
Preparing for Arctic Shipping

Mr. MacDonald gave an overview of his own views, as a Transport Canada employee, regarding the up and coming issues of shipping in the Arctic.

Accidents in shipping have a 10-12% frequency in the Arctic, which is much lower than the east coast of Canada, but is expected to increase with increased access to shipping in the Arctic. The Russians have fewer shipping related accidents - maybe we can learn from them. Accidents pose risks that must be managed for shipping in the Arctic. There is opportunity to learn how to manage these risks at present due to the current low level of shipping and to prepare for the projected shipping increase. Changes in infrastructure and policy are necessary steps in the preparation for increased shipping.

Canada's Shipping Act and the Arctic Waters Pollution Protection Act (AWPPA) requirements take extra steps in Arctic protection and are instrumental in adding to Canada's claims for sovereignty.

Canada was instrumental in the creation of UNCLOS Article 234 which allows countries to make non-discriminatory rules for shipping in ice-covered waters. Canada has since made its own regulatory regime in compliance with Article 234.

The patchwork of requirements for Arctic ships has roots within the IMO guidelines for ships that operate in Arctic waters. These guidelines are voluntary but may eventually lead to mandatory requirements.

Reasons for protecting the Arctic lie within Canadian concern for its environmental value. The majority of Canadians believe the Arctic should be preserved. The Inuit have a high reliance on Arctic

wildlife for basic nutrition and their needs must be considered. Mr. MacDonald showed a photo of a small craft harbour of Nanisivik that portrays the need to be concerned about the preservation of the Arctic, as it is the environment on which communities depend upon for their livelihoods.

The types of shipping that are taking place and are expected to increase include: tug and barge, community re-supplying ships, oil and gas exploration, bulk ore transport, cruise ships, government ships, commercial fishing, adventure tourism, and ecotourism. It was also noted that there is a major lack of infrastructure and ships are causing environmental impacts by landing on beaches.

Finland is currently leading the world in ice-breaking design and technology.

A total of 120 transits have occurred in the Northwest Passage since 1906 (roughly 1 per year), but a lot have been pleasure craft.

Types of shipping that won't be seen in the Arctic are container vessels and nuclear ships.

In summary, today's Arctic in the global context means an increase in shipping traffic due to an increased demand for resources. Canada's "Polar Guidelines" for shipping, which were developed in response to Imp's guidelines, will be re-drafted in November 2008 and have the potential of becoming stronger. Aerial surveillance programs will aid in oil spill monitoring, with Transport Canada being the responsible department for oil spill response preparedness. Transport Canada will work on this in collaboration with the Coast Guard and Arctic communities. The Arctic Council Marine Shipping Assessment is being conducted on the impact of shipping in the Arctic now and in the future. This report should be available next year and will document the environmental, social and cultural impacts of shipping in the Arctic.

Rod Stright, *Canadian Coast Guard Ret'd:*

Final Comments and Recap

The need for improved infrastructure in the form of new icebreakers and port development in a timely manner was an important point raised. It is important to improve capacity to stay in the Arctic for longer periods of time due to the increased travel time to and from the Arctic. Support of remote Arctic communities was highly stressed. The communities of the Canadian Arctic are important for justifying our sovereignty. The Inuit and other Arctic communities are Canadians that deserve Canada's support year-round. Scientific work should focus on partnerships between governments as well as communities. Vessels that support multi-mission personnel are necessary to address issues of environment, sovereignty, and communities.

Modern vessels are needed in the Arctic sooner rather than later, that are capable of meeting government objectives. The Canadian Coast Guard can rationalize their ice-breaking capability if the Southern vessels are sent North to support the larger, more inefficient ships that are currently operating.

Question Period

A speech was given regarding the experience of a World War II veteran, who suggested that RCMP officers work collaboratively with other departments to ensure sovereignty.

The first question was regarding the different perceptions of what is occurring in the Arctic. A point was made that mechanisms are in place to address the potential conflicts and challenges regarding sovereignty in the Arctic. This is realized, however, it is necessary to manage for risk which could be the

breakdown of these management mechanisms. Canada needs to obtain capacity to deal with these potential breakdowns and disputes.

Another question regarding the procedure for icebreaker loss was asked. Brian LeBlanc discussed the limited capacity of the CG for back-filling, an issue that needs to be addressed.

Opinions were voiced regarding the time lag in icebreaker construction and the unlikelihood that new icebreakers would be ready for 2012. A suggestion was made to charter Finland icebreakers.

Panel # 4 - Training
Moderator- Marcel LaRoche, Lloyd's Register

Michel Labrie, Chris Hearn, Chris Richter, Marcel LaRoche

Opening remarks: Marcel LaRoche: Thank you, and probably without this element, the human element, the men and ladies operating the ships the rest of this would not be happening, so I am very happy to be here today, helping with the advancement of knowledge and the ideas that surround Artic navigation. We have heard from our colleagues, the technology, regulatory and economics aspects of Artic navigation, and now, an equally important element to address is the prospects of achieving safe, reliable and sustainable Artic navigation. We have to consider the competence of sea farers who will be tasked to navigate these difficult Artic passages. I spent allot of my time in the Artic, unfortunately not gazing out of windows, but working hard down below, and we had our challenges down there and I know them very well. I also know and have a great deal of respect and admiration for the Artic and what she holds. Some of my most memorable moments as a seafarer happened in the Canadian Artic and this is a very important point because if we are going to attract the best to navigate these waters, and to help ships move through safely, we have to consider the human element but make it an enjoyable process. Panel are then introduced.

Panelist 1: Damage Control Division. *Lt Chris Richter, Canadian Forces Navel Engineering School-Damage Control Division (DCD).*

Introduction: On behalf of LCdr Bellas, DC Division Commander and Cdr Hovey, Commandant of Canadian Forces Naval Engineering School, I would like to thank the conference conveners for giving us the opportunity to participate in this workshop. My presentation has three sections: (A) DCD history; (B) What the DCD does and the capabilities of the Damage Control Training Facility (DCTF) and (C) Preparation of ships by the DCD prior to Arctic deployment.

(A) DCD history: During WWII, the massive recruitment of sailors to support the war effort resulted in extremely inexperienced people manning the ships to defend the convoys; hence the RCN was becoming a hindrance instead of an asset. As crews were worked up in three locations – Bermuda, Halifax and Scotland), the need to train people in Damage Control was realized to be a basic need

as much as sea survival. At the end of the WWII several warships became available in Halifax for training. For example the HMCS St Clair, was used for fire fighting training, as it was ideal for duplicating the conditions a sailor would face, should a fire occur at sea. At the end of WWII, another threat emerged in the form of Atomic, Biological and Chemical defense (ABCD), and the Navy realized they needed training in this area. As the threat was new and barely understood, there was a need for a secluded area for training; hence the abandoned Fort St Ives on McNabs Island made an ideal spot. Although the focus for training was on ABCD, this did not undermine the need for fire and flood training and old fuel bunkers were converted to simulate a shipboard environment. In Oct 23 1969, the navy experienced its worst disaster in peacetime, when a gearbox explosion on board the HMCS Kootenay resulting in the death of 9 sailors and many lessons were learned that today are taken for granted.

(B) What the DCD does and what the DCTF is capable of: Courses that are conducted include 1) Basic damage control (introductory seamanship); 2) Shipwright training, 3) Helo crash rescue; 4) Damage control petty officer, 5) Submarine basic firefighting, 6) Hazmat, 7) Officer training for duty watches, 8) Damage control officer course, 9) Chief engineer DC and damaged stability, 10) Ship's fire and flood refresher courses. The Navy also converted from diesel to propane fueled fires, which allowed for a much more environmentally friendly training platform and provided a safe, controlled training environment that closely replicated a ship with the flexibility to vary some of the spaces and arrangements to simulate different classes of ships. A new trainer containing 15 burn rooms in a "ship", two flood tanks, fireman leaks/ruptures and a helicopter prop was built and named DCTF Kootenay as a testament to the men who gave their lives on board their ship. Annual survivors and their families are also hosted here to remember the high cost of damage at sea. Among the 15 burn rooms are 2 roll-over trainers that enhance the realism in DCTF and encourage students to crouch while attacking fires. Some of the props in the burn rooms are portable and can be moved around and accessible fitted fire fighting equipment can be set up to simulate a certain class of ship. Some of the features incorporated into the spaces at the DCTF require teams to overhaul the fire, which will not extinguish until it is completed. For example, books have to be knocked off the bookshelf and overhauled in order to extinguish the fire. Two main machinery rooms simulate major machinery space fires that have engine enclosures on fire and remote fuel shut off valves that require closing in order to overhaul. Teams descend a ladder and attack this particular fire, which requires significant planning and coordination from the Command level to safely extinguish and overhaul. Through these tactics, sound planning is required and assessed. Helo crash rescue training allows flight deck attack teams and ships without air detachment deal with flight deck fires and safe rescue of air crew. Night burns are the most dangerous with liquid propane flashing off on the initial section of the grating. This is closely monitored by Staff both on the ground and from one of two control towers, with wind direction also being carefully monitored. Flood repair training includes containing flooding damage in one of the two flood tanks with sprung hatches, holes in bulkheads and ruptured pipes that force repair parties to refine individual skills and teamwork. With regards to collaboration, the DCD has memorandums of understanding with outside agencies where both can profit from the enhanced training provided, for example these include the DND Fire Hall, HRM Fire Department and HRM Police.

(C) Preparation of ships by the DCD prior to Arctic deployment: How are these naval flood control training principles related to the civilian shipping industry, in particular while operating in Arctic Waters? *A recap of the MV Explorer incident in Antarctic waters is a sober remainder of what can happen at sea*

and the need for stability training and flood refresher training courses. How do Canadian Forces (CF) Warships prepare for Arctic patrols in the context of damage control? By ensuring that the ships company is current on their refresher training with respect to fire fighting and flood repair at the DCD. Ships in preparation for an Arctic deployment will typically run an intensive program of refresher training on board conducted by the DCD focusing primarily on personnel from the engineering department. The use of splinter boxes, leak stopping, shoring and emergency welding kits are reviewed and practiced. Improvised structural shoring and trialing shoring up of hatches and bulkheads enhance this training and build team skills and cohesion. From a materiel point of view, most engineer officers will request to bring extra shoring in order to conduct this training and in the event of an emergency will be prepared to erect extensive shoring structures. In addition to allowing the training on board to sharpen crew's skills they build confidence in personnel and what they are capable of in addition to proving that all the kit is operational and in place. These include salvage pumps, hilt guns and emergency burning and welding kits. Table topping exercises and planning how to shore difficult doors, hatches and leak stopping hidden areas are best practiced in ideal conditions as opposed to attempting the first time in an emergency. Stability refreshers are also offered at the DCD to engineering officers and senior hull technicians to brush up stability calculation and assessment skills. These are essential when gauging ice accretion and methods of dealing with ice buildup and calculating meta-centric height to assess stability. Canadian warships are inherently very stable by design and are built to withstand extreme weather and ice conditions. Although these are the preparations that are made with respect to the damage control effort, it must also be noted that an extensive environmental impact assessment is carried out and precautions taken to mitigate any environmental impact to the waters and ecosystems prior to CF warships deployment to the far north. This is in addition to training for lookouts, as icebergs are not easily detected via radar, ice recognition training and donning of immersion suits. THANK YOU

Chair*:* It is a very good practice, and I think practical hands-on training to fight fires is the most important aspect for seafarers. There is no doubt about that and it seems that your division has a great deal of experience as far as dealing with the Artic. I think that this great knowledge will help prepare and push the navy into the Artic and in control. Thank you very much; it was a very interesting presentation.
Panelist 2: Ice Navigation Training: *Capt.* Christopher Hearn MM MNI, *Director, Centre for Marine Simulation (CMS), School of Maritime Studies, Marine Institute of Memorial University.*
Captain Hearn: I would like to thank the organizers for the opportunity to present at the conference. My presentation on Ice Navigation training is divided into four parts: a) Background of the Centre for Marine Simulation (CMS) b) Simulation development; c) CMS Courses and d) Future Considerations.
CMS background: The Centre was established in 1994 and is a Not for Profit Revenue institution. There are 11 simulator types and it is the largest, most comprehensive facility in Canada, with a focus on training, research and development. The real world need for ice training eventuates from a) previous experience from ship operations in the Canadian Arctic suggests that human factors play a significant role in marine emergencies; b) effective and safe sea transport on the East Coast of Canada and Canadian Arctic requires that ship's officers be skilled in ice navigation and c) the requirement for skilled ice navigators is not unique to Canada, as it is shared by many countries with shipping operations at high latitudes. The Code for Polar Navigation (Polar Code) notes that ships operating in the Arctic are exposed to unique risks such as a) poor weather conditions, lack of navigation aids and good charts, poor communications, b) remoteness of area in terms of rescue or clean up, c) cold temperatures that may affect ships machinery and emergency equipment and d) ice effect on hull, propulsion and appendages hence the need to focus on human factors and operational procedures. In response to these challenges, an MOU was signed between the Transportation Development Centre (TDC) and the Marine Institute to develop a course that would

address the “Fundamentals of Ice Navigation”. The week-long ice navigator course at the entry level combines lectures with exercises. These include full Mission/Motion Bridge Simulator and a syllabus with objectives that have been established and evaluated by experts in ice navigation. Allowances are also made for recommended changes and continual improvements through a revision process.

Simulation development: Courses provided at the CMS include a) ice modeling (ice thickness, floe concentration and size, ice strength, snow thickness, ice-hull friction, pressure ridge, width of sheets and rate of closure) and b) Ship modeling (numerical modeling, sufficient fidelity, ice set as resistance to performance, sufficient model tests, acceleration, turning behavior, speed loss and its aaffect on the ship). Visual cues include linear features (e .g leads, tracks, pressure ridges) and typical cues (e .g ice thickness with color), as rapid closure of leads indicates ice under pressure. Other cues indicate the concentration of pack ice and floe size, light levels limits what can be seen as well as snow coverage and other weather restrictions. Motion cues include the pitch, yaw and sway motion in ice breaking and extreme motions such as vessel impacts ridge (e. g riding, complete stop, falling back, and heel). Auditory cues include the motion of ship in ice and ice being milled by propellers through an audio file synchronized to the simulation via a numerical model. The fidelity of the audio track is vital to create a believable environment. Electronic sensor cues are important to planning ice routing and integrating ice features with electronic sensors used in ice navigation. Ship borne radars must accurately reflect major ice features, so a navigator is trained to recognize these features from a radar signature. These cues are all essential to simulation as it provides a realistic environment to practice the response by ships and crews to external disturbances, which are namely ice impacts. The instructor station allows an instructor to provide a wide range of experiences to students within a relatively short time frame and can create a suite of scenarios or tailor a course to specific needs. For example common failure scenarios could include propeller loss, clogged nozzles, or even a holed vessel. The objective of the CMS is to create scenarios that challenge students and ensure that training objectives are successfully met.

CMS Courses: *Fundamentals of Ice Navigation*: The aim of this course is to develop basic knowledge associated with operating a vessel near or in ice covered waters and provides the opportunity to exercise that knowledge in a full motion/mission bridge simulator. Persons completing this course successfully should be able to serve and handle the responsibilities of ship’s deck officers on vessels operating in ice covered waters including the Canadian Archipelago, Baltic Region and Arctic Ocean, as defined in *Guidelines for Ships Operating in Arctic Ice Covered Waters.* Ice Navigator qualifications and training requirements include but are not limited to; a) Understanding and proficiency required for operating a ship in Arctic ice covered waters, b) recognition of ice formations, c) ice indications, d) ice maneuvering, e) use of ice forecasts, atlases and codes, f) hull stress caused by ice, g) ice escort operations, h) ice breaking operations and i) effect of ice accretion on vessel stability. The course syllabus includes 1) the ice regime (ice physics, types and concentrations, reporting, coding, terminology, ice signs, and imagery, effects of winds and currents and orientation of simulator), 2) regulation and publications; 3) navigation in ice (navigation, passage planning, new technology, and a second exercise component), 4) ice breaker operations (requirements, communications, methods, safe speed and distance, convoy operations and a third exercise component); 5) effects of extreme low temperature (brittleness of ships structure, equipment freezing, methods/precautions to de-ice, preparations for low temperatures, maneuvering in ice and a fourth simulation exercise). A course evaluation concludes the program.

Future Considerations: These include the need to improve ice visual and performance such as aspects for deicing, understanding independent and dynamic ice structure response, further high architecture and

advanced math modeling and oceanic consulting. Other areas include strategic ice operations and planning using various approaches such as Decision Making Tool Box (DMT), strategic ice overviews, using various ice position sources, towing and mitigation of threat hazards and simulating towing of iceberg and effects on vessel. THANK YOU

Chair: This was fascinating, technology; that is well suited for the next generation of ice navigators, so this is what we have to do to bring young people back into this industry, and this kind of technology will be very helpful. We have a real challenge in disseminating this type of technology quickly to the next generation of ice navigators, because when we look at the number of ships that are planned to be working in the Artic region, other than Canada, Russia, Norway and the other Artic countries that are tagging numbers, we will need to be able to transfer this knowledge to the new sailors, so seeing that this type of technology is available is very encouraging.

Panelist 3: Shipping in the Canadian Arctic: The Challenges and Opportunities, Training to Reduce Risk. *Michel Labrie, District Principal Surveyor, American Bureau of Shipping (ABS) Eastern Canada.*
Thank you Marcel and good aftemoon everyone. It has been a fascinating day which has confirmed that it is a case of when, not if, a substantial amount of maritime traffic will take place in the world's Artic regions. Many of the risks associated with Artic shipping have already been raised. As we hear towards the close of the meeting, I will also focus on risk; specifically the risks associated with the human element and how training should be used to minimize those risks.

No one here needs reminding of the importance of the human element to the safe operation of ships in every part of the world's oceans. In the Artic those risks are magnified. *"A failure on the part of the vessel owner to properly train the crew, to properly outfit the ship and to establish very clear procedures relating to the vessel's navigation and operation can very quickly place the entire vessel and its crew in the gravest danger"*. I need to make one point clear at the outset, although I will be talking about the need for training, ABS does not provide training courses directed at preparing crews for Arctic service.
However, as a classification society, working with industry, we do establish standards that relate to an increasingly broad number of elements that impact the safety of a vessel. In reviewing the standards applicable to ice class vessels, it became clear to us that we needed to broaden the traditional focus on standards for the structure and machinery. Given the unique environment in which these ships operate, we felt that a more holistic approach would provide better guidance for owners and operators. As a consequence, we developed and issued the ABS Guide for Vessels Operating in Low Temperature Environments.

The importance of training: Crew considerations and training form an important part of this guide and I will be drawing on some those recommendations for my remarks here today. Let me start by posing some basic rhetorical questions: Why is training so important? Answer, because an untrained or poorly trained crew can quickly endanger themselves and the ship. Who should receive the training? Answer, everyone including the cook. What is meant by training? Answer, the training may not necessarily result in the issuance of a specific certificate, although certain flag administrations may require that for specified personnel. However, prior to entering Artic waters, every member of the crew should be given a clear understanding of the risks of operating in extreme cold and the protective and preventative measures available to them.

Training in extreme conditions: (emergency safety systems, Lifeboats and fire fighting, Survival procedures and Fire arms training). Every crew member should be fully cognizant of the relevant procedures that govern their activities. They should be not only aware of the special equipment that is on board the vessel but be fully trained in its use. It is also essential that the operation of the various emergency safety systems in extreme conditions is fully understood and practiced with effective drills. Consequently it does not matter how experienced the mariner is, lifeboats and firefighting equipment require different operation in extreme cold. Crew members should be trained by conducting these drills while wearing the full complement of cold weather survival gear so they can become familiar with how this protective clothing can affect their mobility and dexterity. This is a brief list and is not meant to cover all the items that should be covered in crew training. The essential element of any Artic training program is survival, not just how to put on a survival suit but what to do in extreme situations when emergency and survival procedures have left the mariners and the cook, effectively marooned in the most hostile environments. Since we are being practical, this should also include self defensive measures such as fire arms training as one of the risks that could be encountered is a hungry polar bear. The owner and master should have in place clear procedures to be followed when preparing to enter ice covered waters and that govern operations once in those waters.

Contingency planning for emergencies: IMO Guidelines specifically state that *"all ships operating in Arctic ice-covered waters should carry onboard at all times an operating and training manual for all ice navigators onboard the ship."* These IMO guidelines give an owner a basic overview of the type of content that each manual should cover. These manuals should also conform to the vessel's ISM procedures. Reference to the IMO Contingency Planning for Shipboard Emergencies may also be useful when preparing the documents. The operating manual should address and preferably provide check sheets for actions that should be taken prior to entering the ice-infested region.

Operating in extreme temperature: For example: draining piping, activating heating systems, positioning protective covers, sounding tanks and void spaces. These procedures should identify all the steps that are to be taken to prepare the vessel and prevent freezing damage. This may require draining piping, activating heating systems and positing protective covers, particularly with respect to the lifeboat launching controls, sheaves and release mechanisms. Once in the ice, hull integrity should be verified at frequent intervals by sounding tanks and void spaces, and water temperatures in tanks and systems should be subject to constant monitoring to give early warning of potential freeze-up problems.

The master should know a) the operational limitations for special equipment, b) physical limitations of the vessel and c) capabilities of vessel in ice conditions. It should be noted that once operating in extreme temperatures, many systems and components will be operating at or near their design limits. If not properly trained and supervised, crew members may also quickly be near their physical limits. In both cases, performances may degrade rapidly with a comparably rapid increase in the risks to personnel, equipment and the ship itself. While the view is that crews should be trained in cold weather protection and operations, the Master and officers on board the ship should undertake a great deal more specific training. They should be fully conversant with the operation of all the special equipment that may be either fitted or have been placed aboard for the voyage, including the manufacturer's recommendations of use, operational limitations, and maintenance and testing procedures as applicable. They should knowledgeable with respect to the physical characteristics and limitations of the vessel, its hull structure, its machinery and equipment. It is essential that the master is able to relate the ice conditions to the capabilities of the vessel, based on its ice class, powering and other features. The Master needs to be trained to interpret the various

types of information that will be available to him with regard to ice conditions. The information on the vessel's charts should be supplemented by downloadable imagery from satellites or aircraft based surveillance systems and up to date ice bulletins from the relevant authorities. The Master should also be trained to identify the different types of ice formations by direct visual observation. A combination of all this information should determine the optimum route to selected way points based on current and forecast ice conditions. The Master should be knowledgeable about the vessel's ice belt-exactly where and to what degree the hull has been strengthen, and ensure that the operating draft and trim do not expose weaker areas of the hull or appendages to ice impacts. In this respect the Master should also be able to recognize developing pressure events that could trap the vessel at an angle in which the weaker side structure could be subject to damage.

Particulars vary with ship: The particulars will vary with each ship. For example, a standard configuration will have considerable strengthening in the bow area, less on the sides and stern. However, a double acting vessel with an azimuth propulsion configuration is intended break ice moving astern and will have a strengthened stern area as a consequence. The Master needs to have an understanding of the reduced maneuvering characteristics of the vessel in ice. It may become almost impossible to alter course in a conventional fashion, particularly for most commercial vessels that have a long parallel mid-body and no side flare. The Master also needs to be aware of the recommended safe speeds for the relevant ice conditions to minimize the likelihood of incurring either structural or mechanical damage. Furthermore, the Master should know if the vessel is of sufficient hull strength and mechanical power to attempt ramming and if so, the speeds that should be used to prevent either breaching or stability problems. Other problems include the dangers to the propeller especially when going astern in broken ice. It is also particularly dangerous for propellers to hit ice when the shaft is stopped as it can exert very high bending moments on the blades.

Escort Maneuvering Protocols: The Master should be familiar with procedures for escorted operations, particularly in those instances in which a much wider vessel is tracking an icebreaker with a narrower beam. While being escorted, the Master should be trained in appropriate maneuvering protocols, particularly since his vessel will not be as nimble as the icebreaker. The Master needs to be aware that at any time the icebreaker could be stopped by an ice ridge and that large pieces of ice could be submerged below the icebreaker and resurface in a manner that risks damage to the bow or bottom structure of his vessel. The Master must also be completely familiar with the communication protocols between his own vessel, the icebreaker and any other vessels that may be in convoy.

Welfare of the crew: This includes the buddy system, decision verification procedures and allowable times for outside work. Crew members should be drilled on how to recognize the early onset of cold related injuries. Crewmembers should be one of the highest priorities of the Master when operating in an extreme low temperature environment. Once again it is of utmost importance that established procedures are closely followed. Human nature being what it is, there will always be one or two crew members who believe they are indestructible. The problem with these gung-ho individuals is that the cold can very quickly affect thinking and reasoning. A person is usually unable to recognize their own signs and symptoms of hypothermia. A "buddy" system should be strictly enforced to help detect the early signs of mental or physical degradation. Impaired cognitive performance will lead to poor decision making and increased risk of accident, so decision verification procedures should be followed. Allowable times for work outside, based on prevailing conditions should be strictly enforced. Crew members should be drilled on how to recognize the early onset of cold related injuries such as freezing tissue and be aware of the locations of

nearby warming areas. Crew members should be set reasonable tasks by their officers, who should take into account the fact that activities which require hand dexterity, strength and coordination will be adversely affected either directly by the cold or by the need to wear cumbersome protective gear. Navigating in the Artic; I have described in this presentation some of the issues to be addressed in a comprehensive training and education program. Crews and ships should have the training reinforced by extensive drills before entering the Arctic region and close monitoring of actual performance once the vessel is operating in these extreme temperatures. These are examples of how broadly an owner, the master and crew must prepare for such a voyage. Attention to detail is of the utmost importance as the margin for error is so much narrower under these extreme conditions than would be encountered on a balmy voyage in temperate climes. There is an old carpenter's adage that says 'measure twice; cut once". When considering Artic navigation it could be paraphrased as "train twice; survive". THANK YOU

Summary: Chair: So, high technology training solutions from Newfoundland, I want to say low technology, but it is not that because the DCD training facility is fantastic but quite frankly it is beams and hammers and keeping the water out, which I am sure can be very challenging. We also saw the challenges that crews can face working in the Artic regions and the knowledge, considerable knowledge they should possess to mitigate the risk to shipping. In Canada we are used to cold weather so when we consider taking in crews and increasing Artic navigation with crews from all over the world, we will have to consider additional requirements that warm climate crews who will start operating in cold environments will need, and how this will be accommodated with the many other aspects of seafarer training. Lastly we also have to think about the owners. It is one thing to provide the crews with training, but the owners also have responsibility and the onus to react, hopefully not, but they also have to have the contingencies in place if the possible undesirable event does occur.

Questions from the floor

Question 1: Floor: I was taken with great passion, the plea that the Coast Guard be given the sole armed vessel response in the Arctic and so I thought to myself, what would be the logic to drive this argument, and as I listened to the various presentations, I would just like, given your views is it something that the navy simply could not be trained or prepared sufficiently to operate in the Artic? I don't suggest taking over icebreaking or any of the Coast Guard roles, but is that the problem, is it just too difficult for the navy to do, based on the training that you guys have outlined?
2nd comment: Someone has just correctly pointed out that there are many other factors that could be argued about the navy not going to the north as the armed response, and my question was is it a training function that the navy could not get there, but what I am hearing is that training is not the problem.
Lt (N). Chris Richter: So on respect with the training Sir, basically my presentation dealt with the training that we do in the damage control unit. With respect to warships preparing for the Northern Newfoundland's, due to the fact that they are operating on their own for such a long time and with such endurance factored in, the damage control unit does training but with more detail, with focus on flood and pressure training, fire fighting training and carrying extra shoring onboard to carry out the training and improving their kits, Are they worried about that? I think they are preparing for the worst case scenario in that respect and ensuring that any risks gets mitigated and every angle covered.

Question 2: Dick Hodgson: Clear massage that is coming through is that there is a lot of time and effort invested in training crews for the north, in order for ships to be operated safely. What we have heard earlier is that a large percentage of operations will be foreign Flags. What is Canada's position or how is it going

to satisfy itself to the quality of the crew of the ships operating in the Canadian Arctic? I am not sure if this is a fair question three minutes to four?

Chair: I think this is a very significant question and I would like to throw this to the floor and invite a member from Transport Canada perhaps to respond. I think you are right, we will be probably loosing a bit of control over who will be operating in the Artic and how we will be responding.

Alan (Transport Canada): I think this is a very good question Dick, as you are probably already aware of the way in which the insurance companies are complaining bitterly about the way in which claims are going through the roof, probably because of the rapid expansion of shipping has led to a decrease in quality of personnel, people have been promoting to quickly, this sort of thing. Port state control attempt to address this issue, we look at the issue of STCW training, I realize that this begs the question of is the STCW itself adequate, I will leave that for another discussion. I think that allot of the problem is that ports that they control does not have an over the horizon capability. If you are talking about ships that are coming from Rotterdam to main Artic and then returning to Rotterdam as an example, how do you check the quality of the training and so on? The US Coast Guard has addressed this issue in some respect by having a twenty man attachment in Rotterdam and I believe they do the same in Singapore, so that ships coming to the US will be checked, pre-cleared if you will. But it is a huge problem, how do you get this over the horizon capability? It is expensive; you have to look at the expense of maintaining an attachment in these places when often times it will not be used. It is a huge problem and I hope that our leaders will get around to thinking about it, because it is not getting down to my level where I am.

Ivan The AWPPA requires an ice navigator on board, whether it is a foreign ship or not, an ice breaker navigator has got to be there. So it is up to northern and central to ensure that the proper person has ice training. Ross, Ivan is right; I just want to add that the ice navigator is described as someone that has had 30 days recent experience in ice navigation, but I would say that this is not adequate and that you would probably need to do some more research in that area.

Question 3: Floor: I did not hear from any of the three of you about training being given in how to abandon a ship in ice? And I have never done it and I hope I will never do, but it just strikes me that it is not a straight form of procedure and even the Explorer was not able to be abandoned, with its lifeboats in clear water, although it did later drift into ice before it sank. Do you see that it is something that the CMS and Damage Control Division should look into?

Capt. Christopher Hearn: We do have a proposal and a study on-going into that area, because this question is quite valid (Floor: remember the ferry that was going into Goose Bay was in ice and they did a very good job, there was no wind and it worked out fine). This is probably one of the worst case scenarios to try to abandon ship even in ice, and where we have gone with that is that we are developing a model, before we do training. For example, we have developed these simulations to simulate launching a lifeboat in various ice paths to gauge the response and the training needs and identify the issues as nobody wants to put a boat in the water to try it out, unless you have a boat dedicated to try and do that, so from a training perspective we have developed a simulation to virtually see what will happen and locate the issues involved with getting a boat into the water alongside the ship in ice. To further that and from an actual training position this would be more for Transport Canada I would say or the Flag ship, to decide about putting lifeboats in ice.

Floor: DNV said this morning that it was essential that lifeboats should be able to be launched manually so that they do not fall on ice and could be used as a shelter in that, so someone has covered that one.
Michel Labrie: Most of the requirements about safety comes from the IMO, come from the Flag states, and in Canada they have requirements to do with in identification of the location where the vessel will be, and as I was saying earlier and a lot of the people have been mentioning in the day, that allot of the vessels will be designed for specific operations. If we are talking about the Artic and we get stuck in an ice ridge, I am not sure if I am going to use the lifeboat. This ship might not be sinking if you are stuck in the ice, and you might end up with another problem.

They always say that the best way, chances of survival is to stay on board and fight it, but I think regarding the aspect and drills of abandoning ship and all that the only thing we really look at when we do the drill, and even then when we do a guest may come out in a small t-shirt, with lifejacket on and I had to tell them to go back in and put the winter gear on. It is not necessary up to the attending Transport Canada inspector or the Principle surveyor to tell people what to do, because they are supposed to be all trained and the officers are responsible for their crews. Also the owners are responsible to make sure that the vessel has the training component to operate in specific waters.

Floor: Two points, First, Transport Canada has to make sure that ships going into ice have done some consideration and preparation for going for cold environment water voyage and 2. Whether you make it mandatory and pass out this message and make sure it is answered, but the owner will not have a successful voyage if the crews are not prepared and you will have a disastrous voyage in all respects, but if the owner is dispatching the ship from Malaysia he may not know that, so I believe that it is fully up to us in Canada and the Transport Canada people and the coastguard people who are monitoring the ships that are going to the Artic to make sure that they monitor every ship, not just one or two and every voyage so that they know what is going on, and that is my view.

Chair: Thank you very much and I like that view. We will be wrapping up now, and further questions can be asked of the panel after this session. THANK YOU to the panel and the audience.
Panel 4: Arctic Seafarer Training: Rapporteur Liz Wilson

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