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Arctic Shipping Scenarios and Coastal State Challenges

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Abstract

The Arctic Council, an intergovernmental forum of the eight Arctic states, is currently embarked on a comprehensive assessment of Arctic marine activity in the 21st century – the Arctic Marine Shipping Assessment (AMSA). One of the challenges for the AMSA study team has been to identify the major uncertainties that will be central to shaping the future of Arctic marine use in 2020 and 2050. Using scenario planning, AMSA has identified two primary drivers and uncertainties: (A) Resources and trade; and, (B) Governance. Four scenario narratives have been developed with these two, key uncertainties as the framework elements. The main arguments focus on the fact the Arctic has experienced globalization early in the century and that the global maritime industry has already ventured into the Arctic Ocean. Marine access in the Arctic Ocean is also changing in unprecedented ways and the extraordinary transformation Arctic sea ice is undergoing – thinning, extent reduction, and a reduction in the area of multiyear ice in the central ocean – has significant implications for longer seasons of navigation. However, the high prices of global commodities such as oil, gas, and hard minerals (for example, copper, nickel and zinc) have generated high levels of demand for Arctic natural resources. The Arctic states are challenged by an overall lack of maritime infrastructure to adequately support current and future levels of Arctic marine operations; ports, communications, environmental monitoring, search & rescue, incident response, aids to navigation, and coastal charting, to name a few, require substantial and timely investment by the coastal states and marine operators. A second challenge is the ongoing development of an integrated system of rules and regulations governing Arctic navigation that will enhance marine safety and ensure marine environmental protection throughout the basin. These challenges will require historic levels of cooperation among the Arctic states and broad engagement with the many, non-Arctic stakeholders and actors within the global maritime industry.

Key words: Arctic Shipping, Sea Ice, Infrastructure, Climate Change, Scenarios, Future Challenges

1 Introduction

Marine use of the Arctic Ocean is expanding in unforeseen ways early in the 21st century. A transformation is underway where development of the natural wealth of the Arctic is taking centre stage. In addition, recent Arctic sea ice retreat under the influence

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of climate change is providing for increased marine access in all seasons throughout the Arctic basin and its coastal seas. In response to these factors, the Arctic Council, an intergovernmental forum of the eight Arctic states, decided to conduct a comprehensive assessment of current and future Arctic marine activity. The primary foci of the study, the Arctic Marine Shipping Assessment (AMSA), are on marine safety and marine environmental protection in keeping with the mandate (environmental protection and sustainable development) of the Arctic Council. AMSA takes a circumpolar view, but also considers many regional and local issues where the impacts of expanded marine use may be greatest. AMSA is seeking the views of the Arctic states, indigenous residents of the Arctic, and many non-Arctic stakeholders and actors within the global maritime industry.

AMSA is a follow-up to two Arctic Council initiatives: the Arctic Climate Impact Assessment (ACIA) and the Arctic Marine Strategic Plan (AMSP), both released by the Council in November 2004. ACIA documented the recent changes in the Arctic sea in cover – sea ice thinning, extent reduction, and a reduction in the area of multiyear ice in the central Arctic Ocean. In addition ACIA model simulations for the 21st century (using Global Climate Models) indicate increasing ice-free areas in all coastal Arctic seas, suggesting plausible increases in marine access and therefore longer seasons of navigation. AMSA will use the Arctic sea ice information from ACIA and the 4th Assessment of the Intergovernmental Panel on Climate Change as guides to what marine access might be in future decades. AMSP is a strategic guide that emphasizes ecosystems-based management of Arctic marine resources and coastal regions. A fundamental geographic construct – the Large Marine Ecosystem (LME) – is being used to describe the general environmental impacts of current and future marine activity in select regions of the Arctic Ocean.

2 Current Arctic Marine Use

A cursory look around the Arctic indicates increasing marine operations, particularly in the Barents, Kara, and Norwegian seas. Year-round navigation is maintained (since 1979) to the port of Dudinka, allowing marine traffic to flow from the Yenisey River in western Siberia to the port of Murmansk on the Kola Peninsula (See Figure 1). Using advanced icebreaking carriers, this Arctic marine transportation system services the industrial complex in Noril'sk, location of the world's largest nickel mine. An Arctic tanker shuttle system has been established to support a route from a new Russian terminal in Varandey in the Pechora Sea (the southeast corner of the Barents Sea) to Murmansk and direct to global markets. The first 70,000 dwt tanker for this service, *Vasily Dinkov*, has delivered its initial cargo to eastern Canada in June 2008; two additional icebreaking tankers for this operation are being completed in Korea. Two similar icebreaking tankers, under construction in St. Petersburg, will be used to ship oil from the Prirazlomnoye oil field in the northern Pechora Sea to a floating terminal in Murmansk. Again, year-round operations are envisioned in seasonally ice-covered waters, in this case to provide a continuous supply of oil to Murmansk for subsequent export by supertanker. From Arctic offshore Norway, gas produced from the Snohvit ('Snow White') complex was first shipped in October 2007 to Spain

by StatoilHydro from its liquefied natural gas (LNG) production plant in Melkoya (near the port of Hammerfast); the first cargo of Snohvit LNG arrived on the U.S. East Coast in February 2008. LNG tanker operations out of northern Norway to world markets are poised to increase during the next decade and Norwegian Arctic offshore production is forecast through 2035.

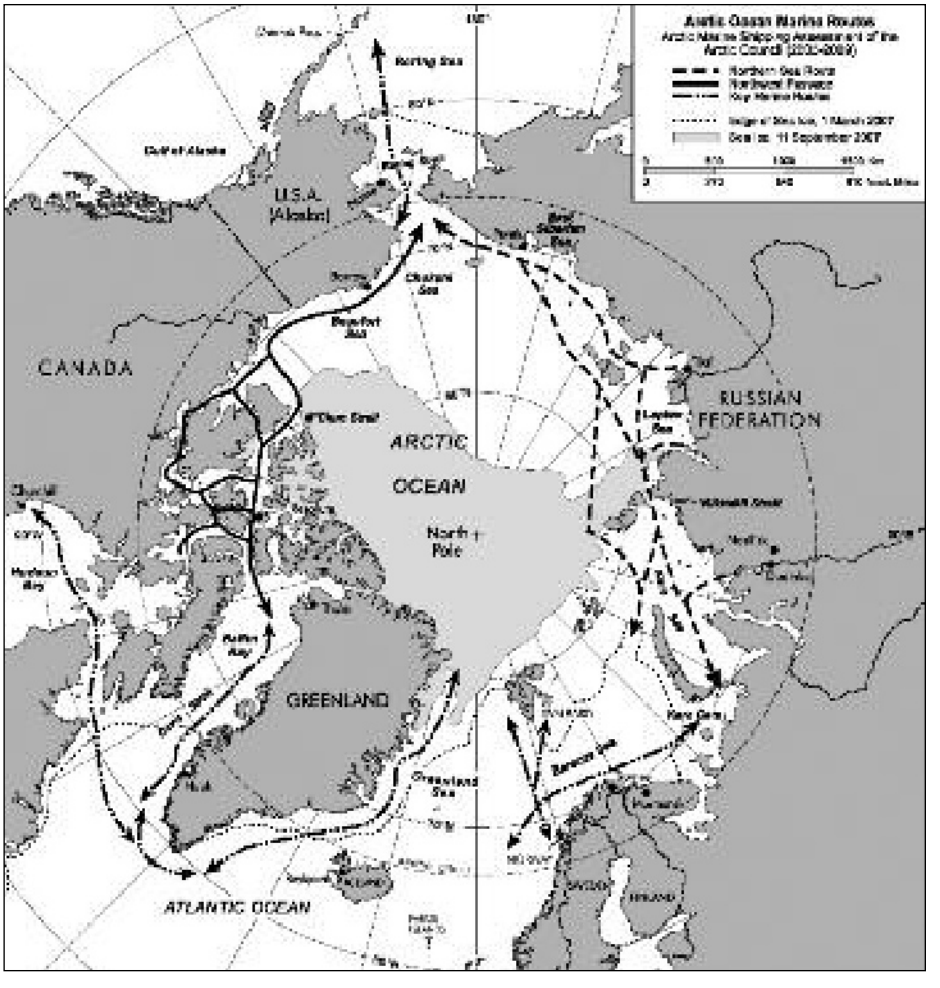

Figure 1. Map indicating key marine routes in the Arctic Ocean. Included are the multiple routes of the Northwest Passage through the Canadian Arctic and potential routes across the Russian maritime Arctic along the Northern Sea Route. Also shown is the summer, near-minimum extent of Arctic sea ice for 11 September 2007, and the winter sea ice edge for 1 March 2007.

During the summers of 2004 to 2007, a remarkable 28 icebreaker voyages to the North Pole were made for scientific research and tourism. Thus, marine access in *summer* to much of the central Arctic Ocean has been attained by polar icebreaker. Marine tourism around the coasts of Greenland has also increased from 27 voyages

in summer 2004 to an estimated 200 voyages of cruise ships conducted during the 2007 summer season. In northwest Alaska the world's largest zinc mine (Red Dog) continues to receive large bulk carriers during a short summer season in ice-free conditions; a longer navigation season is plausible given the recent retreat of Arctic sea ice in the Chukchi Sea. In early 2008 offshore lease sales conducted by the U.S. Minerals Management Service for the U.S. Arctic offshore totaled 2.7 billion U.S. dollars; Arctic offshore gas appears to be the resource under consideration for development. Increasing Arctic marine operations off Alaska in the Chukchi and Beaufort seas to support oil and gas exploration are envisioned for the next decade. Expanded marine scientific exploration in the central Arctic Ocean and in all Arctic coastal seas have been conducted early in the 21st century and continued research operations, some in winter, will become routine.

Marine operations in the Canadian Arctic have recently averaged 100 voyages by large ships in summer. Nearly all of the voyages are destinational from the Atlantic to support the summer sealift to Arctic communities; few of the voyages are full transits of the Northwest Passage (only 5 in 2004 by Canadian Coast Guard icebreakers, yachts and a Russian icebreaker on charter for tourism). Most operations along Russia's Northern Sea Route in the Eurasian Arctic have been confined to the western end of the Route, principally in the Kara Sea and along the marine transportation linkage between Dudinka and Murmansk. Voyages east of the Kara Sea into the Laptev, East Siberian, and Chukchi seas have generally been for summer support to coastal communities and for scientific expeditions. The near-term focus of Arctic marine transportation in the Russian Arctic is to support regional offshore oil and gas development in western Siberia, while continuing to maintain an effective and reliable system to facilitate the carriage of nickel and copper ore from Noril'sk Nickel to world markets.

3 Arctic Shipping Futures

During 2007 AMSA scenario creation workshops were held in San Francisco and Helsinki to create a framework for a set of scenarios, or plausible futures, for Arctic marine navigation to 2050. The workshops were facilitated by Global Business Network (GBN), a pioneer in the application and evolution of scenario thinking. The main purpose of these strategic conversations was to identify the major uncertainties that would be critical to shaping the future of Arctic marine activity to 2020 and 2050. The use of different stories of future marine activity can indicate how critical uncertainties might play out in ways that can challenge the Arctic states to make timely and effective decisions. The scenario narratives provide a rich source of material for strategic discussions about the future of marine safety and marine environmental protection among a diverse group of Arctic and non-Arctic stakeholders and decision makers.

3.1 Uncertainties

AMSA participants in the scenarios creation effort identified nearly 120 factors and forces that could shape the future of Arctic marine activity by 2050. Among those

factors deemed most important were: global trade dynamics and world trade patterns; climate change severity; global oil prices; the marine insurance industry; legal stability (governance) of marine use in the Arctic Ocean; the safety of other global trade routes (for example, the Suez and Panama canals); global (International Maritime Organization) agreements on Arctic ship construction rules and operational standards; a major Arctic shipping disaster; limited 'windows of operation' for Arctic shipping (the economics of seasonal vs. year-round Arctic operations); emergence of China, Japan and Korea as Arctic maritime nations; transit fees; conflicts between indigenous and commercial uses of Arctic waterways; new resource discoveries; an escalation of Arctic maritime disputes; a global shift to nuclear energy; and, socio-economic impacts of global weather changes. This list of critical factors clearly illustrates the great complexity and range of global connections surrounding future use of the Arctic Ocean.

3.2 Scenarios Framework

The AMSA scenarios work created six potential matrices for framing a set of scenarios. Pairs of critical factors or uncertainties were chosen and crossed to produce candidate frameworks:

- Indigenous Welfare *crossed with* Resource Exploitation
- New Resource Development *crossed with* Maritime Disasters
- Climate Change *crossed with* Level of Trade
- Indigenous People *crossed with* Rise of Asia
- Legal Regime *crossed with* Value of Natural Resources
- New Resource Development *crossed with* Legal Regime.

The strengths, weaknesses, and applicability to the Arctic of each of these matrices were discussed. Through brainstorming and plenary discussions, two primary drivers and key uncertainties were selected as the 'axes of uncertainty' for the final AMSA matrix – (A) Resource and Trade: the level of demand for Arctic natural resources and trade. This factor exposes the scenarios to a broad range of potential market developments, such as the rise of Asia or regional political instabilities, and (B) Governance: the degree of relative stability of rules for marine use both within the Arctic and internationally. Less stability implies shortfalls in transparency and a rules-based structure, and an atmosphere where actors and stakeholders tend to work on a unilateral basis; more stability implies a stable, efficiently operating system of legal and regulatory structures, and an atmosphere of international collaboration. The chosen axes met three key criteria: degree of plausibility, relevance to the Arctic and maritime affairs, and being at the right level or threshold of external factors.

The roles of global climate change and continued Arctic sea ice retreat are fully considered in the AMSA scenarios. Arctic sea ice retreat is assumed to provide opportunities for improved marine access and potentially longer seasons of navigation. However, for AMSA it is the globalization of the Arctic and development of natural resources that are the primary drivers for increased marine use in the region. Greater access facilitates that use, but economic drivers are considered paramount.

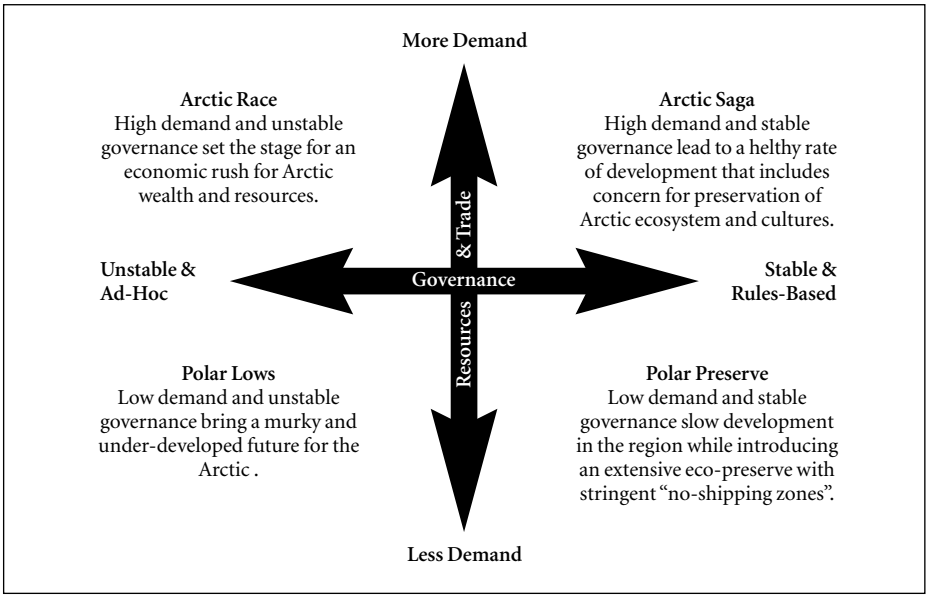

Figure 2. Scenarios framework for the Future of Arctic Marine Navigation in 2050. (Source: Arctic Marine Shipping Assessment)

Figure 2 illustrates the crossed uncertainties (Resources & Trade, and Governance) with four resulting scenarios central to the message of AMSA. The *Arctic Race* scenario might fit the current situation where high commodity prices and demand for Arctic natural resources have created an Arctic rush for wealth and resources. *This scenario implies an 'economic race' or rush for development, based in part on global markets, and not a 'geopolitical race' for sovereign rights or new territory*. This is a region where the international maritime community has moved into the Arctic Ocean for resource extraction and marine tourism at a time when there is lack of an integrated set of maritime rules and regulations, and insufficient infrastructure to support such a high level of marine activity. *Polar Lows* is a future of low demand for resources and unstable governance – a murky and undeveloped future for the Arctic. There is minimal marine traffic in the Arctic Ocean in this scenario and low attention is given to regulations and standards that remain weak and undeveloped. *Polar Preserve* is a future of low demand, but with a stable and developed governance of marine use. This also is a world where environmental concerns, with geopolitical and economic interests focused elsewhere, drive a movement toward a systematic preservation of the Arctic. In this scenario Arctic oil and gas reserves are disappointing, and there is strong public concern about climate change and conservation impacts on Arctic affairs. *Arctic Saga* is a future of high demand for resources and trade coupled with a stable governance of marine use. This world leads to a healthy rate of Arctic development that includes concern for the preservation of Arctic ecosystems and cultures, and shared economic and political interests of the Arctic states. There is improved marine infrastructure making marine transportation safer and more efficient, supporting systematic and safe development of oil, gas, and hard minerals.

4 AMSA Workshop on Arctic Marine Incidents

A key AMSA workshop was held 25–27 March 2008 at the Coastal Response Research Center of the University of New Hampshire on the U.S. east coast. Sixty maritime experts (from Canada, Denmark, Finland, Norway, Russia, South Africa, and USA) discussed the ramifications and challenges of five plausible Arctic marine incidents: (A) a grounded barge (with hazardous materials onboard) on St. Lawrence Island in the Bering Sea; (B) a cruise ship grounding and subsequent abandoning of the ship off the west coast of Greenland; (C) a tanker and fishing vessel collision near the disputed boundary between Norway and Russia in the Barents Sea; (D) an ore carrier sinking near the North Pole in international waters; and, (E) a collision and fire between a mobile drilling rig and support ships near the disputed boundary between Canada and the US in the Beaufort Sea. All of the plausible incident scenarios revealed a significant lack of adequate maritime infrastructure in the Arctic Ocean, particularly with regard to rescue and environmental response. Each of the incidents exposed a host of challenges and issues for the Arctic coastal states and the maritime industry. The nearly complete lack of salvage resources in the Arctic was one issue that quickly surfaced in the discussions. The following common outcomes were developed by the expert group:

- Mandatory IMO Arctic Ship Guidelines are necessary in the near-term.
- Places of refuge must be indentified throughout the Arctic basin and coastal seas.
- An international Arctic search and rescue (SAR) agreement is required with participation of the eight Arctic states.
- Enhanced environmental response is required in each of the Arctic's coastal seas.
- Mandatory improvements in Arctic communications and vessel routing are necessary.
- Expanded environmental monitoring is required and should be supported as a legacy of the International Polar Year.
- The Arctic states should host a summit with leaders of the international cruise ship industry to discuss shared concerns for marine safety issues in Arctic waters.
- Residents of Arctic communities should be made a part of all local response exercises.
- Needed are comprehensive environmental risk assessments for each Arctic coastal sea.
- Increased research and development is required to improve responses to oil spills in ice.

5 Arctic State Challenges

A significant challenge facing the Arctic states is to recognize the international nature of shipping and to effectively engage with a host of *non-Arctic* actors and stakeholders. Recognition of this global reach of the industry also includes a responsibility to work toward balancing historic navigation rights with regimes and mechanisms designed to enhance marine safety and to protect the Arctic marine environment. A major task will be for the Arctic states to work within the IMO to develop a set of mandatory or binding (vice voluntary) Arctic ship guidelines.

The continued retreat of Arctic sea ice will result in improving marine access throughout the Arctic basin. Complimenting this access will be new Arctic ship designs which will allow greater access and independent operations (no icebreaker convoys) during potentially longer seasons of navigation. Such extended marine operations will require two actions: (A) expanded SAR cooperation – perhaps with an international Arctic SAR agreement that would pool resources, and (B) expanded regional environmental response networks.

Information and data sharing will be key to the future of the maritime Arctic. Expanded surveillance and monitoring of marine operations, particularly in the central Arctic Ocean, will require agreements among the Arctic states for the rapid transfer of ship transit information. Improved monitoring of the environment will hopefully be realized by the establishment of the Arctic Observing Network, an activity of the International Polar Year. Potential designation of the central Arctic Ocean as a no discharge region or special area (Particularly Sensitive Sea Area) will provide unique challenges to the Arctic states and the global maritime community.

6 Conclusions

AMSA is a response by the Arctic states to three key issues: the ongoing globalization of the Arctic through natural resource development; arrival of the global maritime industry in the Arctic Ocean with the Arctic voyages of large tankers, cruise ships and bulk carriers; and, the increased marine access that is provided by the continuing retreat of Arctic sea ice. AMSA will be released by the Arctic Council to the Arctic and global maritime communities in April 2009. A host of recommendations and a robust research agenda will flow from the AMSA reports; timely action to many of the recommendations will be necessary. The Arctic states will continue to be challenged by a widespread lack of adequate maritime infrastructure to cope with current and future levels of Arctic marine operations. To enhance marine safety and environmental protection, the Arctic states, together with the IMO, must develop an integrated system of rules and regulations governing Arctic marine transportation. The Arctic states must continue to engage non-Arctic states and global institutions that will influence the future of Arctic marine operations. More cooperation in Arctic maritime affairs among the eight Arctic states will be imperative to address complex marine use issues in an uncertain future.