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Governance of Arctic Marine Shipping

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Law • Policy • Governance

Contents

List of Tables and Figures

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Acronyms

ABS	American Bureau of Shipping
AECO	Association of Arctic Expedition Cruise Operators
AFS	International Convention on the Control of Harmful Anti-Fouling Systems on Ships
AIRSS	Arctic Ice Regime Shipping System (Canada)
AIS	automatic identification system
AMAP	Arctic Monitoring and Assessment Programme (Arctic Council)
AMSA	Arctic Marine Shipping Assessment
ARCOP	Arctic Operational Platform
ASPPR	Arctic Shipping Pollution Prevention Regulations (Canada)
AWPPA	Arctic Waters Pollution Prevention Act (Canada)
BIMCO	Baltic and International Maritime Council
BWMP	ballast water management plan
CANUSNORTH	Canada-United States Joint Marine Pollution Contingency Plan – Beaufort Sea Geographic Annex
CASAR	Civil Aviation Search and Rescue (Canada)
CBD	Convention on Biological Diversity
CCG	Canadian Coast Guard
CHC	Canadian Hydraulics Centre
CSC	International Convention on Safe Containers
CLC	International Convention on Civil Liability for Oil Pollution Damage
CLCS	Commission on the Limits of the Continental Shelf
COLREGS	International Regulations for Preventing Collisions at Sea
COMSAR	Sub-Committee on Radiocommunications and Search and Rescue (IMO)
COPE	Compensation for Oil Pollution in European waters fund
DE	Sub-Committee on Ship Design and Equipment (IMO)
DFAIT	Department of Foreign Affairs and International Trade (Canada)
DFO	Department of Fisheries and Oceans (Canada)
DNV	Det Norske Veritas
EC	European Commission
EEZ	exclusive economic zone
EPPR	Emergency Prevention Preparedness and Response Working Group (Arctic Council)
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FAL	Facilitation Committee (IMO)
FPSO	floating production, storage and offloading unit
FSU	floating storage units
GMDSS	Global Maritime Distress and Safety System
HNS	hazardous and noxious substances
IACS	International Association of Classification Societies
IGC Code	International Gas Carrier Code
IHO	International Hydrographic Organization
ILO	International Labour Organization

IMDG Code	International Maritime Dangerous Goods Code
IMF	International Monetary Fund
IMO	International Maritime Organization
INSROP	International Northern Sea Route Programme
INTERTANKO	International Association of Independent Tanker Owners
IOPC Funds	International Oil Pollution Compensation Funds
ISM Code	International Safety Management Code for the Safe Operation of Ships and Pollution Prevention
ISPS Code	International Ship and Port Facilities Code
JANSROP-GIS	Japan Northern Sea Route-Geographic Information system
LC	Legal Committee (IMO)
LLMC	Convention on Limitation of Liability for Maritime Claims
LNG	liquefied natural gas
LOF	Lloyd's Open Form
LPG	liquefied petroleum gas
LSA	life saving appliance
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee (IMO)
METAREA	meteorological area
MLA	Marine Liability Act (Canada)
MLC	Maritime Labour Convention
MOU	memorandum of understanding
MPCF	Maritime Pollution Claims Fund (Canada)
MRCC	Marine Rescue Coordination Centre (Canada)
MSC	Maritime Safety Committee (IMO)
NAV	Sub-Committee on Safety of Navigation (IMO)
NAVAREA	navigational area
NORDREG	Arctic Canada Traffic Zone (vessel traffic reporting)
NRC	Natural Resources Canada
NRDA	Natural Resources Damage Assessment Regulations (United States)
OPA	Oil Pollution Act of 1990 (United States)
OPRC	International Convention on Oil Pollution Preparedness, Response and Co-Operation
OSLTF	Oil Spill Liability Trust Fund (United States)
P&I	protection and indemnity
PORCP	National Place of Refuge Contingency Plan (Canada)
PSSA	particularly sensitive sea area
REET	Regional Environmental Emergencies Team
RO	response organization
SAR	search and rescue
SDR	special drawing right
SOLAS	International Convention on Safety of Life at Sea
SOPEP	shipboard oil pollution emergency plans
SOPF	Ship-source Oil Pollution Fund (Canada)
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers

STOPIA	Small Tanker Oil Pollution Indemnification Agreement
STS	ship-to-ship
TBT	tributylin
TCC	Technical Cooperation Committee (IMO)
TOPIA	Tanker Oil Pollution Indemnification Agreement
TROOP	Guidelines for Transfer of Refined Oil and Oil Products in Arctic Waters (Arctic Council)
UNCLOS	United Nations Convention on the Law of the Sea
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
USCG	United States Coast Guard
VTS	vessel traffic services
WHO	World Health Organization
WMO	World Meteorological Organization
WWF	World Wildlife Fund for Nature International

INTRODUCTION

The governance of shipping activities in the Arctic might be described as a "complicated mosaic." The 1982 United Nations Convention on the Law of the Sea (UNCLOS), often referred to as the constitution of the oceans, sets out the overall legal framework for the regulation of shipping. The Convention sets out coastal state legislative and enforcement powers over foreign ships according to the maritime zones of jurisdiction laid out in the Convention. A fragmented array of international agreements attempts to address specific challenges raised by shipping such as marine pollution prevention standards, ship safety, seafarer rights and qualifications, and liability and compensation for spills (Appendix A). In addition, the threats raised to/by ships operating in ice-covered waters have led northern countries that border these waters, such as Canada and Russia, to adopt national legislation specifically for Arctic shipping (Appendix B).

The term "governance" highlights a further complexity in connection with the range of actors that affect shipping law, policy and practice in the Arctic. Governments and governmental officials are not the only actors with a role in shipping development and management roles (Rothwell & VanderZwaag 2006). Shipowners, cargo owners and insurers, among others, may be involved in determining when and where shipping in the Arctic should occur and under what conditions. Governance in shipping is characterized by efforts to promote harmonization and uniformity in international maritime law. The reason for the global approach to shipping governance is that by definition and function, shipping is essentially an international tool in the service of global trade.

The standards for global shipping are by and large adopted at the international level. The International Maritime Organization (IMO), a specialized agency in the United Nations system, promotes safety, environment protection, trade and security in international shipping. The IMO provides the machinery for the adoption of legal, technical and training standards for most types of ships through four major committees: Maritime Safety Committee (MSC), Marine Environment Protection Committee (MEPC), Legal Committee (LC), Technical Cooperation Committee (TCC) and, more recently, the Facilitation Committee (FAL). In particular, the MSC and MEPC have had occasion to consider Arctic shipping matters. Much of the technical work of the Committees is conducted through sub-committees and inter-sessional correspondence groups. Some of these bodies have or are currently considering issues that have direct application in the Arctic, such as the Sub-Committee on Radiocommunications and Search and Rescue (COMSAR) (which recently considered the establishment of new NAVAREAs, Navigational Areas within the World Wide Navigational Service, in the Arctic) and the Sub-Committee on Ship Design and Equipment (DE) (currently considering amendments to the Guidelines for Ships Operating in Arctic Ice-covered Waters) (see below).

Composed of national delegations or members, in effect it is IMO member states that establish these international standards. The IMO also acts as secretariat for most international maritime conventions and facilitates their implementation through the adoption of numerous codes and guidelines aimed at operationalizing international standards. However, international conventions and related protocols become binding only on those states that choose to become parties. States can still legislate the provisions of a convention or protocol without becoming a party.

Other intergovernmental organizations work closely with the IMO in the governance of international shipping (Table 1). For example, the International Labour Organization (ILO), established in 1919, has played a seminal role in the establishment of minimum basic standards

for seafarers' rights. The United Nations Conference on Trade and Development (UNCTAD), World Meteorological Organization (WMO), International Hydrographic Organization (IHO), and Food and Agricultural Organization of the United Nations (FAO), among others, have also collaborated with the IMO on shipping matters of common interest.

Table 1. Global intergovernmental shipping and related organizations

United Nations Secretariat, Division for Oceans Affairs and the Law of the Sea (DOALOS)
Food and Agriculture Organization of the United Nations (FAO)
Intergovernmental Oceanographic Commission (IOC)
International Hydrographic Organization (IHO)
International Labour Organization (ILO)
International Maritime Organization (IMO)
International Maritime Satellite Organization (INMARSAT)
International Telecommunications Satellite Organization (INTELSAT)
International Telecommunications Union (ITU)
Organization for Economic Cooperation and Development (OECD), Maritime Transport Committee
United Nations Environment Programme (UNEP)
United Nations Conference on Trade and Development (UNCTAD)
World Customs Organization (WCO)
World Meteorological Organization (WMO)

However, law-making and standard-setting in shipping are not the exclusive realm of international diplomacy and maritime administration. A broad range of international industry, labour and environmental non-governmental organizations (NGOs) play a critical role in building the knowledge base necessary for the adoption of rules and standards. Industry is broadly represented by organizations acting on behalf of shipowners, tanker owners, cargo owners, insurers, salvors, port and harbour authorities, among others (Table 2). Industry provides a pipeline to technical knowledge, management know-how and practical experience. Frequently, an international standard first emerges or is updated in new industry practices before being embraced in a proposal of a national delegation in an IMO committee. Worker or seafarer interests are similarly represented by trade and labour union associations. Several international non-governmental interests advocate the protection, preservation and conservation of the marine environment. NGOs often have accredited or observer representation in international shipping fora. In turn, these organizations receive regular and substantial inputs from their constituents, frequently consisting of another layer of member organizations.

Table 2. Examples of international non-governmental shipping and related organizations

Baltic and International Maritime Council (BIMCO)
International Association of Classification Societies (IACS)
International Association of Marine Insurers (IUMI)
International Association of Dry Cargo Shipowners (INTERCARGO)
International Association of Independent Tanker Owners (INTERTANKO)
International Association of Lighthouse Authorities (IALA)
International Association of Ports and Harbours (IAPH)
International Association of Producers of Insurance and Reinsurance
International Cargo Handling Co-Ordination Association (ICHCA)
International Chamber of Shipping (ICS)
International Federation of Shipmasters' Associations (IFSMA)
International Federation of Freight Forwarders Association (FIATA)
International Group of Protection and Indemnity Associations
International Maritime Bureau (IMB)(a specialized division of the International Chamber of Commerce)
International Maritime Committee (CMI)
International Maritime Industries Forum (IMIF)
International Organization for Standardization (ISO)
International Salvage Union (ISU)
International Shipowners Association (INSA)
International Shipping Federation (ISF)
International Support Vessel Owners' Associations (ISOA)
The International Tanker Owners' Pollution Federation Ltd. (ITOPF)
International Transport Workers' Federation (ITF)
The Mission to Seafarers
Oil Companies International Marine Forum (OCIMF)
Society of International Gas Tanker and Terminal Operators (SIGTTO)
Society of Naval Architects and Marine Engineers (SNAME)

An explanation of the governance of shipping would not be complete without noting the critical role played by standard form contracting and related "good practices" developed by industry, which are not necessarily within the framework of formal conventions. These standard forms have been recognized and applied by courts around the world. Thus the governance of international shipping, and especially standard setting, is much more diffuse than may be the case with other ocean uses. Therefore the governance of international shipping in the Arctic can be expected to occur at various international levels and with the participation of multiple layers of actors, in addition to any initiatives that may be undertaken by the Arctic Council and coastal states of the region.

This technical report provides a four part overview of governance of shipping in the Arctic. International shipping conventions consist of instruments that provide (1) a legal framework for inter-state rights and obligations (international public maritime law conventions), and (2) a framework for the conduct of maritime transactions between private actors on selected topics (international private maritime law conventions). This overview is conducted according to

these two major divisions. First, the role of international conventions and other instruments relevant to Arctic shipping is described through a look at UNCLOS (Part I), maritime safety and seafaring conventions, and maritime environmental protection agreements (Part II). Part III sets out the international private maritime law framework, including carriage of goods by sea rules, insurance, salvage, and liability and compensation agreements. In Part IV, a further survey of the national experiences of Canada and Russia in regulating shipping in the Arctic is undertaken as they are the two Arctic states that have adopted more stringent regulations than generally applicable international standards. The chapter concludes with a list of key findings and further research needs and priorities.

PART I: INTERNATIONAL LAW OF THE SEA FRAMEWORK

UNCLOS: The Overarching Legal Framework

The tension between coastal states and flag states has a long history. Flag states have sought to maximize various freedoms of their flagged vessels, including freedom of navigation, while coastal states have sought to maximize control over foreign vessels for security, fishing rights, pollution prevention and other activities (Sebenius, 1984). The following discussion describes the complex web of jurisdictional entitlements and limitations set out in UNCLOS for the three categories of states concerned with shipping: coastal, flag and port (Vidas & Østreng, 1999).

Coastal State Jurisdiction and Control

The extent of coastal state legislative and enforcement control over foreign ships varies according to the maritime zones set out in the Convention. Those zones include internal waters, the territorial sea, the contiguous zone, the exclusive economic zone and an extended continental shelf where a country's continental margin extends beyond 200 nautical miles from the territorial sea baselines. Coastal states bordering straits used for international navigation are substantially restricted in controls that may be imposed over foreign transiting ships. Coastal states may also exert greater control over foreign ships operating in ice-covered waters.

In UNCLOS, the determination of the seaward limits of these zones and jurisdictions is based primarily on distance from a combination of the low-water marks along the coast, straight baselines and closing lines for bays (Arts. 3, 5, 7, 10, 57 and 76). With the exception of the United States, the Arctic states have proclaimed straight baselines along most or all of their Arctic coasts (Scovazzi, 2001, 69–84).

Internal Waters

Coastal states are granted full sovereignty and maximum jurisdiction over ships choosing to enter internal waters. The only limitations are where the establishment of a straight baseline has the effect of enclosing as internal waters areas which had not previously been considered as such,

in which case UNCLOS recognizes a right of innocent passage in those waters (Art. 8), and where there is a historic regime of shared sovereignty over an area (Gulf of Fonseca Case, 1990/1992), both exceptional situations which preserve rights of passage. Sovereignty entitles coastal states to exercise far reaching power over their internal waters. In these waters, coastal states might prohibit entry of certain "risky ships", such as substandard ships and those carrying radioactive wastes or other hazardous cargoes, or they might impose "zero discharge" limits on particular ship-source pollutants. The only likely constraint on the exercise of this power is the traditional customary duty to grant refuge in sheltered waters to a ship in need of assistance, which has seen some change recently, and for which the IMO has adopted guidelines to assist decision-making, as will be seen below (Chircop & Linden, 2006).

In addition to coastal ports and harbours, UNCLOS allows various waters to be designated as internal. For example, where a bay has natural entrance points not exceeding 24 nautical miles, a closing line may be drawn between the two low-water marks and the waters enclosed become internal (Art. 10(4)). Historic waters and bays, which are exempt from the rules for bays in the Convention, are also subject to the internal waters regime (Art. 10(6)). A coastal state may also choose to draw straight baselines around a deeply indented coastline or where there is a fringe of islands in the immediate vicinity of the coast. Waters enclosed would be internal (Art. 7).

Exactly which Arctic waters may be claimed validly as internal has been contentious (Kraska, 2007). For example, Canada enclosed its Arctic archipelago with straight baselines, effective January 1, 1986, but the United States and other states protested against the internal waters status claim (Franckx, 1993c, 103). The exercise of exclusive authority for a long period of time and acquiescence by foreign states are two considerations in justifying historic waters claims (Brubaker, 2005, 34).

Territorial Sea

Within the limit of the 12-nautical miles that may be claimed for the territorial sea, normally measured from baselines permitted by UNCLOS, coastal states have full sovereignty, but jurisdiction over foreign ships is substantially curtailed by the right of foreign ships to innocent passage. UNCLOS provides that passage is innocent "so long as it is not prejudicial to the peace, good order or security of the coastal state" (Art. 19 (2a)). Article 19 lists activities by foreign ships in the territorial sea that would be considered non-innocent, e.g., undertaking research or surveys, fishing, and any act of wilful or serious pollution.

UNCLOS limits coastal states' authority to adopt laws and regulations applicable to foreign ships transiting through the territorial sea. Domestic laws can be applied in relation to, *inter alia*, safety of navigation, preservation of the marine environment, and marine pollution control (Art. 21 (1)), but Article 21(2) prohibits coastal states from imposing design, construction, crewing or equipment standards on foreign ships unless giving effect to generally accepted international rules or standards. Article 22 allows coastal states, having regard to the safety of navigation, to designate sea lanes and traffic separation schemes for foreign ships, particularly tankers, nuclear-powered ships and others carrying hazardous cargoes. However, the coastal state must take account of recommendations of the IMO and any channels customarily used for international navigation. As long as it does so without discrimination, the coastal State may suspend temporarily innocent passage of foreign ships in specified areas of its territorial sea

when this is essential for the protection of its security (Art. 25(3)). Coastal states may only levy charges upon foreign ships passing through the territorial sea for specific services rendered (Art. 26).

There is ongoing tension between coastal states wishing to maximize marine environmental protection in the territorial sea and flag states wanting to maximize freedom of navigation. For example, differences of opinion continue over whether a coastal state may require prior notice and authorization as a precondition before allowing a foreign ship carrying hazardous wastes to transit the territorial sea (Agyebeng, 2006, 394–395). Whether a coastal state may impose more stringent pollution discharge standards on foreign ships operating in the territorial sea than set out in the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) has also been a point of contention (Molenaar, 1998, 201).

Five Arctic coastal states, Canada, Iceland, Norway, Russian Federation, and the United States, have each claimed territorial sea limits to a maximum of 12 nautical miles; Denmark (Greenland) has claimed 3 nautical miles.

Contiguous Zone

In a 12-nautical mile contiguous zone adjacent to the territorial sea (i.e., up to a seaward limit of 24 nautical miles), coastal states are granted jurisdiction over foreign ships to prevent infringement and to enforce violations of customs, fiscal, immigration or sanitary laws and regulations committed in its territory or territorial sea (UNCLOS, 1982, Art. 33). This power might be used by a coastal state to justify boarding and inspecting a foreign ship suspected of carrying illegal immigrants.

Exclusive Economic Zone

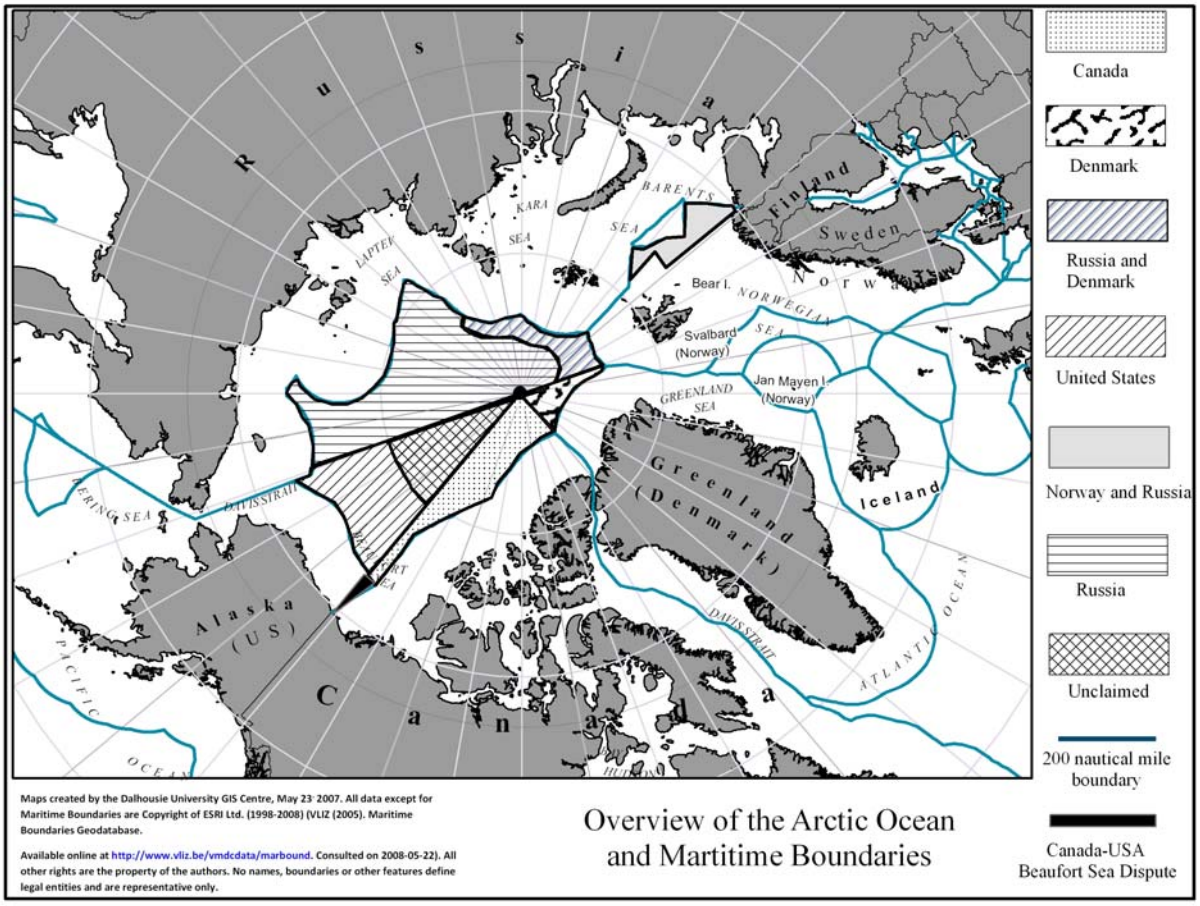
In a 200-nautical mile exclusive economic zone (EEZ), measured from the territorial sea baselines, coastal states may only adopt pollution prevention and control laws applicable to foreign ships if in conformity with generally accepted international rules and standards established through the IMO (UNCLOS, 1982, Art. 211(5)). UNCLOS does allow coastal states to propose special discharge standards or navigational practices applicable to foreign ships in the EEZ because of special ecological and traffic conditions. However, this requires IMO review and approval (Art. 211(6)).

A coastal state has limited enforcement powers in the EEZ against foreign ships violating applicable international rules and standards for preventing and controlling pollution. A coastal state may only undertake physical inspection of a foreign ship where a violation has resulted in a substantial discharge causing or threatening significant pollution of the marine environment (Art. 220(5)). Actual arrest and detention of a foreign ship is only allowed if a violation causes major damage or a threat of major damage to the coastline, interests or resources of the coastal state (Art. 220(6)). In such a case, the coastal state may only impose monetary penalties (Art. 230(1)).

The six states (Canada, Denmark, Iceland, Norway, the Russian Federation and the United States) claim 200-nautical mile EEZs in Arctic waters. However, Norway claims a 200-nautical mile extended fisheries protection zone around Jan Mayen and a 200-nautical mile fisheries protection zone around Svalbard. Figure 1 sets out the 200-nautical mile claims in the

Arctic Ocean. Inherent in the 200-nautical mile zone claims made by the littoral states of the Arctic Basin (Canada, Denmark (Greenland), Norway, the Russian Federation and the United States) is the dismissal of the so-called sector theory as a basis to claim offshore jurisdiction (Churchill, 2001, 121–123). As opined by a leading law of the sea scholar, the sector theory cannot serve as a root of title for the acquisition of sovereignty, particularly not to marine areas (Pharand, 1988, 79).

Figure 1. Overview map of the Arctic Ocean and maritime boundaries



Note: The disputed area between Canada and Denmark (Greenland) in the Lincoln Sea is not shown on this map due to its small area (see Appendix C).

Continental Shelf

Under Article 77(1) of UNCLOS, as well as customary international law, coastal states "exercise over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources." There are three critical elements to this jurisdictional

entitlement: the legal definition of the "continental shelf", the characterization of "natural resources", and the scope of "sovereign rights".

The legal continental shelf comprises the seabed and subsoil of the submarine areas beyond the territorial sea of the coastal state, to the outer edge of the continental margin, or to at least 200 nautical miles from the coastal baselines, where the continental margin does not extend to 200 nautical miles (Art. 76(1)) (Appendix C). The definition of the outer limits of the continental shelf may extend significant distances *beyond* the 200-nautical mile limit of the EEZ. The sovereign rights of the coastal state over these areas are exclusive and do not require any use or occupation, or even any express legal declaration (Art. 77(2) & (3)), although the finalization of the precise outer limits is subject to a process mandated under UNCLOS. Article 76(2) and (4–6) set out the criteria for determining the outer edge of the continental margin beyond 200 nautical miles.

Annex II of UNCLOS established the Commission on the Limits of the Continental Shelf (CLCS), comprised of 21 technical experts elected by state parties, to consider data and information submitted by coastal states on their outer limit claims and to make recommendations on the claim. Where the coastal state establishes the outer limits in accordance with the recommendations of the CLCS, these limits shall be "final and binding" for parties to the Convention. Coastal states are required to make their submissions within a prescribed timeframe upon ratifying UNCLOS, and two Arctic states have already made submissions dealing with parts of the Arctic region (Table 3) (Russian Federation, 2006b; Norway, 2006). Both the Russian and Norwegian submissions include potential overlaps with claims of other Arctic states (Appendix C; Figure 1). The CLCS does not engage in delimitation or resolution of such conflicting and overlapping claims.

Table 3. National submissions to the CLCS for the Arctic Ocean

Arctic Ocean State	**Date of UNCLOS Ratification**	**Deadline for Submission/ Date Submitted**
Canada	7 November 2003	7 December 2013
Denmark (Greenland)	16 November 2004	16 December 2014
Norway	24 June 1996	27 November 2006
Russian Federation	12 March 1997	20 December 2001
United States	Not a party	--

The natural resources encompassed by the continental shelf regime include "mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species…" (UNCLOS, 1982, Art. 77(4)). Sedentary species are those which organisms which, "at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil" (UNCLOS, 1982, Art. 77(4)). Article 77(1) refers to sovereign rights "for the purpose of exploring and exploiting" the natural resources of the shelf. The term "sovereign rights" indicates a level of legal entitlement which is greater than mere jurisdiction, but clearly less than the full sovereignty involved in a territorial claim. As a result, coastal state claims to an extended continental shelf will affect only those powers and functions expressly set out in the Convention. Also, Article 82 of UNCLOS

imposes a limit on the entitlement to the benefits of natural resources beyond 200 nautical miles in some cases, imposing a graduated scheme of payments or contributions in kind based on percentages of the "value or volume" of production. The payments are to be made via the International Seabed Authority, and distributed on an equitable basis among states party to the Convention.

The legal regime of the continental shelf does permit some limited interference with navigational rights, incidental to the regulation and control of seabed activities, presumably for safety or related purposes. Article 60 details these rights with respect to navigational and other impacts resulting from artificial islands, installations and structures. Article 60(4) and (5) provides, *inter alia*, for the creation of safety zones around such facilities, up to a maximum of 500 metres, and prohibits the establishment of artificial islands, installations and structures "where interference may be caused to the use of recognized sea lanes essential to international navigation" (Art. 60(7)). Article 79 addresses the issue of submarine cables and pipelines, and preserves the rights of other states to lay cables and pipelines on the continental shelf, subject to "reasonable measures" taken by the coastal state with respect to seabed activities and the prevention of pollution from pipelines. The delineation of routes for pipelines and cables is subject to the consent of the coastal state.

Straits Used for International Navigation

Coastal states bordering a strait used for international navigation retain very limited powers over foreign shipping between one part of the high seas or an EEZ and another part of the high seas or EEZ because of their right to transit passage. States bordering straits cannot suspend passage and may only adopt ship-source pollution laws applicable to foreign ships if in accord with international standards (UNCLOS, 1982, Arts. 42 & 45). Sea lanes and traffic separation schemes may be designated, but only with IMO approval (Art. 41). A ship exercising transit passage may do so in its "normal mode", a phrase taken to mean that a submarine may remain submerged, whereas in innocent passage it must navigate on the surface and show its flag.

The application of the international straits regime in the Arctic has been subject to controversy. For example, Canada and the United States have disagreed over the status of the Northwest Passage. While UNCLOS recognizes transit passage rights in straits used for international navigation between one part of the high seas or an EEZ and another part of the high seas or an EEZ, the Convention does not spell out the required degree of use for international navigation to transform an area into a strait (Pharand, 1984, 91). If straight baselines in accordance with Article 7 of the Convention are used to enclose areas of a strait, a right of innocent passage may continue to exist where the waters had not previously been considered internal (Art. 8).

Article 234

Of particular interest to Arctic coastal states is Article 234 of UNCLOS, which recognizes their right to adopt and enforce special pollution prevention and control laws in ice-covered areas, which has no analogous provision for any other marine region:

> Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of the ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance. Such laws and regulations shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence.

During the Third United Nations Conference on the Law of the Sea, this article was negotiated primarily between Canada, the Russian Federation (USSR at the time) and the United States with the purpose of providing for the adoption of higher international standards than permitted elsewhere in the Convention (Nordquist, et al., 1991, 396). Clearly, the text of the article sets out criteria for the exercise of this significant power. However, the lack of reference to the competent international organization, i.e., the IMO, is particularly noticeable considering that elsewhere in the Convention the coastal state is expected to consult other states and act through the competent international organization, for example in relation to special mandatory measures for special areas in the EEZ (Chircop, 2007, 200-201).

Article 234 raises various questions of interpretation. What is required to meet the litmus of "ice covering such areas for most of the year"? For example, will even partial ice cover suffice if there is an exceptional hazard to navigation? What is the significance of giving special coastal state powers only in the EEZ? Some writers have suggested the EEZ limitation implies that coastal states are given no greater powers than applicable to the territorial sea (McRae & Goundrey, 1982), while others have supported a bestowing of much broader powers, in particular the right to unilaterally adopt special ship construction, crewing and equipment requirements (Pharand, 2007, 47). Application of Article 234 to international straits used for navigation may also be questioned. Since UNCLOS does not exempt straits from the application of Article 234, questions of interpretation may again rise over the geographical scope of coverage and the breadth of coastal state regulatory powers.

Flag State Control

Maritime states, or flag states, have a significant role to play in the governance of shipping in the Arctic. UNCLOS bestows a central role for states to control ships flying their flag, with each state allowed to fix conditions for granting its nationality to ships so long as there exists a "genuine link" (Art. 91). Ships are allowed to sail under the flag of one state only (Art. 92). The flag state's domestic laws dealing with technical, administrative, social and other matters, for example, criminal law, would apply to those aboard its ships. A flag state is also responsible for taking measures to ensure that its ships conform to generally accepted international rules and standards in relation to safety of life at sea, including ship construction, equipment and seaworthiness, manning, labour conditions and seafarer training, use of signals, and communications to prevent collisions. Seafarers are required to observe the applicable international regulations concerning safety at sea, the prevention of collisions, the prevention, reduction and control of marine pollution, and maintenance of radio communications (Art. 94).

Flag states are required to provide for effective enforcement of international rules/standards irrespective of where a violation occurs (Art. 217(11)).

The flag state is granted *exclusive* jurisdiction over its ships on the high seas with the only exceptions being where UNCLOS itself or other international agreements provide otherwise (Art. 92(1)). An example of an exception is where states agree to mutual boarding and inspection schemes on the high seas through a regional fisheries management organization.

A state's warships and other ships used only on government non-commercial service enjoy sovereign immunity (Art. 236). In other words, the UNCLOS provisions on the protection and preservation of the marine environment, including Article 234, do not apply to these vessels. Although such ships may not be subject to investigation or prosecution by other states for marine pollution violations, each state is required to ensure that its ships comply as far as practicable with international standards.

Port State Control

Under general international law, the port state has the authority to impose conditions for the entry of foreign ships into its ports. When foreign ships are voluntarily in the port of another state, that state has broad inspection and enforcement powers (White, 2007, 27). A port state may choose to investigate and prosecute foreign ships for pollution violations not only in the port and internal waters but also in the territorial sea, the EEZ and even on the high seas (UNCLOS, 1982, Arts. 218(1), 220(1)). A port state is obligated to comply with requests from other states for investigation of illegal discharge violations (Art. 218(3)). If a port state determines that a foreign ship is unseaworthy and threatens marine environmental damage, it may prevent the ship from sailing (Art. 219). In addition to the provisions of UNCLOS, a global regime of agreements and conventions establishes international standards in relation to ships visiting coastal state ports.

Although bearing the same title and having some overlap, there are differences between port state control under UNCLOS and the regional memoranda of understanding (MOUs) on port state control and port state control under MARPOL 73/78 and the International Convention on Safety of Life at Sea, 1974 (SOLAS). MOU-based port state control consists of agreements between maritime authorities (not states) in particular geographical regions for the purpose of spot-check inspection of ships visiting their ports. The inspections are for ensuring compliance with international instruments concerning ship safety, labour, training and pollution prevention standards set out in the MOU and the inspection data is centralized in databases to which member authorities have access, and which are used to track the compliance of a particular ship and the record of violations by flag. Port state control in SOLAS and MARPOL 73/78, both of which are enforced through regional MOUs, is a compliance control mechanism to enable those conventions to be enforced effectively. These issues are discussed more fully below.

Maritime Boundaries in the Arctic

Lack of clearly delimited maritime boundaries in the Arctic for territorial seas and EEZs is of potential concern for future shipping in three main ways. Ship operators may face uncertainty over which national shipping laws are applicable in a disputed zone. In case of a ship-source spill and damage within a disputed area, which state could make compensation

claims could also be contentious. Unresolved ocean boundaries may also delay offshore exploration and development, such as for oil and gas, and for which shipping provides a supportive role.

There are eight bilateral agreements between Arctic states delimiting maritime zone and continental shelf boundaries (see Appendix C; Figure 1). Some Arctic states still have maritime boundary disputes and they include Canada and the United States in the Beaufort Sea, Canada and Denmark (Greenland) in the Lincoln Sea, and Norway and the Russian Federation in the Barents Sea (Appendix C; Figure 1) (Brubaker, 2002). In addition the five Arctic Ocean coastal states, Canada, Denmark (Greenland), Norway, the Russian Federation and the United States, have potential overlapping claims to the continental shelf beyond 200 nautical miles (Appendix C; Figure 1).

High Seas and the International Seabed Area

If transpolar shipping develops across the high seas of the Arctic, at least two main governance issues would arise. Since Article 234 and corresponding special coastal state control powers over foreign shipping would not apply to high seas areas beyond national 200 nautical mile zones, transiting ships would only be subject to global shipping safety, security and environmental rules and standards. Thus one issue is the adequacy of international shipping standards for Arctic conditions. To increase marine environmental protection, Arctic states could consider working through IMO in various ways. For example, they might seek to have the Arctic high seas designated as a special area under MARPOL 73/78 in order to impose stricter than normal standards for oil and garbage management and discharge, as will be seen below. They could also seek to have IMO declare the Arctic high seas as a particularly sensitive sea area (PSSA) where further shipping control measures might apply, such as navigational routing and certain areas to be avoided (Koivurova & VanderZwaag, 2007). However, as will be seen below, Arctic states would need to demonstrate how a PSSA and proposed protective measures would provide protection of the marine environment from threats posed by international shipping.

A second issue is whether a regional approach towards shipping might be developed (Jensen, 2008). For example, Arctic states could seek to develop a common policy towards transpolar shipping and discuss ways to cooperate in ensuring "safe shipping" if it is to occur.

After the process of determining the seaward limits of extended continental shelves in the Arctic on the basis of recommendations from the CLCS, it is possible that there will be international seabed areas (the Area, i.e., beyond any national jurisdiction) that will be governed by Part XI of UNCLOS (Macnab, 2006). The Area and its resources are the common heritage of mankind and vested in mankind subject to a unique international licensing regime administered by the International Seabed Authority, an international organization established by UNCLOS in Jamaica (Art. 136). Although seabed mining in the Area is not considered commercially or technologically feasible for many more years, prospecting licences in international seabed areas in the Indian and Pacific Oceans have already been granted to large mining corporations. The Authority is empowered to adopt regulations to ensure the protection of the marine environment from mining activities (Art. 145) and has adopted Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area. Further regulations on prospecting and exploration for cobalt rich crusts and polymetallic sulphides are being drafted. UNCLOS provides for the accommodation of international shipping where the establishment of mining installations and

their safety zones might interfere with the use of recognized sea lanes essential to international navigation or lawful access to particular maritime zones (Art. 147).

Various governance options have been suggested in the recent literature for the area beyond national jurisdiction in the Arctic. They include establishment of a regional ocean management organization to facilitate integrated management of future uses, including navigation (Rayfuse, 2007) and a voluntary moratorium on new activities except for marine scientific research (Rayfuse, 2008).

PART II: INTERNATIONAL PUBLIC MARITIME LAW FRAMEWORK

Introduction

Ships operating in the Arctic environment are exposed to a number of unique risks besides the sea and glacial ice concentrations which pose a structural risk to ships. Poor weather conditions and the relative lack of up-to-date bathymetry on charts, communications systems and navigation aids are special hazards for mariners in the Arctic (Østreng, 1999). The remoteness of the areas makes rescue or pollution clean-up operations difficult and costly. Extreme cold temperatures may reduce the effectiveness of components ranging from deck machinery to emergency equipment. When ice is present it can impose additional loads on the hull, propulsion systems and appendages. Government ships in the Arctic region during the summer season may be available to assist ships in need of assistance, but in a grounding a salvage tug may be required, as well as pollution control and clean-up equipment. If the casualty is on fire, assistance from another ship may not be available, and crew and passengers, in the case of a tourist ship, may have to land on ice. There is an increased level of risk of marine casualty should the volume of ship traffic increase from the current low levels in ice-covered waters.

In addition to safe operations of ships in Arctic waters, ships' crews, unless they are regularly trading into the Arctic, will require special attention as it can be expected that they are generally unfamiliar with conditions in the region and the severe stresses these conditions impose on them. This lack of experience among commercial ships' officers has already been blamed for an increasing number of casualties and violations of the international collision regulations in sea areas other than the Arctic. Safe operation in such conditions requires specific attention to human factors, such as protective clothing, training and competence in operational procedures.

It can be expected that the international conventions establishing safety and environmental rules and standards for international shipping, which have been mostly developed with different operational conditions in mind, may have to be re-visited as international shipping in the Arctic increases. In addition to international standards for ships and seafarers, the regulation of marine safety in polar environments is also a right and responsibility of Arctic states. As noted earlier, UNCLOS empowers states with coastal frontage in ice-covered areas to adopt safety and environmental standards for shipping in their EEZs (Art. 234).

Maritime Safety and Seafaring Rules and Standards

The sinking of the *Titanic* after striking an iceberg in the northwest Atlantic serves as reminder of the particular dangers faced by ships navigating in waters where ice is present. Periodic reformulations and regular amendments have culminated in the current SOLAS 1974 regime. For the most part, international safety standards for shipping are formulated in the rules, codes and procedures adopted within the framework of SOLAS (Appendix D). There are also other conventions that set out safety standards and practices, including the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS), the International Convention on Load Lines, 1966 (Load Lines Convention), the International Convention on Safe Containers, 1972 (CSC), the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW), and the International Convention on Maritime Search and Rescue, 1979 (SAR Convention) (Appendix D). Additional non-mandatory codes and guidelines adopted under these instruments set out good practices (Boisson, 1999).

Today SOLAS is more than an acronym, and has become a concept capturing all matters relating to international standards for safety and security at sea in all marine regions. SOLAS is regarded as the most important of all international treaties concerning merchant ships. The first SOLAS convention, drafted following the *Titanic* disaster of 1912, was adopted in 1914, a second version was adopted in 1929 and a third in 1948. The 1960 SOLAS Convention was the first major task for IMO, after its creation in 1958, and it was a considerable advance in modernizing regulations and in keeping pace with technical developments in the shipping industry. A completely new convention was adopted in 1974. This included all the amendments accepted to that date and a new amendment procedure designed to ensure that technical changes could be made within a specified period and without involving cumbersome diplomatic processes.

The main objective of the SOLAS convention is to specify minimum standards for the construction, machinery, equipment and operation of ships, compatible with their safety. Flag states are responsible for ensuring that ships under their flag comply with SOLAS requirements and a number of certificates are prescribed in the Convention as proof that this has been done. Control provisions also allow contracting states to inspect ships of other states if there are clear grounds for believing that a ship and its equipment do not comply with the Convention. This international inspection is known as port state control, discussed elsewhere in this report. Like other IMO conventions, SOLAS applies to ships engaged on international voyages.

The adoption of a convention, such as SOLAS, marks the conclusion of the first stage in a long process. Before the convention becomes binding upon states which have ratified it, individual contracting states must formally accept it into their national maritime regulatory regime. Entry into force of a convention is often a protracted procedure. As an example, SOLAS 1974 came into force following acceptance by 25 states whose combined merchant fleets represented not less than 65% of world tonnage. Other maritime conventions may require fewer states and less tonnage to come into force. Most IMO conventions enter into force within an average of five years following adoption. Appendix D outlines the status of ratifications of key conventions discussed in this report by Arctic states.

International standards are constantly under review at the IMO. As noted earlier, the IMO has a system of subsidiary bodies studying the substance of each convention in the light of rapidly developing technology and changes in the characteristics of many traditional ship types and equipment (e.g., life-saving and fire-fighting equipment standards) used in marine industrial

operations, including offshore oil and gas exploration and exploitation. Currently, amendments to the SOLAS Convention, STCW and many other conventions and codes, are being developed, promulgated and given dates for implementation. As international shipping increases in the Arctic, it may be necessary for the IMO and Arctic states to undertake studies and tests on such ships, equipment and techniques, which may result in further amendments to SOLAS and national maritime legislation.

Consideration will also need to be given to the safe carriage of the diverse cargoes expected on major international Arctic shipping routes. The carriage and care of dangerous goods in the marine transportation mode is regulated by the International Maritime Dangerous Goods (IMDG) Code, which is part of SOLAS, Chapter VII (IMO IMDG Code, 2006). It is given obligatory effect for both cargo owners and carriers by national legislation of the contracting parties to SOLAS. Chemicals covered by the IMDG Code may need to be reviewed for the purpose of identifying any chemicals which may have a dangerous reaction if exposed to prolonged extremely low temperatures during transportation in the Arctic.

The SOLAS Convention includes specifications for "passenger ships" and these are under constant review and amendment by IMO, to provide for the maximum degree of safety. At this time it does not appear that cruise ships have dedicated international construction requirements for polar operations. Cruise ships, which are not classed as ice-strengthened, may operate in the Arctic at certain times of the year and in areas of open water. Cargo ships and tankers have been doing this for many summers. The international cruise ship industry has initiated a Cruise Ship Safety Forum to develop design and construction criteria for new vessels and to consider other safety issues (Lloyd's Register, 2007). It would be expected that IACS and IMO will become involved in rule-making for such ships capable of operating in ice-covered waters.

In January 2008, IMO adopted Guidelines on Voyage Planning for Passenger Ships Operating in Remote Areas (IMO, 2008a). The Guidelines focus on maritime safety operational issues, including navigation in ice-covered waters and emergency contingency planning and call on passenger ships to refer to the Guidelines for Ships Operating in Arctic Ice-covered Waters (IMO Arctic Guidelines, 2002) for recommended construction provisions, equipment recommendations, and operational guidelines.

Carriage of liquefied natural gas (LNG) is covered by the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk Code (International Gas Carrier Code), adopted as a mandatory code under Chapter VII of SOLAS which covers carriage of dangerous goods (IMO IGC Code, 1993). The IGC Code establishes various construction and equipment standards, such as gas leak detection and alarm systems, for LNG carriers. The American Bureau of Shipping and the Russian Maritime Register of Shipping recently announced that they are jointly developing the classification rules for Arctic LNG carriers, building upon their experience in the transport of gas in Canada, the United States and the Russia Federation (ABS, 2008).

With regard to oil tanker construction, non-ice strengthened or lightly strengthened tankers have operated regularly in summer conditions with open water or ice-breaker assistance in areas of the Arctic. Interest in ice class tankers has been steadily rising as oil exports from Russia's northern regions have become increasingly viable. The ice class tanker fleet is expected to grow by 18 million dwt by 2008 (ABS, 2007). Construction standards, including requirements for double hull tankers under MARPOL 73/78 and national regulations, are governed by the

Arctic Guidelines. For the Arctic, regulatory authorities may require Polar Class vessels if they are to operate beyond the open water season.

The COLREGS do not contain specific rules for ships navigating in ice-covered waters. However, they cover a situation where a ship is constrained in its ability to manoeuvre due to size, draught or other reason (COLREGS, 1972). This could apply to a ship manoeuvring in ice and when unable to take action to avoid close quarters with another ship. In the future, if the Arctic shipping season is extended and there is more open water navigation attracting more ship traffic, COLREGS can be expected to assume more importance.

Navigation through ice places particular demands on a ship's structure, for example, when a ship rams ice and rides up on ice and when ice impacts on the hull. Polar Class ships' stability concerns are covered from the design stage, but existing ships may require special consideration. Also, navigation in the Arctic may pose a stability concern as ice, due to the freezing of rain, snow and sea spray, accumulates on a ship's superstructure. This may be prevented by a reduction in the ship's speed or an alteration of course. Wind velocity is also a factor in ice accretion. It is common practice for the crew to beat off the ice with wooden mallets and to take measures to reduce the additional top weight which may reduce a ship's positive stability. In Polar Class ships, the effect of icing is to be considered in the stability calculations provided by the builder.

A ship's speed is a vital factor when operating in ice as it affects the force of impact and consequent damage. There is a useful formula which shows that the force of impact with the ice may be calculated by multiplying the ship's speed squared by the ship's displacement in tons. It is particularly dangerous for a large vessel to proceed at excessive speed through ice-infested waters during reduced visibility or at night. According to the IMO Arctic Guidelines, all Polar Class ships should be fitted with at least two speed and distance measuring devices.

When a ship suffers ice damage it should be able to withstand a degree of flooding and still maintain positive stability as is required under the SOLAS Convention. All Polar Class ships should be able to withstand flooding resulting from hull penetration due to ice damage and should remain in a satisfactory condition of equilibrium after such damage. The IMO Arctic Guidelines require that in the design of Polar Class ships, calculations should show that the vessel will maintain positive stability when operating in ice in conditions causing the ship to roll, pitch, heave or heel due to turning or contact with ice. A Polar Class ship capable of operating in polar regions year-round, and ice-breakers of all classes, should be capable of maintaining positive stability when riding up on ice and remaining momentarily poised with bow on the ice.

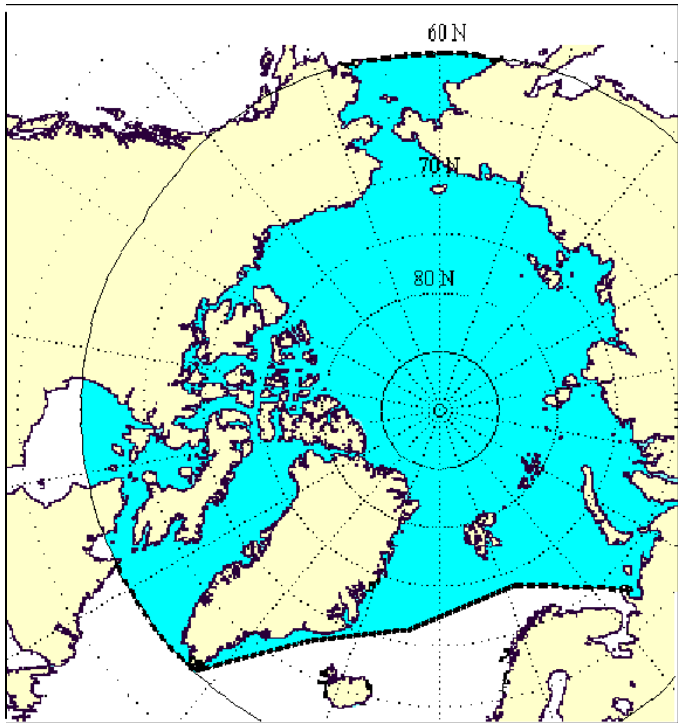
Arctic Guidelines

Generally, the contents of IMO safety conventions are not specific to Arctic shipping. Nonetheless, requirements for double hulls for tankers and increased safety and communications equipment systems for passenger ships and cargo ships as well as search and rescue developments, will be effective for ships trading into, or transiting, Arctic waters. The IMO recognized the need for recommendatory provisions additional to the requirements contained in existing IMO instruments. In 2002, IMO approved non-mandatory Guidelines for Ships Operating in Arctic Ice-covered Waters (IMO Arctic Guidelines, 2002), aimed at providing additional provisions to existing regulations, in particular SOLAS (Jensen, 2008). Member governments were invited to bring the Arctic Guidelines to the attention of shipowners, ship

designers, shipbuilders, ship repairers, equipment manufacturers and installers and all other parties concerned with the operation of ships in Arctic ice-covered waters.

The Arctic Guidelines aim to promote the safety of navigation and to prevent pollution from ship operations in ice-covered waters. Ice-covered waters are defined as those waters north of 60^{o} latitude, as adjusted in Figure 2, and in which sea ice concentrations of one-tenth coverage or greater are present and which pose a structural risk to ships (para. G-3.2). The Arctic Guidelines emphasize the need to ensure that all ship systems are capable of functioning effectively under anticipated operating conditions and of providing adequate levels of safety in accident and emergency situations. The Arctic Guidelines define "ship" as "any vessel covered by the SOLAS Convention" (para. G-3.22). This excludes from the area of application fishing vessels, pleasure yachts, wooden ships of primitive build, cargo ships of less than 500 gross tonnage, and naval vessels, but would include passenger ships and cargo ships of 500 gross tonnage or more engaged in international voyages (Jensen, 2008).

Figure 2. Geographical scope of the IMO Arctic Guidelines (shaded area)



Source: IMO Arctic Guidelines, 2002

Not all ships entering the Arctic environment will be able to navigate safely in all areas at all times of the year. It is the responsibility of the shipowner to select a Polar Class appropriate for the ship's intended service in polar waters. The Arctic Guidelines' system of Polar Classes designates different levels of capability (Table 4). In a complementary and parallel effort with the Arctic Guidelines, the International Association of Classification Societies (IACS) has adopted a set of Unified Requirements which use the class system of the Arctic Guidelines

(Table 4). In addition to general class rules, the unified requirements address essential aspects of construction for ships of Polar Class (IACS, 2007). The Unified Requirements form part of IACS member rules and apply to ships of member associations contracted for construction on and after 1 March 2008. The unified requirements are consistent with the Arctic Guidelines and are incorporated by reference on technical matters such as hull and machinery standards not addressed by the Arctic Guidelines (Jensen, 2008).

The Arctic Guidelines are structured in four parts. Part A provides construction, subdivision and stability in damaged condition requirements for Polar Class ships. No pollutants should be carried directly against the hull in areas of significant risk of ice impact. Operational pollution of the environment should be minimized by equipment selection and operational practice. Safety-related survival and pollution control equipment should be rated for a low temperature environment and other Arctic conditions. Navigation and communications equipment should provide adequate performance in high latitudes, in areas with limited infrastructure and unique atmospheric interference.

Table 4. Polar Classes set out in the IMO Arctic Guidelines and IACS Unified Requirements

POLAR CLASS	GENERAL DESCRIPTION
PC 1	Year-round operation in all Arctic ice-covered waters
PC 2	Year-round operation in moderate multi-year ice conditions
PC 3	Year-round operation in second-year ice which may include multi-year ice inclusions
PC 4	Year-round operation in thick first-year ice which may include old ice inclusions
PC 5	Year-round operation in medium first-year ice which may include old ice inclusions
PC 6	Summer/autumn operation in medium first-year ice which may include old ice inclusions
PC 7	Summer/autumn operation in thin first-year ice with which may include old ice inclusions

Source: IMO Arctic Guidelines, 2002; IACS, 2007.

Part B applies to Polar Class and non-Polar Class ships and includes recommendations on fire safety, fire detection and extinguishing systems, life-saving appliances and arrangements, and navigation equipment. The latter should conform to the requirements of SOLAS, Chapter V, and are not additional to SOLAS. All Polar Class ships should be provided with an automatic identification system (AIS).

Part C concerns ship operations, crewing, and emergencies. Part D covers provisions for environmental protection and damage control. These parts are covered in greater detail below.

The Arctic Guidelines recommend that operational manuals be available to the ships' personnel. The IMO may amend the International Safety Management Code for the Safe Operation of Ships and Pollution Prevention (ISM Code), adopted under SOLAS, Chapter IX, to include the operating and training manuals. The ISM Code provides a framework for the safe management and operation of ships and for the prevention of vessel-source pollution (Gold et. al., 2003, 226–228). The ISM Code came into force for all commercial vessels over 500 gross

tonnage and mobile offshore drilling units on 1 July 2002 as an amendment to SOLAS (IMO ISM Code, 2002). The basic principle of the Arctic Guidelines is similar to that of the ISM Code.

To achieve certification under the ISM Code, a shipping company must document its activities in manuals, educate its personnel in the ISM system of quality control, draft procedures for its office and for its ships and crews, implement the system, do internal audits, gain experience for external audits and receive a document of compliance for its safety management system from their flag state and be subject to inspection by port state control (Anderson, 2003). In ships trading to the Arctic, use of the manuals would be part of a ship's safety management system.

At the MSC's seventy-ninth session, South Africa submitted on behalf of the Antarctic Treaty Consultative Parties, a proposal to amend the Arctic Guidelines (IMO MSC, 2004). The principal purpose of the proposal is to update and extend coverage of the Guidelines to include Antarctic waters and include technological updates since they were adopted in 2002. At a recent meeting of the IMO Design and Equipment Sub-committee, it was agreed to completely revise the Arctic Guidelines and to establish a correspondence group under the coordination of Canada (IMO DE, 2008).

The Arctic Guidelines have been criticized for various deficiencies. They include, among others, lack of details on training for ice navigators, lack of a requirement that actual ice navigational experience be a certification prerequisite for ice navigators, and limited provisions regarding how to prevent and mitigate sea-spray icing of ships (Jensen, 2008). Guidance given about towage in icy waters is also quite limited, for example, urging that all Polar Class ships be capable of receiving emergency towing assistance. The Guidelines do not set out any specifics about ship speed, watchkeeping during towing and safe methods of securement.

Standards for Seafarers in the Arctic and Maritime Labour Law Issues

The Arctic presents a particularly hazardous work setting. While some attention has been devoted to ensuring that ships that operate under the harsh conditions mentioned earlier are especially equipped and constructed, much less attention has been given to the operational or "human" aspects, i.e., the conditions for the workforce that must live and work under these extreme conditions. In addition to affecting the well-being of seafarers, the working and living conditions for seafarers can affect the safety of ships and the protection of the marine environment. It is vital that seafarers operating in Arctic waters possess knowledge and skills necessary for navigation and that the working conditions are appropriate.

Both the IMO and the ILO set international standards for the seafarers' competence and their working and living conditions (Appendix D). In addition, the World Health Organization (WHO) is responsible for some aspects of seafarers' health (e.g., medical fitness for duties and requirements for on board medical chests and medical guides). The majority of the international standards are directed to flag states and apply to ships undertaking international voyages, although some requirements are directed to countries in their capacity as maritime labour supply states. The IMO addresses conditions in relation to seafarer competency and training and other matters related to ensuring the safety of the ship and people on board mainly through STCW and SOLAS. The STCW convention is in the process of revision, including with respect to issues such as standards for medical fitness for duty and hours of work and rest. The ILO addresses maritime labour conditions through international conventions and recommendations and other

guidance that sets standards for decent working and living conditions (e.g., hours of rest and work, accommodation, occupational safety and health, wages, food, medical care) (ITWF, 2006). Since 1920, more than 70 international instruments dealing with seafarers' working conditions have been adopted along with additional standards developed to address conditions in the fishing sector. The majority of these maritime labour conventions (more than 35 in total, Appendix A) and related recommendations have been consolidated in the Maritime Labour Convention, 2006 (MLC, 2006), which is expected to enter into force by 2011. A similar consolidation has taken place in the fishing sector with the adoption of the Work in Fishing Convention, 2007 (ILO Convention No. 188).

These organizations (IMO, ILO and WHO) have not adopted specific binding instruments addressing Arctic or Antarctic shipping as distinct from the general requirements. This means that the existing minimum standards would apply to ships flying the flag of states party to these conventions and, *de facto*, would be enforced on non-party ships under the regime of port state control inspection. The Arctic Guidelines also make recommendations on issues not dealt with under SOLAS or STCW. The integrated approach adopted by the Guidelines goes beyond design and equipping of ships and recognizes that safe operation in ice-covered conditions "requires specific attention to human factors including training and operational procedures" (IMO Arctic Guidelines, 2002, para. P-2.5).

Seafarer Training

The human factor plays a significant role in marine emergencies. Effective and safe sea transportation in the Arctic requires that the seafarers be skilled in different aspects of ice navigation. The issue of sufficient well-trained seafarers for Arctic navigation will be critical at a time when the global shortage of skilled seafarers is expected increase. In particular, it is expected that there will be an estimated shortage of up to 4,000 seafarers with ice experience and training (Bivbere, 2008). In addition, it is also important to note that shipowners, operators or others trading or expecting to trade in the Arctic develop an awareness and understanding of the challenges that Arctic navigation can pose for their ships and for the seafarers working on those ships.

As many as possible of the ship's deck and engine officers should be trained in ship operations in ice-covered waters. However, an area of concern is that ships on international voyages through Arctic waters may have crew drawn from tropical countries possessing little knowledge of the intricacies of ice navigation and little experience of living and working in cold climates. Any minor operational mistake in such a hostile environment is a recipe for a disaster. Accordingly, before a ship embarks on a journey via Arctic waters, the crew should have had ice navigation and simulator training (Tucker et al., 2006; IMO Arctic Guidelines, 2002, Chapter 14). In addition, the crew should have exposure to ice breaking operations, cold weather cargo handling, the effects of icing and ice build-up rate, ice-related services, survival and occupational safety. Although the Guidelines are not comprehensive with respect to seafarer training in respect of the Arctic, they do offer specific recommendations related to ice navigation, use of radio equipment and firearms, and training manuals.

Safe navigation in icy waters depends much on the knowledge and skill of the ice navigator. The Arctic Guidelines emphasize that all ships operating in Arctic ice-covered waters should have at least one qualified ice navigator who should be available at all times to

continuously monitor ice conditions (Chapter 1.2.). The Guidelines stipulate that the ice navigator training programme cover all aspects of knowledge, understanding and proficiency required for operating a ship in Arctic ice-covered waters. Training should also cover recognition of ice formation and ice characteristics; ice manoeuvring; use of ice forecasts, atlases and codes; hull stress caused by ice; ice escort operations; ice breaking operations and effect of ice accretion on ship stability (Chapter 14.2). Interestingly, the Guidelines require that the ice navigator provide documentary evidence of having satisfactorily completed an approved training programme in ice navigation. Currently, most ice navigation programs are *ad hoc* and there are no uniform international training standards (IMO, 2001; Ice Navigation Courses, n.d.). The Arctic Guidelines are the first international instrument to emphasize the need for specialized training in ice navigation in respect of the Arctic. Recently, Finland submitted a proposal for ice operation training for consideration by the IMO's Sub-Committee on Ship Design and Equipment to be considered with the current efforts to revise the Arctic Guidelines (IMO DE, 2007).

The Arctic Guidelines call for a minimum of two crew members to be trained in the use of low frequency radio equipment (Chapter 14.3.2). In cases where firearms are carried, a minimum of two crew members are to be cognizant of current firearm regulations and guidelines and be trained in the use of shotguns or hunting rifles (Chapter 14.3.1). Training manuals covering ship operations in Arctic ice-covered waters such as ice recognition, navigation in ice and escorted operation are also required (Chapter 13.3.3). In addition, the manual is to contain a summary of the Arctic Guidelines and annexes with instructions for drills and emergency measures (Chapter 13.3.3).

The Arctic Guidelines emphasize the need to provide for emergency training and survival skills for seafarers and appropriate cross-training of crew members (Chapter 13.3.4.). However, the Guidelines permit changes to the standard procedures due to the peculiarities in Arctic operations (Chapter 13.3.4.). Accordingly, the Guidelines lay down detailed rules in respect of how evacuation drill scenarios, rescue boat drills, fire drills, damage control drill scenarios, and launching lifeboats and rescue boats are to be conducted, incorporating variations so that different emergency conditions can be simulated (Chapter 13.4). All ships' officers and crew are to be made familiar with cold weather survival by training or self-study of course materials or publications. Guidance can also be drawn from the IMO *Guide to Cold Water Survival* (IMO, 2006), which focuses on passenger ships operating in cold water areas.

Seafarers' Working and Living Conditions

The Arctic Guidelines only lay down general recommendations for accommodation standards on board ships in Arctic waters. All personnel accommodations, public spaces and equipment installed in them are to be designed and arranged to protect the occupants from unfavourable environmental conditions and to minimize risk of injury during normal (including ice transiting or ice breaking) operations and emergency conditions (Chapters 4.1 and 4.2). In the event of an emergency and/or of extended ice entrapment, ships (Polar Classes 1 to 5) are to have sufficiently available and reliable facilities in order to maintain a life sustaining environment (Chapter 4.1.3). General reference is made to maintaining ventilation in working areas (Chapters 8.1.2 and 10.2), and provisions are included for personal and group safety kits and protective clothing kits (Chapter 11).

Outside STCW or the ILO standards (ILO 180, 1996 and MLC, 2006), there do not appear to be any special requirements for minimum hours of rest or maximum hours of work and safe manning despite navigation under what could be regarded as especially hazardous conditions. The general minimum requirements for seafarers working on a ship relating to conditions of employment, accommodation, recreational facilities, food and catering, health protection, medical care, welfare and social security protection as set out in the MLC, 2006 and the predecessor ILO conventions (Appendix A), are also applicable to seafarers involved in Arctic navigation (in international and domestic national waters) for states party to these conventions.

Search and Rescue

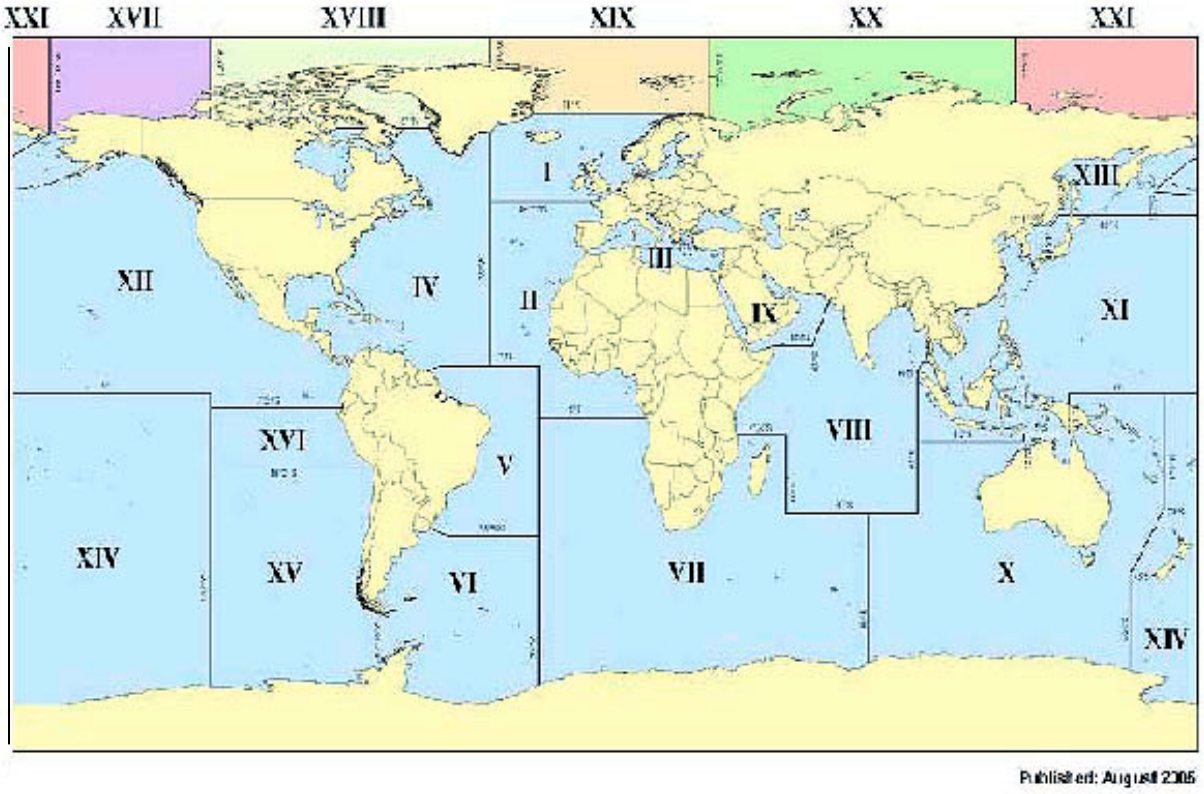
There is a longstanding tradition to provide assistance to persons in distress at sea, observed by both coastal state authorities and other ships in the vicinity of the persons in need of rescue. This duty is frequently legislated by maritime states as a requirement for ships flying their flags. The SAR Convention provides a system for the rescue of persons at sea and cooperation among states for this purpose. The IMO has established thirteen major search and rescue areas around the world, within which coastal states have designated search and rescue regions. The SAR Convention requires parties to establish rescue coordination centres and sub-centres, to establish ship position reporting systems and to expedite the entry of rescue units from other states into their territorial waters. Arctic state parties to the SAR Convention must ensure that rescue resources are available in the Arctic area under their jurisdiction during the shipping season and should cooperate with each other as required.

To facilitate maritime safety communications, the IMO adopted the Global Maritime Distress and Safety System (GMDSS). It is mandatory for all SOLAS Convention parties' cargo ships of 300 gross tons or greater and all passenger ships on international voyages. The Arctic is considered as Sea Area A4 for GMDSS purposes. Some Arctic coastal states are responsible for coordination of one or more navigational areas, known as NAVAREAs, within the World Wide Navigation Service (Table 5). NAVAREAs are navigational areas within the World Wide Navigational Service designated for the issue of navigational warnings and related maritime safety information within the GMDSS. Recently, the IMO's Sub-Committee on Communications and Search and Rescue (COMSAR) endorsed the creation of Arctic NAVAREAs up to 90 degrees North (Figure 3) proposed by a joint IMO/IHO/WMO group and approved by the MSC (IMO COMSAR, 2007; IMO MSC, 2007). Further, coastal states are responsible for the promulgation of maritime safety information in navigable waters within those areas. METAREA (meteorological information) Issuing Service providers in Canada, Norway and the Russian Federation were identified, with the United States and Denmark agreeing to be Preparation Service providers for designated areas (IMO COMSAR, 2008). METAREAs are meteorological areas corresponding to the NAVAREAs defined by the IMO. The new areas should be fully operational 24/7, bearing in mind that portions of the NAVAREAs will not be navigable during certain times of the year. Discussions are now underway with commercial satellite service providers concerning transmission and monitoring of warnings (IMO COMSAR, 2008).

Table 5. Arctic NAVAREA coordinators

Arctic NAVAREA	Coordinator
XVII	Canada
XVIII	Canada
XIX	Norway
XX	Russian Federation
XXI	Russian Federation

Figure 3. Arctic NAVAREAs



Source: IMO COMSAR, 2006, Annex 1.

Marine Environmental Rules and Standards

Onboard Waste Management and Operational Ship-Source Pollution

Over the past five decades the management and discharge of operational wastes on board ships has been a major global concern for the international community (Gold, 2006). As part of

their normal operations ships generate a wide variety of wastes including waste oil, oily water from tanker operations, waste engine oil, noxious liquid substances, sewage and garbage, generally resulting in pollution of the coastal and marine environment. The old habit of direct discharge into the marine environment is long gone, as onboard waste management is now a regulated activity.

The impact of ship-source pollution may be exacerbated in semi-enclosed seas like the Arctic Ocean. Geography imposes hydrological limitations, in effect trapping the wastes, including non-biodegradable wastes in the region's marine environment for decades. The presence of ice and very cold temperatures for much of the year are likely to contribute to long-term presence of ship waste discharged in the Arctic. It is therefore imperative that emphasis is placed on prevention of ship-source pollution (Vidas, 2000; National Research Council, 2001) and proper waste reception (DNV, 2006).

Adopted under the auspices of the IMO, the International Convention on the Prevention of Pollution from Ships, better known as MARPOL 73/78, establishes a system of international standards for onboard multi-waste management and eventual discharge (MARPOL, 1973/78; IMO, 2002). MARPOL can be expected to play an important role in the protection of the Arctic marine environment. Mandatory technical rules and procedures of MARPOL are found in the six annexes which respectively deal with the prevention and control of pollution by oil (I), noxious liquid substances (II), harmful substances in packaged form (III), sewage from ships (IV), garbage from ships (V), and air pollution from ships (VI). MARPOL does not totally prohibit the discharge of wastes in the marine environment, a point worth noting when considering the protection needs of the sensitive Arctic marine environment.

Not all state parties to MARPOL are necessarily parties to all the annexes. When a state becomes a party to MARPOL, it effectively becomes a party to both the convention and the first two annexes, whereas the other annexes are optional. Non-party states to one or more of Annexes III to VI (see Appendix D) consequently are not required to enforce the standards of the latter annexes to their ships.

Perhaps the most significant annex for the protection of the Arctic environment is Annex I. Annex I requires that the oily ballast discharge by an oil tanker must occur more than 50 nautical miles from the nearest land and must not exceed 30 litres per nautical mile. The total quantity of oil discharged must not exceed not exceed 1/15,000 of the cargo carrying capacity (for old tankers) and 1/30,000 of total cargo carried (for new tankers) irrespective of whether the oil is persistent or non-persistent. An oil record book has to be maintained to record all movement of cargo oil and residues from loading to discharging, and including tank-to-tank transfer operations on board. Annex I also establishes a 15 ppm discharge limitation on oily bilge water from oil tankers, as well as from other ships.

A major concern with the oil trade is single-hull tankers. Amendments to MARPOL in 1992 introduced a mandatory requirement of double hulls for new oil tankers and a phase-out period for existing single-hull tankers. The phase-in period was further expedited through 2003 amendments. Other revisions to Annex I establish higher standards for new ships including double bottoms for pump rooms and accidental oil outflow performance to provide better protection against oil pollution in cases of strandings and collisions. Also of interest to the Arctic is the proposal of Norway, on behalf of the 28th Consultative Meeting of the Antarctic Treaty in 2005, to amend MARPOL 73/78 Annex 1 to introduce a prohibition on the carriage of heavy grade oil as cargo and fuel oil in the Antarctic Area (IMO MEPC 54, 2006). This proposal has raised concerns on the part of the International Council of Cruise Lines (IMO MEPC 56, 2007a).

Annex IV sets out sewage regulations that apply to ships of 400 gross tonnage or more, or ships that are certified to carry more than 15 persons. Sewage may be discharged at a distance of more than three nautical miles from the nearest land when a ship has an approved treatment system and the sewage discharged is comminuted and disinfected. Sewage which is not comminuted and disinfected may be discharged at a distance of more than 12 nautical miles from the nearest land if the ship is proceeding at not less than 4 knots and the discharge is not instantaneous but at a moderate rate. Coastal states may impose less stringent sewage discharge limits. For example, the Canadian *Arctic Shipping Pollution Prevention Regulations* (ASPPR) permit the discharge of sewage, defined as "human or animal waste generated on board ship and includes wastes from water closets, urinals or hospital facilities handling fecal material," without regard to distance from land (Canada, 1978a, Reg. 26).

Annex V, while prohibiting the disposal of plastics into sea, still allows ships to discharge some garbage generated by normal operations of a ship and depending on the distance from land. For example, ships are allowed to dispose of packing materials more than 25 miles offshore, and paper, rags, glass, metal and bottles if beyond 12 miles. All ships of 400 gross tonnage and above, and every ship certified to carry 15 persons or more, must keep a garbage record book and record all disposal and incineration operations. A garbage management plan is also required. IMO guidelines for the implementation of Annex V urge that a preference be given to disposal of garbage at shore reception facilities. IMO is presently undertaking a comprehensive review of Annex V and recommendations for further action can be expected.

Annex VI, which sets limits on sulphur oxide and nitrogen oxide emissions from ship exhaust and prohibits deliberate emissions of ozone depleting substances, is also undergoing major review. The current Annex includes a global cap of 4.5% m/m on the sulphur content of fuel oil, while in special sulphur oxide emission control areas (SECAs) the sulphur content must not exceed1.5% m/m. The MEPC at its 57th Session (31 March – 4 April 2008) approved with a view to circulating for subsequent adoption at its 58th Session in October 2008 draft amendments to Annex VI which would impose stricter air pollution standards, including a phased reduction in sulphur content of any fuel oil used on board ships (IMO MEPC 57/21, 2008).

The IMO is also actively considering ways to reduce greenhouse gas emissions from sulphur. The MEPC at its 57th Session decided to re-establish the Intersessional Correspondence Group on Greenhouse Emissions from Ships with a mandate to further consider possible control measures with a final report to be presented to the MEPC's 59th Session (IMO MEPC 57/21, 2008).

Where the general ship discharge rules set out under the various annexes are not sufficient for the protection of sensitive areas, MARPOL Annexes I, II and V provide for the designation of special areas by the IMO. Special area is defined as "… a sea area where for recognized technical reasons in relation to its oceanographic and ecological conditions and to the particular character of its traffic, the adoption of special mandatory methods for the prevention of sea pollution by oil, noxious liquid substances, or garbage, as applicable, is required" (IMO Special Area Guidelines, 2002). The Antarctic area (defined as south of 60^{o} latitude) is designated as a special area under Annexes I, II and V. The effect of special area designation is a higher standard for discharges. Thus, in the Antarctic area an Annex I amendment made in 2004 (Regulation 15, in force on 1 January 2007) prohibits any discharge into the sea of oil or oily mixtures from any ship. This zero oil discharge standard, which applies to all ships irrespective of tonnage while in Antarctic waters, is higher than for other special areas such as the Baltic.

Special area designation entails an amendment to the relevant MARPOL 73/78 annex. A major condition for the designation of special areas is an undertaking by regional coastal states in the special area designated to provide reception facilities in their ports for the wastes concerned. For example for the purposes of Annex I, Mediterranean, Black Sea and Baltic Sea states undertook to "ensure that all oil loading terminal and repair ports within the special area are provided with facilities adequate for the reception and treatment of all the dirty ballast water and tank washing water from oil tankers" and for those ports to "be provided with reception facilities for other residues and oily mixtures from ships" (MARPOL 1973/78, Annex I, Reg. 10 (7)(a)(i) and Reg. 12). These facilities must have the capacity to ensure there is no undue delay. The special area designation does not take effect until the states in the special area inform the IMO that the port reception facilities are in fact established. This has been a concern in some marine regions, where the establishment of port reception facilities did not occur until many years after the special area designation occurred (Chircop, 2005). Should MARPOL 73/78 special area designation be considered for Arctic waters, it will be important for Arctic states to consider what reception facilities may need to be developed in their ports to ensure compliance with the designation.

The Arctic may satisfy at least the first two conditions for special area designation, namely oceanographic and ecological, if not also ship traffic conditions, as set out in the IMO Guidelines for the Designation of Special Areas under MARPOL 73/78 (IMO Special Area Guidelines, 2002). The physical conditions of the Arctic, such as restricted hydrology and ice conditions, "may cause the concentration of harmful substances in the waters or sediments of the area." The ecological conditions in the Arctic include both marine and non-marine species (e.g., polar bears, birds), habitats, migratory routes, and fragile coastal and marine ecosystems. In addition, the indigenous peoples of the Arctic depend on the land and resources of the region for cultural reasons and subsistence and would require alternative sources of livelihood should their resource base be impaired. With regard to ship traffic conditions, it would need to be demonstrated that "[T]he sea area is used by ships to an extent that the discharge of harmful substances by ships when operating in accordance with the requirements of MARPOL 73/78 for areas other than special areas would be unacceptable in the light of the existing oceanographic and ecological conditions in the area." Although at this time ship transits through the Arctic Ocean are relatively few, it is arguable that the threat is not posed by numbers as much as by the nature of the threat, for example the potential discharge of oil or oily waste as may be permitted by MARPOL in an environment that is very sensitive to even the smallest of discharges (AMAP, 2007, 9).

The IMO Arctic Guidelines play a potentially important role in complementing MARPOL. The Guidelines recognize the lack of repair and waste reception facilities, communications limitations, unique navigational and environmental hazards and limited response capabilities in Arctic ice-covered waters (IMO Arctic Guidelines, 2002, Chapter 16.1.1). In effect, in many parts of the Arctic a ship is likely to find itself on its own with limited prospects of timely assistance when in need.

The London Convention 1972 and its 1996 Protocol govern ocean dumping from ships and of ships in the Arctic. "Ocean dumping" refers to wastes and other matter loaded for dumping. It excludes wastes from normal ship operations. The London Convention takes a permissive approach to ocean dumping and just about anything may be dumped except those wastes listed on a "black list" pursuant to a national ocean dumping permit. The 1996 Protocol adopts a precautionary approach whereby only wastes listed on a global "safe list," such as

dredged material, fish wastes, organic wastes of natural origin, and ships from which hazardous materials have been removed, may be disposed of subject to a waste assessment audit and a national permit (VanderZwaag & Daniels 2008).

Contingency Planning for Accidental Oil Pollution

The sensitivity of the Arctic to pollution from oil and other hazardous substances underscores the need for preventive measures to avoid accidents and incidents that could release such substances into the marine environment. At this time there does not appear to be a capability anywhere for the effective removal of hydrocarbon pollutants from ice-infested waters, although some experiments have taken place. The Arctic Oil and Gas Assessment 2007 concluded that oil spills are the largest threat to the marine environment (AMAP, 2007, 24). In addition to international regulations aimed at preventing pollution from indiscriminate waste discharges, poor ballast waters management and oil transport, the IMO has adopted an instrument aimed at promoting international cooperation in contingency planning and response. The International Convention on Oil Pollution Preparedness, Response and Co-operation is in force, and all Arctic states are parties (OPRC Convention, 1990). In 2000 a protocol on hazardous and noxious substances (HNS) was adopted and entered into force in 2007 (OPRC/HNS Protocol, 2000). These instruments are particularly relevant for Arctic shipping, where incidents may occur in remote locations and coastal state assistance might not be readily available.

OPRC state parties are required to establish measures for dealing with oil and HNS pollution incidents, either nationally or in co-operation with other countries. Ships and offshore installations within the jurisdiction of Arctic state parties must have onboard oil pollution emergency plans (SOPEP), including a plan for responding to ice damage, which are to be coordinated with national response systems for prompt and effective response. There should be a written procedure to effect damage repair and mitigate pollution. Crews should be exercised in damage control and materials for this purpose should be on board. Ships have a duty to report pollution incidents to coastal authorities. OPRC also calls for the establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercises and the development of detailed plans for dealing with pollution incidents. State parties have a duty to provide assistance to other states in pollution emergency situations.

The Arctic Council established the Emergency Prevention Preparedness and Response (EPPR) Working Group to provide a forum for regional governments and indigenous peoples (Permanent Participants) to cooperate in dealing with environmental threats from accidental pollution. Operating under the lead country principle, the specific objectives of the EPPR are to:

- Improve prevention measures aimed at reducing accidents in the Arctic, including source control management programs,
- Improve emergency preparedness programs at local, national, regional and international levels to ensure they are commensurate with the level of risk that exists, including arrangements for mutual assistance, and
- Improve response capabilities so that they are commensurate with existing threats (Transport Canada, 2007).

While the EPPR is consistent with the expectations for cooperation under the OPRC, it is not a response agency and has served as a forum for exchange of information and conducting projects. The EPPR Working Group has noted the need to increase communication within the Oil Pollution Preparedness, Response and Cooperation (OPRC)/OPRC-HNS Technical Group (under IMO) and to share information in such areas as dispersant application, waste removal and treatment, in-situ burn up, and spill response in ice and snow conditions (EPPR, 2007).

Several Arctic states have joint contingency planning arrangements. They include, among others, the Canada/United States Joint Marine Pollution Contingency Plan, most recently revised in 2003 and having as Annex 4, CANUSNORTH for the Beaufort Sea area (Canada/United States, 2003), and the Canada/Denmark Agreement for Marine Environmental Cooperation (Canada/Denmark,1983), which includes annexes for responding to shipping and offshore hydrocarbon spills (Environment Canada, 2006).

Anti-fouling Systems

Ships use anti-fouling systems to prevent algae and molluscs, or other marine organisms, from attaching themselves to the hull below the waterline, thereby slowing down the ship and increasing fuel consumption. These anti-fouling systems can be any coating, paint, surface treatment, surface or device that is used on a ship to control or prevent attachment of unwanted marine organisms. One of the most common systems used, anti-fouling paint, contains substances that can harm human health and marine species. Tributylin (TBT), an active ingredient in certain anti-fouling paints, is considered to be the most toxic human-introduced substance in the marine environment. It became widely available in Canada and the United States by the 1960s and in other countries in the 1970s. In addition to its concentration in hotspots such as ports and harbours, and in semi-enclosed seas such as the Baltic, it has also been traced in ocean-going highly migratory species, suggesting continued contamination in the open ocean.

TBT contamination is arguably of potential concern for the Arctic waters and species. It has been traced and monitored in Iceland's sub-Arctic waters and in the harbour porpoises on the west coast of Greenland (IMO MEPC, 2006).

In 2001, the IMO adopted the International Convention on the Control of Harmful Anti-Fouling Systems on Ships to combat use of TBT (AFS Convention, 2001). The Convention entered into force on 17 September 2008. Although several Arctic Council members regulate TBT use, only Denmark, Norway and Sweden are parties to the Convention. As of 1 January 2008, the European Union introduced a complete ban on the use of TBT-based paints, both on EU ships and ships visiting European ports (EC, 2003). The IMO has suggested that anti-fouling paints are not necessary for icebreakers in deep polar waters as ice action scrapes off fouling organisms (IMO MEPC 55, 2006), but it should be noted that most vessels in polar waters are not icebreakers.

Ballast Water Management

The majority of the world's ships carry some form of "ballast" to ensure ship stability and structural integrity, particularly, when they are not fully laden with cargo. Since the late

1800s ballast has taken the form of sea-water pumped aboard (taken up) in a ship's ballast water tanks when cargo is unloaded in port and discharged in the next port when new cargo is loaded (or en route when the ship's safety and structural integrity requires this adjustment). This means that port or near coastal water from one place in the world is transferred by a ship throughout the world (Dudley et al., 1994; Gold, 2006).

UNCLOS recognizes that international trade using ships has resulted in the movement of "alien species" (living organisms and pathogens) attaching either to ships' hulls or equipment (hull fouling) and in ships' ballast water (McConnell, 2003; Doelle et. al., 2007). Both UNCLOS (Art. 96(1)) and the 1992 Convention on Biological Diversity (CBD) call on parties to prevent or control marine alien species (Art. 8(h)).

The movement of these organisms can displace local marine species (e.g., the zebra mussel in the Great Lakes and the comb jellyfish in the Black Sea) or create a risk to human health (e.g., introduction of cholera, red tide). The economic, human and eco-security impact of the introduction of invasive marine species through ballast water has been identified as "... one of the four greatest threats to the world's oceans" (Global Ballast Water Management Program, n.d.).

The IMO has responded to this issue through a series of resolutions and, more recently, with the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention). Although many coastal and port states have adopted national laws or regulations to implement the resolutions and to protect their coastlines from this threat, the Ballast Water Convention, is not yet in force. To date, the Ballast Water Convention has been ratified by only sixteen countries representing 14.24 per cent of the world tonnage (IMO, 2008b). At present, except for national legislation and the binding preventative international obligations under UNCLOS and the CBD, the IMO resolutions on ballast water management remain the (non-binding) applicable international regulatory regime.

The Ballast Water Convention details technical standards and requirements for the control and management of ships' ballast water and sediments. The major goal of the Convention is to shift ballast water management from exchange to treatment by 2016 for all ships. Ships are to maintain on board a ballast water management plan (BWMP) specific to the requirements of that ship depending upon the year of construction and to record ballast water operations in the ships' ballast water record book. Ballast water exchange (discharge port/coastal water and take up new water) is to be conducted at least 200 nautical miles from the nearest land and in water which is at least 200 metres in depth. In cases where the ship is unable to do this, the exchange can be conducted in areas at least 50 nautical miles from the nearest land and where the depth of the water is at least 200 metres. However, if the parameters of distance and depth cannot be met, the port state can designate areas, in consultation with adjacent or other states, where a ship could conduct the exchange. The Convention also establishes standards for ballast water exchange methods and ballast water performance standards, i.e., concentration of viable organisms in the ballast water discharged.

Since ballast water exchange can have serious repercussions for the safety of ships, the Ballast Water Convention provides that a ship need not comply with these requirements if the master reasonably decides that such exchange would threaten the safety or stability of the ship, its crew, or its passengers either due to adverse weather, ship design or stress, equipment failure, or any other extraordinary condition. Article 13 of the Convention provides that parties with a common interest in protecting the environment, human health, property and resources in a given

geographical area, particularly those parties bordering enclosed and semi-enclosed seas, can establish regional agreements consistent with the Convention.

Ballast water discharges could pose serious challenges to the ecologically fragile and biodiversity rich Arctic marine environment. However, in Arctic waters it may in fact be the case that species from southerly latitudes are unlikely to survive if discharged in northern waters. In addition, the nature of voyages (cargo laden or in ballast) that would occur in Arctic waters is uncertain.

Despite these unknowns, it should be noted that the IMO recently adopted (13 July 2007) Guidelines for Ballast Water Exchange in the Antarctic Treaty Area (IMO MEPC 56, 2007b). These Guidelines provide international guidance on the implementation of Article 13 of the Ballast Water Convention on how ballast water is to be managed in regions of extreme cold with fragile ecosystems. The Guidelines provide an interim measure for all ships entering the Antarctic Treaty area before the Convention comes into force. Ships with ballast tanks entering the Antarctic waters should prepare a ballast water management plan taking into account the problems of ballast water exchange in cold environments and in Antarctic conditions. In addition, the Guidelines recommend exchange well before entering the Antarctic area. Importantly, the Guidelines address specific concerns for ships sailing in both Arctic and Antarctic waters, proposing special measures with respect to sediment in ballast tanks (para. 9) and the discharge of ballast water from Antarctic waters into Arctic and sub-Arctic waters (para.7).

The mix of national and international waters in the Arctic poses special challenges in managing ballast water and sediments. As noted recently, the Arctic may be an area with significant wealth in marine genetic resources (DFAIT, 2007). Ballast water discharges by ships in the Arctic pose not only complex environmental issues but, more importantly, raise serious issues of safety (e.g., the waters in the ballast tanks may need constant heating as the waters could turn into ice, jeopardizing the stability of the ship). Moreover, as weather conditions constantly change, there could be very little predictability regarding decisions over ballasting and de-ballasting.

The Ballast Water Convention does not take into consideration the harsh environmental conditions of the Arctic that mandate special treatment and concern for safety. Among the Arctic Council member states, Canada has a comprehensive set of regulations for ballast water discharge (Canada, 2006). However, these are applicable only to areas that fall within its jurisdiction. Even the Canadian regulations may prove inadequate to meet the challenges posed by the Arctic, particularly in the context of safety. For instance, the contingency provisions under the Regulations mandate that even in the event of a ship facing difficulties in complying with the regulation or its BWMP, the ship is required to take direction from Transport Canada regarding the discharge of ballast water. Questions may arise regarding the efficacy of this consultation, particularly when a ship is caught up in rough weather and where split second decisions would have to be made in the best interests of the ship and its crew. This position stands in sharp contrast to the U.S. regulations wherein considerable discretion is provided to the master, operator, or person-in-charge of a vessel in determining the safety exemption. Norway, a party to the Ballast Water Convention, would also have responsibilities with respect to ships flying its flag.

Particularly Sensitive Sea Areas

Since the early 1990s, several marine areas have received special protection from the IMO because of their particular sensitivity to international shipping through designation as

particularly sensitive sea areas (PSSAs). A PSSA is a marine area "that needs special protection through action by IMO because of its significance for recognized ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities" (IMO PSSA Guidelines, 2005). Special protection consists of appropriate protective measures such as areas to be avoided, traffic re-routing and separation schemes, mandatory ship reporting and prohibited discharges. It is possible for special area designation under MARPOL 73/78 to be one such measure. In exceptional situations, special mandatory measures may be adopted under UNCLOS Article 211(6), although this has not yet occurred. These measures raise the standard of protection for PSSAs and may be enforced by proponent coastal states once designated. Using the authority provided by its own mandate, the IMO has developed Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas, most recently revised in 2005.

An increase, perhaps even a marginal increase, in shipping in the Arctic, could result in a significant threat to this particularly fragile environment. The PSSAs designated to date include diverse sensitive environments such as the Great Barrier Reef and the Torres Strait, the Sabana-Camaguey Archipelago in northern Cuba, Western European Waters and the Baltic Sea. Areas eligible for such designation need to satisfy requirements grouped under (1) ecological, (2) social, cultural and economic, and (3) scientific and educational criteria. Only one criterion within any of these requirements need be satisfied. However, the threat from international shipping must be demonstrated. The IMO designates a PSSA following a proposal by one or more states and its consideration by MEPC and the Sub-Committee on the Safety of Navigation, if a safety measure is proposed. Decisions are based on the proposed area's environmental conditions, demonstrated vulnerability to international shipping, and the availability of measures within the IMO's competence.

If the conditions and criteria set out above are satisfied in a given area of the Arctic, that area may be eligible for PSSA designation. However, experience with the Western European and Baltic PSSAs suggests that it would be important to secure consensus among Arctic states before proceeding with a PSSA proposal. The Russian Federation opposed the Baltic PSSA and, as a result, Russian waters have been excluded from that PSSA. Further, and as noted earlier in this chapter, Article 234 of UNCLOS permits coastal states in ice-covered areas to adopt and enforce non-discriminatory laws and regulations to combat vessel-source pollution in their EEZs, and this is without the need to seek prior IMO approval. This provision may be read as complementary to PSSA designation in that it provides enforcement authority. At the same time, Article 234 powers may be exercised to achieve the same effect of a PSSA, without having one designated.

For a sensitive marine area to be protected from a threat posed by international shipping, there is also the option of obtaining measures under SOLAS without necessarily involving the designation of a PSSA. An IMO member state, or a group of cooperating member states, may take the initiative to propose the establishment of a routeing system. Regulation 10 of Chapter V of SOLAS provides for the adoption of ships' routeing systems which can be made mandatory or recommendatory for all ships or certain classes of ships or ships carrying a particular cargo. These include recommended routes (including recommended tracks), routeing system, traffic separation scheme (including traffic lanes, separation zone or line and established direction of traffic flow), roundabout, inshore traffic zone, two-way route, deep-water route, precautionary area (requiring special care in navigation), area to be avoided, and no anchoring area (IMO, 2008c). The purpose of these measures is to provide for safe passage. However, routeing

measures may also be proposed for the protection of the marine environment, for example to reduce the risk of pollution in heavily trafficked areas. For example, by limiting the access to ships in an area to be avoided, the potential for ship discharges may be minimised. SOLAS Regulation 11 further provides for mandatory ship reporting systems for all ships, or certain categories of ships, or ships carrying particular cargoes. These may include entry and exit reports, passage plan reports, intermediate reports and defect reports. The proponent states would then be in a position to provide ships with information (e.g., navigational warnings) and procedures to be followed. There are useful examples of routeing and reporting measures adopted in northern waters which could be useful examples for the Arctic, such as the traffic separation scheme in Prince William Sound, Baltic (measures prior to PSSA designation), recommended routes joining traffic separation schemes off the coast of Norway, two way routes off the coast of Iceland, and mandatory ship reporting systems off the coast of Greenland (IMO, 2008c).

Places of Refuge for Ships in Need of Assistance

As international shipping increases in the Arctic, it should be expected that there will be a probable concomitant increase in the frequency of incidents involving ships in need of assistance. This probable increase can be expected to occur even in the best of scenarios where only modern Polar Class ships with highly competent crews navigate the harsh conditions of the Arctic. Experience shows that stress of weather, equipment failure, human error or some other unforeseen factor can adversely affect the performance and consequent safety of the best of ships. Tradition and necessity have led to the observance by the international community of a long-standing humanitarian custom to provide assistance to ships that request it. Injured or sick crew may need to be airlifted or the ship itself may need temporary refuge before proceeding on its maritime adventure. Where search and rescue is called for, the SAR Convention provides the necessary legal framework. However, this custom has been subjected to international scrutiny in relation to situations where provision of assistance to a ship, most especially when refuge in sheltered coastal waters such as a port or a bay, is requested (Chircop & Linden, 2006, 1-31). The casualties of the *Erika* and *Prestige* highlight the difficulty a national or port authority faces when confronted by a ship requesting assistance when its condition poses major safety and environmental threats to the coastal state.

In 2003, the IMO adopted Guidelines on Places of Refuge for Ships in Need of Assistance to assist decision-making in these situations (IMO Refuge Guidelines, 2003). Although not mandatory, the Guidelines provide a risk assessment framework for masters and salvors on site with the ship, and coastal state authorities whose permission is requested for the ship in need of assistance to enter a place of refuge in sheltered waters. In the European Union, the European Commission has gone farther in developing a legal framework that not only includes a duty to assist, but also a duty to designate places of refuge in member states (EC, 2002). Canada and the United States have had a longstanding practice of granting refuge on humanitarian grounds and on a case-by-case basis. As will be seen below, Canada adopted a National Places of Refuge Contingency Plan (PORCP), which establishes a national framework and approach with associated regional measures (Transport Canada, 2007b). In the United States, in 2007 the U.S. Coast Guard adopted a new internal policy for places of refuge (United States, 2007). An important condition is that the ship in need of assistance has a certificate of financial responsibility under the U.S. *Oil Pollution Act of 1990* or an acceptable letter of undertaking, but

that standard coverage under the CLC Convention would not be recognized. However, the parties concerned would coordinate with the U.S. National Pollution Funds Centre and servicing legal office to arrange for acceptable coverage to enable port entry.

In the Arctic marine environment, ships in need of a place of refuge encounter considerable challenges. Elsewhere where places of refuge have been designated or offered to a ship in distress, there is either help at hand (e.g., salvage) or a standby response capability in the place of refuge or vicinity. Most of the sections of the actual and potential international navigation routes in the Arctic are remote and over long distances, implying that salvage or any coastal state assistance is likely not to be timely, if at all available. Also, with ice cover in sheltered areas to be expected even in the summer navigation months, the identification of a reasonably located safe place for a ship can be difficult. Consequently, there are likely to be significant practical difficulties to be encountered in finding and supporting suitable places of refuge for ships in the Arctic. Suitable locations for ships requiring shelter to make repairs in the Canadian or Russian Arctic might be difficult to designate in advance due to the changes in ice conditions depending on the season. Even with optimum conditions, a sudden wind change could move ice into an otherwise sheltered location. However, a ship in need of assistance would contact the coastal state's marine administration through vessel traffic services and it would be hoped that that state's Maritime Assistance Service, as recommended by IMO, would designate a location and provide assistance if requested (IMO MAS, 2004). To facilitate the provision of a place of refuge by national authorities, the International Group of Protection & Indemnity (P & I) Clubs informed the IMO of a new cover to be provided to ports for some of the risks they undertake in providing refuge (IMO LEG, 2004).

Wreck Removal

The most recent international convention adopted by the IMO that has the potential to contribute to the governance of shipping in the Arctic is the Nairobi International Convention on the Removal of Wrecks, 2007 (Wreck Removal, 2007). Clearly, it is too soon for the convention to be in force and at the time of writing none of the Arctic states are parties. The purpose of this instrument is to provide state parties with the legal basis, beyond their territorial seas (and within their territory or territorial seas at their option), to remove, or have removed, shipwrecks that may have the potential to adversely affect human safety, goods and property at sea, and the marine environment. Wrecks can pose significant danger to the safety of navigation, human lives and the marine environment. Shipowners are made responsible for locating, marking and removing ships; they are financially liable. Insurance is required and the possibility of direct action against the insurer is also provided. Shipowners normally purchase cover for these risk from the P & I Club (Gold, 2002).

The Role of Ports in International Maritime Law

Enforcement Through Port State Control

Most marine regions around the world are now covered by a global network of memorandums of understanding (MOU) on port state control. At this time, the marine regions

covered by MOUs include: Paris MOU (Europe and North Atlantic), Tokyo MOU (Asia and the Pacific), Viña del Mar MOU (Latin America), Cartagena MOU (Caribbean), Abuja MOU (West and Central Africa), Black Sea MOU, Valletta MOU (Mediterranean), Goa MOU (Indian Ocean), and Riyadh MOU (Arab States of the Gulf). Although the United States administers its own port state control system, it has cooperating observer status with the Paris MOU. These agreements among national maritime authorities provide a systemic approach to the inspection of ships visiting their ports to ensure compliance with international standards established by conventions listed in the individual MOU (Gold, 2006). The enforced conventions include SOLAS, COLREGS, MARPOL 73/78, and STCW, among others. In the case of suspected violations of COLREGS Rule 10 (traffic separation schemes) and MARPOL, an authority may gather evidence at the request of another authority. The principal responsibility to implement and enforce international shipping standards belongs to the flag state. However, each national authority applies the instruments listed in the MOU that are in force and to which its state is a party in relation to ships visiting its ports. Inspecting states ensure that ships of states that are not parties to the instruments enforced under the MOU are not given any more favourable treatment than the ships of states that are parties to such instruments. A port state control inspector can require a ship to rectify a deficiency before departing the port and in the worst cases can detain the inspected ship.

The Paris MOU is potentially relevant for ships navigating within the Arctic Circle (Paris MOU, 1982). Members are the maritime authorities and coastal states of the North Atlantic basin in North America and Europe. The maritime authorities of the Arctic Council states, including Canada, but not the United States, are parties to the Paris MOU. The Tokyo MOU, which is the only other arrangement involving states adjacent to the Arctic Circle, limits the area of application to the Asia-Pacific region. The maritime authorities of Canada and Russian Federation are parties, but the U.S. maritime authority is only an observer to the Tokyo MOU. The Paris MOU refers to the ports of member authorities and does not appear to have any other geographical restriction, including ports of member authorities located within the Arctic Circle.

At this time only Canada and the Russian Federation appear to have national safety and environmental standards specifically designed for navigation in the Arctic, separately from international standards adopted under the auspices of the IMO, including the Arctic Guidelines. The Russian Federation employs a ship inspection system for the purpose of passage through the Northern Sea Route. Canada requires that ships comply with the *Arctic Waters Pollution Prevention Act* (AWPPA) (Canada, 1970) construction and other standards before they can navigate in Arctic waters, and are inspected for this purpose.

A potential issue for Arctic Council states and the international maritime community generally whose ships would be inspected with respect to their polarworthiness under SOLAS is the potentially multiple standards that apply, i.e., the Arctic Guidelines (including the IACS Unified Requirements), Canadian AWPPA standards and the Russian Federation standards, and the instruments enforced under the Paris MOU on Port State Control. As international shipping in the Arctic grows and new ports are developed within the Arctic Circle, it may be necessary for the maritime authorities of Arctic states to consider whether they should coordinate port state control enforcement efforts through a new dedicated MOU, or whether existing MOUs are sufficient to enforce the higher regulatory standards applicable to the Arctic. Effective port state control would need to enforce compulsory rules (Jensen, 2008).

Ports and Maritime Security

In 2002, about a year after the 9/11 terrorist attacks in the United States, the IMO introduced the International Ship and Port Facilities Code (ISPS) as a mandatory instrument and linked to the SOLAS Convention (IMO ISPS Code, 2002). The Code applies to all commercial vessels over 500 gross tons engaged in international trade and, should a contracting party so decides, also to ships not engaged on international voyages that serve ships arriving or departing on an international voyage (IMO ISPS Code, 2002, Reg. 3.2). Mobile offshore drilling units are also included. For the first time, an IMO instrument applies on land. The ISPS Code requires ports and terminals, public and private, within or outside ports, to be secure. The Code decrees levels of security for ships and ports. Ships may be required to provide notice and information that may be requested by the maritime authorities of the host state (SOLAS, 1974, Chap. XI-2, Reg. 9). Canada and the United States have advance notice of arrival requirements for ships that depend on the duration of the voyage. For voyages longer than ninety-six hours, the notice must be given ninety-six hours in advance (United States, 2002; Canada, 2004, s. 221).

Security plans for ships are prepared for approval by flag states, ship and company security officers are appointed, as are security officers for ports, and port plans prepared and approved. Certificates are issued to ships, companies and ports, and security plans are subject to periodic audit. On 1 July 2004, the ISPS Code came into force and was quickly implemented worldwide. This was followed by introduction of regulatory regimes, methods of identification for seafarers and port workers, security audit processes, and intelligence gathering equipment and procedures.

In the Arctic, a risk assessment should be conducted for ports as well as ship-loading docks wherever located and at oil and gas transfer facilities, followed by adoption of security plans, in order to comply with the ISPS Code. Ships engaged in cargo operations, support services, or cruises in the Arctic will have to comply with the ISPS Code and cooperate with port and terminal security. In areas under their jurisdiction, Arctic coastal states should have ship control procedures in place, as well as intelligence gathering for the Arctic domain and a secure system of assessing threats and sharing intelligence with law enforcement agencies.

PART III: INTERNATIONAL PRIVATE MARITIME LAW FRAMEWORK

Introduction

The shipping industry exists to transport people and to trade products for business and profit. To be successful in the Arctic shipping business, shipowners must interact with a variety of other commercial parties, whether the source of their earnings, such as cargo owners and cruise passengers, or the suppliers of essential shipping services, like insurers and salvors. In each case, shipowners engage with their customers or suppliers by private contracts. As private arrangements, these contracts are regulated by private or civil law, typically of national origin. Since ships move between different countries, their owners' contracts can be subjected to a variety of different national jurisdictions and laws. The resulting confusion has impelled the international community to harmonize the relevant national laws in some areas by the conclusion of international private law conventions that establish uniform contractual regimes. These are the

principal topics of explanation in this Part. The international public law of the sea, described in Parts I and II, is not aimed at the regulation of the private commercial relationships being discussed here. Even so, since it governs the conduct of ships and their owners, it must be taken into account to the extent that it inevitably influences both the conclusion and performance of maritime commerce. In addition, Part III includes discussion of the international conventions that establish the means to acquire compensation and remedies for claimants that suffer loss or injury as a result of the breach of the international public laws for the protection of the oceans from ship-sourced pollution (Appendix D).

Carriage of Goods and Passengers by Sea

The movement of goods and passengers by sea is regulated by the terms of the carriage contract with the carrier. Fundamentally, this is a voluntary arrangement which both sides have freedom to negotiate and conclude. In principle, it is not regulated by international public law because it is a private arrangement between the parties. Thus the international customs and practices of the shipping, cruise and merchant communities are more likely to govern the Arctic movement of goods and passengers than international maritime law.

Nonetheless, public law of the sea may influence the carriage contract in two ways. First, the carrier must ensure that its ship meets all the public law standards for human safety and environmental protection (e.g., SOLAS, MARPOL 73/78 and STCW). These standards are likely to be written or read into carriage contracts, unless special terms about them are concluded. Secondly, the carriage of passengers, the carriage of goods under bills of lading and the shipment of dangerous goods have raised sufficient concern to attract public intervention through international treaties containing minimum mandatory rules of carriage, which are incorporated in the parties' carriage contracts (Appendix D).

The essence of a contract of sea carriage is an agreement for safe transport and delivery by ship in exchange for payment of freight, hire or passage. In addition to specifying the voyage, the contract will allocate between the parties the risks and responsibilities of the transit. In general, the *kinds* of risks are the same for all marine transport. The carrier must provide a seaworthy ship for the voyage which must be prosecuted without deviation or delay and with due care for the cargo or passengers. For example, the ship should be adequately crewed, equipped and waterproof whether the voyage is through tropical or polar seas. However, the specific risks are particular to each voyage and the carrier is obliged to prepare against reasonably foreseeable risks. Thus for the carriage of a perishable cargo into the Arctic, a carrier must supply a ship that is both seaworthy (i.e., watertight) and sufficiently heated.

A carriage contract is likely to contain a multitude of specific clauses designed to cover all foreseeable contingencies of the particular voyage. Given the repetitious nature of many international trade deliveries and cruise destinations, it is no surprise that international shipping organizations and traders' associations have developed standardized clauses for particular trades, cargoes and routes and organized them into blank forms of contracts. In some areas, international conventions also impose standard terms. There are three general international contractual frameworks governing Arctic sea carriage relationships: 1) bulk goods in general cargo or tramp ships, 2) packaged merchandise on northern supply and liner services, and 3) passengers on cruise ships.

Bulk Goods in General Cargo or Tramp Ships

A key reason for marine transportation in Arctic waters is to remove extracted natural resources. Typically, petroleum and minerals are moved in bulk in tankers and ore carriers that tramp (sail) around the world from port to port. Natural gas is similarly transported but in dedicated liquefied natural gas (LNG) carriers. The contracts of carriage of such trade are known as charter parties, which are not governed directly by any international laws. Such international "regulation" as exists consists of widely used and generally accepted standard terms of trade set by industry bodies like BIMCO and INTERTANKO. Given the long experience of shipping to ice-bound ports around the Arctic, these organizations have devised voluntary "ice clauses" for inclusion in individual charter parties (e.g., BIMCO Ice Clauses). These clauses allow for the contingency of changing ice conditions by giving the carrier liberty to deviate from the contracted carriage to avoid, for instance, sending the ship to a destination that becomes icebound or leaving it in a loading port as ice moves in.

More recently, member societies of IACS have introduced winterization guidelines for navigation in cold climates, e.g., Det Norske Veritas (DNV) Guidelines (DNV, 2006) and American Bureau of Shipping (ABS) Guidelines (ABS, 2006). These guidelines set out standards of ship preparedness for Arctic shipping and thereby indirectly affect the standard of care for the goods on board. For example, DNV Guidelines for winterization require cargo oil lines to be located under deck and cargo valves to be protected from icing. When these guidelines are regarded as best practice in the industry for shipowners, they set the expected minimum standard of reasonable care for cargo.

Similarly, the IMO's Arctic Guidelines and the Arctic Council's Guidelines for Transfer of Refined Oil and Oil Products in Arctic Waters (TROOP Guidelines) (Arctic Council, 2004) may also affect the carriage of cargo. In addition, the public international maritime law that mandates standards for ships may also indirectly influence the standard of care in a carriage contract. Likewise, mandatory national legislation about Arctic shipping, which typically but not exclusively falls upon the shipowner, may also affect a voluntarily concluded contract of carriage such as a charter party. For example, under the Canadian AWPPA where weather, ice or sea conditions require, a pollution prevention officer may order a ship away from a shipping safety control zone, with consequent deviation and delay in delivery of its cargo as contracted.

Packaged Merchandise on Northern Supply and Liner Services

The re-supply of northern communities and work sites, everything from industrial tools and machinery parts to food and personal items, are transported on shipping services along an ordered route of delivery. As ice conditions diminish in the future, transportation of merchandise between Europe and Asia along the Northern Sea Route by liner shipping services may be expected. Such packaged, crated and containerized items are carried under contracts represented by bills of lading and sea waybills. This kind of maritime trade *is* regulated internationally. Several sets of competing international rules now exist, but their mode of operation and regulatory function are the same. Subscribing countries must legislate the rules domestically so that they are mandatorily incorporated into the carriage contracts. These rules set out the minimum responsibilities of the carrier towards the cargo and its owner in return for a limited maximum liability in the event of breach of the contract.

Established in 1924, the Hague Rules received wide application until modern shipping and cargo handling methods rendered their allocation of risks and responsibilities between the carrier and cargo owner somewhat dated. The Hague Rules were amended to some countries satisfaction by the Visby and Special Drawing Right (SDR) Protocols in 1968 and 1979 (Hague-Visby Rules, 1968/79), while other states chose to replace them with a new set named the Hamburg Rules in 1978 (Hamburg Rules, 1978). In 1980 a further set, modelled on the Hamburg Rules but designed for the burgeoning multimodal movement of goods that resulted from the container revolution, was concluded by the Multimodal Convention (Multimodal Rules, 1980). This growing confusion of international regulations has led the United Nation Commission on International Trade Law (UNCITRAL) to prepare prospectively for possible conclusion in 2008 a wholly new uniform set of rules (UNCITRAL Draft Convention). The pattern of ratification of the international carriage conventions by the Arctic states is set out in Appendix D. However, ratification of an instrument *per se* is not determinative of the support or otherwise to a particular instrument. For example, although not a party, Canada has implemented through the *Marine Liability Act* the Athens Convention and the Hague-Visby Rules.

Each set of rules has to solve the same problem, namely balancing the risks of sea transport and maritime trade in an internationally acceptable way. As with bulk cargo, the carrier must provide a suitable ship in which to load, carry and care for the cargo to its destination. The various sets of rules differ in the standards of conduct expected of the carrier, the scope of application of the rules and the limits of liability for their breach. These are variations in details, not principles. The Hague-Visby Rules, or some variant of them, are the most widely applied international regulations at present. These rules apply in the Arctic just the same as in any other ocean area. As with bulk cargo transport, practical standards appropriate for sailing in Arctic waters (e.g., the IMO Arctic Guidelines, the DNV and ABS Guidelines, the Arctic Council's TROOP Guidelines and the Nunavut Conditions), concerning seaworthiness of the ship in ice conditions and care of the cargo in cold climates, influence the operation of the rules.

In general, the Hague-Visby Rules require the carrier to load, handle, stow, carry, safe-keep, care for and discharge the cargo (Art. II). The carrier must ensure that the ship is seaworthy and cargoworthy and is properly equipped, supplied and crewed (Art. III(1)). It must also complete the voyage without unreasonable deviation or delay (Art. IV(4)) and must protect the cargo until discharge at its destination (Art. III(2)). There are provisions for exceptions for intervening events and actions by persons beyond the carrier's control, in addition to the notable exclusion of liability for the negligence of the master and crew in the navigation of the ship (Art. IV(2)). These rules are mandatory minimum terms of the carriage contract (Art. III(8)). However, the carrier is free to agree to undertake greater responsibilities towards the cargo (Art. V). In the event of breach of its duties, the carrier is liable for a specified compensation to the cargo owner. No limitation of liability is applicable if the carrier has acted wilfully or recklessly in disregard for the cargo (Art. IV(5)).

Beyond paying the agreed cost of transportation, the cargo owner's chief duty is not to ship dangerous goods without adequately forewarning the carrier of their hazardous nature. Whether the cargo owner does so or not, the carrier is entitled to discharge or destroy a cargo that poses a risk at any stage of the voyage and to hold the cargo owner liable for all damage caused by it (Art. III(6)). What constitutes a dangerous cargo, and how such a cargo must be treated, is determined in the first instance under the IMDG Code, but because new chemicals and other hazardous products are continually being produced, these are constantly evolving**.** Further,

in instances of containerized cargo, the safety of the containers themselves is regulated by the International Convention for Safe Containers (CSC, 1972).

Passengers on Cruise Ships

The growing interest in eco-tourism in the Arctic is rapidly increasing the number of cruise ships making excursions in polar seas. The commercial carriage of passengers by sea, whether on ferries or cruise ships, is internationally regulated by the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea, 1974 and its protocols of 1976 and 1990 (not yet in force) (Athens, 1974/76/90). (A further protocol was concluded in 2002 but it is also not yet into force: when it is, the consolidated treaty will be known as the Athens Convention, 2002). The safety of everyone on board, whether crew, cruise company employees or fare paying passengers, is the responsibility of the carrier and is regulated by SOLAS. The Athens Convention governs the terms of the passengers' contract of carriage with the carrier, providing minimum conditions subject to specified exceptions and limits of liability.

The Athens Convention states straightforwardly that the carrier is responsible for any personal injury to passengers and loss or damage to their luggage that occurs as a result of the fault or negligence of the carrier or its employees (Art. 3). If the injury or loss is incurred as a result of shipwreck, collision, stranding, explosion, fire or defect in the ship (collectively called "shipping incidents"), the carrier is presumed to be at fault unless it can affirmatively prove it was not (Art. 3(2)). (Under the Athens Convention 2002, Art. 3, the carrier will be held strictly liable for shipping incidents unless it proves they resulted from acts of war, hostilities, civil war, insurrection, exceptional natural phenomena, or the wilful acts of third parties.) In other circumstances, the injured passenger must prove the carrier or one of its employees was negligent in a way that caused the claimed loss. Thus, for example, the failure of the master to give passengers an appropriate warning before a potentially dangerous manoeuvre to avoid ice would constitute negligence giving rise to a claim if passengers could demonstrate they were injured as a consequence of the manoeuvre.

The Athens Convention does not, however, spell out the criteria of negligence. Negligence acquires its meaning from accepted international shipping practices, particularly amongst cruise ship operators, e.g., Association of Arctic Expedition Cruise Operators Guidelines (AECO, 2007), and from SOLAS as well as other binding shipping safety rules such as IMO's Life Saving Appliances Code (IMO LSA, 2003). The IMO LSA sets out the minimum kinds and operability of personal life saving equipment on board a passenger ship. However, industry standards and international guidelines may not be sufficient as they may not be up to date or adequately reflect special shipping situations. For example, the IMO LSA calls for personal life saving appliances (e.g., lifeboats, liferafts, rescue boats and life jackets) to be operational in temperatures ranging from $+40^{o}$C down to -15^{o}C, which is likely inadequate given the low temperatures in the Arctic.

The Athens Convention also protects carriers by imposing controversial limits on the compensation payable by them for breach of their duties. Under the Athens Convention 2002, contracting states will be allowed to set their own higher or unlimited ceilings of compensation (Art. 7). Injured claimants can exceed the prescribed limits only if they can prove the carrier's default was done wilfully or recklessly with the expectation that injury would probably result (Athens, 1974/76/90, Art. 13). However, the compulsory insurance requirements and a direct

right of action against the liability insurers for injured claimants that will arise under the Athens Convention 2002 should offer passengers greater assurance of actual receipt of compensation (Art. 4bis).

Marine Insurance

There is no international convention on marine insurance. A business and private law matter, marine insurance tends to be legislated at the national level (e.g., Canada and Russian Federation) and, occasionally, at a sub-national level (e.g., United States). Insurance practices are driven by insurance markets, the major providers being located in London, New York, Oslo and Tokyo. Of particular significance for Arctic shipping is protection and indemnity insurance, offered through P & I Clubs, with the major clubs being based in Japan, Norway, Sweden, United Kingdom and United States, and represented by the International Group of P& I Clubs (Table 6). Until recently, Russian Federation shipping in the Arctic tended to be insured under state schemes (Schelkanov & Vasilyev, 2006; Smirnov & Stepanov, 2006). With the exception of Russian Northern Sea Route experience, there is only limited knowledge and research on the marine insurance aspects of Arctic shipping (Gold et al., 1996; Gold et al., 1997; Musin, 1998; Ragner, 2000; Gold & Wright, 2006; Schelkanov & Vasilyev, 2006; Smirnov & Stepanov, 2006).

Marine insurance is an essential service to international shipping. It is generally conceded that without marine insurance, international commercial navigation in the Arctic would not be economically or environmentally viable (Gold & Wright, 2006). Marine insurance allows shipowners and carriers generally to take on the risk of trading on Arctic routes and liabilities imposed by statute, for example those arising from oil pollution damage. Shippers and consignees would also want to protect their cargoes.

Throughout the long history of marine insurance, marine underwriters, although conservative, have not been averse to risk exposure. What has enabled them to take on the risk and charge an appropriate premium is the specialized knowledge they and the assureds possess to enable them to assess the risk so as to be able to quantify it and consider the extent, conditions and price of coverage.

Today, although most of the risks associated with shipping are well known and understood by insurers and assureds alike, the risks associated with polar navigation are still not fully known or understood. Marine insurance tends to follow the commercial nature of the venture rather then lead it. Underwriters often base their underwriting premiums on a historical loss record. It is a competitive market. For the most part, and although significant knowledge has been generated in relation to the Northern Sea Route, most of the Arctic is still perceived as an unknown quantity or a marine frontier. As a result, the provision of insurance for Arctic shipping tends to be on a case-by-case basis, expensive and also requiring self-insurance (Gold & Wright, 2006). Underwriters normally charge a surcharge in the range of 25 percent with respect to hull and machinery and cargo insurance. However, at this time there do not appear to be discernible insurance market patterns for Arctic shipping, partly because of the paucity or specialized nature of activities to date (Gold & Wright, 2006). On the Northern Sea Route, it has been noted that “marine underwriters are willing to assume the risks involved provided that sufficient support for the vessels operating on this route is assured” (Gold & Wright, 2006).

Table 6. The International Group of Protection & Indemnity (P & I) Clubs

American Steamshipowners Mutual Protection and Indemnity Association, Inc.
Assuranceforeningen Gard (Gjensidig)
Assuranceforeningen Skuld (Gjensidig)
The Britannia Steam Ship Insurance Association Ltd
The Japan Shipowners' Mutual Protection and Indemnity Association
The London Steam-Shipowners' Mutual Insurance Association Ltd
The North of England Protecting and Indemnity Association Ltd
The Shipowners' Mutual Protection and Indemnity Association (Luxembourg)
The Standard Steamshipowners' Protection and Indemnity Association Ltd
The Standard Steamshipowners' Protection and Indemnity Association (Bermuda) Ltd
The Standard Steamshipowners' Protection and Indemnity Association (London) Ltd
The Steamship Mutual Underwriting Association Ltd
The Steamship Mutual Underwriting Association (Bermuda) Ltd
The Steamship Mutual Underwriting Association (Europe) Ltd
Sveriges Ångfartygs Assurance Förening (The Swedish Club)
The United Kingdom Mutual Steam Ship Assurance Association (Bermuda) Ltd
The West of England Shipowners Mutual Insurance Association (Luxembourg)

Marine insurance claims concerning Arctic operations can be expected to encounter certain difficulties. A loss in the remote Arctic can be a disincentive for the insurance industry (NRC, 2007). It might be difficult, time consuming and costly for an assured to gather all the material facts related to an incident in a remote area. It is possible for a vessel to be damaged and not removed before ice closes in for the season. Whether the underwriters would consider such a vessel a constructive total loss would depend on the particular facts of the case. If the vessel is ice-strengthened and suffers no damage, it could be considered merely delayed and not covered under the terms of the policy. Because the claims for a constructive loss are potentially greater in the Arctic, the premium charged for such coverage reflects this higher risk. If the insurer chooses not to accept the assured's notice of abandonment, the shipowner, under statutorily derived liability, could still be liable for wreck removal, which is normally covered by its P & I Club. In the case of the sinking of *Arctic Ublureak* in 1983, the Canadian government required that the vessel be removed the following summer. The cost of wreck removal was probably borne by the P & I Club involved, not by the hull insurers, because the vessel was a constructive total loss and the cost of removing the vessel exceeded its value when recovered. Thus P & I cover is likely to play a critical role in Arctic shipping and is in fact a requirement for trading on the Northern Sea Route (Schelkanov & Vasilyev, 2006). With respect to the latter, the requirement is for cover that would provide compensation in the range of US$12 million to US$1.25 billion (Schelkanov & Vasilyev, 2006).

Salvage

The opening of new trade routes in and through the Arctic will require the provision of important services for safe international navigation in the region, such as timely meteorological

information, up to date charts, ice conditions advisories, navigation aids, port services, possibly pilotage for some areas, towage and salvage. High standards for shipping will help prevent, but not totally eliminate maritime incidents or even casualties, possibly due to human error or equipment failing in the harsh conditions. A ship that experiences an incident, such as grounding, fire, damage from a collision or even simply loss of engine power, may need external assistance to stabilize its condition and be taken to a safe place.

Arctic shipping will need to have access to salvage just as shipping in any other marine region. However, more than most other regions, the provision of salvage in Arctic waters will encounter difficulties due to remoteness, harsh climatic conditions, darkness for half of the year, relatively few ports that could provide even temporary repairs or a save haven, lack of experience of salvors in ice-covered waters, the likely requirement for ice breaking and Polar Class vessels, lack of dedicated salvage depots, and the particular fragility of the Arctic environment. The recent M/S *Explorer* sinking off the Antarctic coast highlights the remoteness and issues that would arise in an Arctic salvage operation. Perhaps to a significantly lesser extent in the Northern Sea Route, there is little if any resident salvage capacity in the Arctic basin. The ice-free ports of Murmansk and Nahodka appeared to be the best equipped for salvage operations, airlift capacity and infrastructure (Semanov et al., 1997).

Against this backdrop the International Convention on Salvage, 1989 is an important instrument and all Arctic Council member states are parties (see Appendix D). In general, salvage is legislated and subject to industry standard form agreements. In common law jurisdictions, such as most provinces and territories in Canada and states in the United States, there is also common law salvage governed by principles and rules of equity administered by the courts. Maritime law also recognizes life salvage, that is the saving of persons in distress at sea, and this is governed by different principles from property salvage. This section focuses on property salvage.

"Salvage" as a term of art refers to the actual service provided to a ship in need of assistance, the body of law that exists to govern this maritime institution, and the reward due to the salvors for their services. Essentially, the law of salvage provides to the salvor a reward for successful salving of the vessel or cargo. The public law of salvage seeks to encourage this essentially private aspect of commercial shipping. Private firms of professional salvors have been created to respond to shipping casualties. Salvage is as much an art as a science, and professional salvors build up their experience over a lifetime using the latest in computer modelling of ship damage stability and their own intuition to complete successful salvage operations. The goal of the law of salvage from a public perspective is to encourage investment in equipment and for these firms to stay in business. Some states provide a state-operated salvage response where it is thought that there is insufficient commercial capacity. The Russian Federation has a fleet of polar vessels, including seventeen icebreakers, several of which are nuclear-powered and provide salvage services (Brigham, 1988; Wikipedia, List of Icebreakers, 2008).

Traditionally salvage was only paid if there was success. Salvors took a risk and they were paid handsomely if they were successful. The salvage award is a percentage of the value of the salved property (ship and cargo), normally determined through an arbitration process and frequently in London. Hence, the "no cure-no pay concept" that has existed for centuries. However, perceptions and expectations have changed and salvage has become a complex operation subject to environmental liabilities in modern national marine environmental legislation. The 1989 Salvage Convention now recognizes that a salvor who has minimized or

prevented environmental damage is entitled to special compensation (Art. 14). Further, the P & I insurance and salvage industries have developed additional standard clauses, such as the Special Compensation P & I Club Clause (SCOPIC, including SCOPIC 2000), to enable the salvor to at least recover their expenses (Gold et al., 2003, 614–617). The situation at this time is still not sufficiently satisfactory to encourage the provision of salvage in conditions of great environmental risk and the salvage industry has been lobbying for the introduction of a reward specifically for the provision of environmental salvage, in addition to the reward for salving maritime property. This would require an amendment to Article 14 on special compensation in the Salvage Convention, or perhaps a new standard term for this purpose in the salvage contract (Bishop, 2007). Salvage awards are normally paid by the shipowner's hull and machinery underwriters. Pollution salvage awards are paid for the P & I insurers. The P & I insurers are also responsible for wreck removal if there is a government-ordered clean-up.

The parties to a salvage operation, i.e., salvors, shipowners and their insurers, can enter into any contractual arrangement that they choose. The best known standard salvage agreement is the "Lloyd's Open Form of Salvage Agreement – No Cure-No Pay", which provides a comprehensive self-contained commercial document setting out the rights and obligations of the parties to a salvage operation (LOF, 2000; Gold et al., 2003, 594–595). This form has been in existence in successive iterations for a hundred years. If there is no contract, the parties will have to commence action in the domestic courts to obtain a salvage award. Experience has shown that this is an expensive and time consuming process, which tends not to encourage salvage activity.

As shipping in Arctic waters increases, there is likely to be a need for dedicated, experienced and professional salvage personnel. There are few salvage companies with extensive salvage experience in Arctic operations. The present international salvage and wreck regimes do not contemplate Arctic operations. There has been very little contingency planning or exercises of salvage operations in Arctic waters. Nor is there much equipment to draw upon as vessels of opportunity. The lack of dedicated salvage equipment and repair facilities in the region will likely require that the vessel be either towed out or repaired *in situ* and then made ready for a voyage to a repair facility in more southern latitudes. Any salvage operation in the Arctic would likely require an interaction between private salvors and government agencies that operate governmental vessels such as icebreakers and re-supply ships. Special "liability salvage" will probably need to be negotiated between shipowners, salvors and underwriters. If equipment has to be brought in to a salvage scene, this will require heavy lift aircraft and there may not be airfields in close proximity to the salvage incident. With so little shipping relative to other trading routes, it seems unlikely that private interests will stockpile equipment and do work in the Arctic without some special relationship with the coastal state.

Liability and Compensation for Ship-source Pollution Damage

Compensation for pollution damage caused by ship-source pollution is governed by an international regime elaborated under the auspices of the IMO (Appendix D). If a pollution incident occurs involving an oil tanker, compensation is available to governments or other authorities that have incurred costs for clean-up operations or preventive measures and to private bodies or individuals who have suffered damage as a result of the pollution. Separate conventions deal with compensation for such damages caused by hazardous and noxious substances from ships and bunker oil spills from non-tankers. Under the conventions, in general,

the shipowner is liable for the loss or damage up to a certain amount. This liability will be covered in part by insurance (Gold, 2006; Tan, 2006). Separate compensation funds provide additional compensation when the victims do not obtain full compensation from the shipowner or his/her insurer. These compensation funds, established under the auspices of the conventions, are managed by intergovernmental organizations established by the state parties.

Oil Spills from Tankers

The international regime governing compensation for damage caused by oil pollution from oil tankers is based the 1992 Civil Liability Convention (1992 CLC) and the 1992 Fund Convention. Additionally, the 2003 Supplementary Fund Protocol (Supplementary Fund) came into force in 2005 (IOPCF, 2006; SOPF, 2007). These conventions apply to pollution damage in the territory or territorial sea or EEZ, or equivalent area, of a state party regardless of the polluting ship's flag state or its owner's state. However, the conventions only apply to spills of persistent cargo and fuel (bunker) oil from sea-going tankers, not to spills of bunker oil from ships other than tankers.

The main types of "pollution damage" covered are: (1) property damage; (2) the costs of clean-up and preventative measures at sea or on shore; (3) compensation payable for loss of earnings suffered by the owners of property contaminated by oil as a result of a spill (consequential loss); (4) compensation payable for loss of earnings caused by oil pollution suffered by persons whose property has not been polluted (pure economic loss); and (5) compensation payable for the costs of reasonable reinstatement measures aimed at accelerating natural recovery of environmental damage.

The 1992 CLC applies the principle of "strict liability" for damage from pollution to the registered shipowner; proof of negligence is not required. Claims under the Convention are prohibited against the servants or agents of the owner, the charterer (including a bareboat charterer), manager or operator of the ship, and others. The Convention requires compulsory liability insurance for tankers carrying more than 2,000 tonnes of persistent oil in bulk or cargo. Uniquely, claims for pollution damage for which the tanker owner would be liable under the Convention may be brought directly against the insurer.

Tanker owners will normally be entitled to limit their liability to an amount based on the gross tonnage of the tanker involved in the incident (Table 7). Additional compensation may be available under the 1992 Fund Convention when the compensation available from the tanker owners and their insurers is insufficient to meet all valid claims (Table 7). The 1992 Fund will not pay compensation if the damage occurred in a state which was not a party to the 1992 Fund Convention. The "optional" Supplementary Fund provides for additional compensation. If the total amount of valid claims exceeds the total amount of compensation available under the conventions, the compensation paid to each claimant will be reduced proportionately.

The 1992 Fund is financed by contributions levied on any "person" who has received in one calendar year more than 150,000 tonnes of crude oil and heavy fuel oil (contributing oil) in a state party to the 1992 Fund Convention after sea transport, collected retrospectively. There is no regular levy or fixed premium to establish a standing fund.

Table 7. Liability limits

Convention	Maximum amount payable	Ship size
1992 CLC	89.77 million SDR (US$ 148 million), shipowner and insurer	140,000 units gross tonnage or more
1992 Fund	203 million SDR (US$ 334 million), includes the sum actually paid by the shipowners and their insurers under the 1992 CLC	Irrespective of size
Supplementary Fund Protocol	750 million SDR (US$ 1.2 billion), including the amounts payable under the 1992 CLC and the 1992 Fund Convention	Irrespective of size
HNS Convention	100 million SDR (US$ 165 million) shipowner and insurer	100,000 units of gross tonnage or more
	HNS Fund provides up to 250 million SDR (US$ 411 million), includes amount paid by shipowners and their insurers	Irrespective of size
Bunkers Convention	Insurance or other financial security to cover liability for pollution damage compulsory for the registered owner of a ship	1,000 units gross tonnage or more
1996 LLMC Protocol (can apply in claims under Bunkers Convention)	1 million SDR (US$ 1.6million) Additional amounts for larger ships: 400 SDR (US$ 658) 300 SDR (US$ 494) 200 SDR (US$ 329)	Not exceeding 2,000 gross tons For each ton from: 2,001 to 30,000 30,001 to 70,000 In excess of 70,000
OPA ‘90	US$1 billion insurance cover for pollution	

Note: IMF value calculated as at March 28, 2008 (SDR 1 = US$ 1.64599).

In the Arctic context, it may be unclear if the conventions apply to floating storage units (FSUs), floating production, storage and offloading units (FPSOs), and permanently and semi-permanently anchored ships engaged in ship-to-ship (STS) oil transfer operations. The 1992 Fund’s governing bodies’ policy statements emphasize that the decision on the application of the

1992 conventions to a specific incident would be taken in the light of the particular circumstances of that case (IOPCF, 2000: 34–36; IOPCF, 2006: 29–30; Canada, 2001a, Part 6, 5.49). In this respect the conventions' current definition of "ship" is problematic. For the purposes of the 1992 CLC and Fund Conventions, "'Ship' means any sea-going vessel and seaborne craft of any type whatsoever constructed or adapted for the carriage of oil in bulk as cargo, provided that a ship capable of carrying oil and other cargoes shall be regarded as a ship only when it is actually carrying oil in bulk as cargo and during any voyage following such carriage unless it is proved that it has no residues of such carriage of oil in bulk aboard." Thus ultimately, in accordance with the conventions, the question as to whether a particular vessel is covered may come down to a judgement of a court in a state party (Fund Convention, 1992, Art. 7).

Hazardous and Noxious Substances Spills from Ships

The International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996 (HNS Convention) is not yet in force. Among Arctic states, only the Russian Federation is a party at this time. The HNS Convention is modelled on the international compensation regime for oil pollution from tankers. Hazardous and noxious substances includes bulk solids, liquids including oils, liquid gases such as liquefied natural gases (LNG) and liquefied petroleum gases (LPG), and packaged substances. Bulk solids such as coal and iron ore are excluded. The HNS Convention covers loss or damage caused by non-persistent oil, as well as non-pollution damage from persistent oil. Pollution damage caused by persistent oil spills from tankers is excluded since such damage is already covered by the international regime for oil tankers. Likewise, the convention excludes loss or damage caused by radioactive materials.

The HNS Convention covers the following "damage": (a) loss of life or personal injury on board or outside the ship; (b) loss of, or damage to, property outside the ship; (c) loss or damage caused by contamination of the environment (compensation for environmental damage is limited to costs of reasonable measures of reinstatement actually undertaken); and (d) the costs of preventive measures taken by any person after an incident has occurred to prevent or mitigate damage. The Convention shall apply exclusively to all or some damages depending on where they occur geographically. In a state party's territory or territorial sea any damage caused during carriage of HNS by any seagoing ship is covered; in its EEZ or equivalent area, damage by contamination of its environment is covered. The Convention also covers any damage (excluding damage by contamination of the environment) caused outside the territory, including the territorial sea, by HNS carried by seagoing ships registered in a state party. The Convention applies to preventative measures wherever taken.

The HNS Convention establishes a two-tier compensation regime. The first tier is provided by individual shipowners and their insurers, and the second tier by the International Hazardous and Noxious Substances Fund (HNS Fund). This Fund is financed by contributions from individual receivers of HNS after sea transport in state parties to the Convention.

The shipowner is strictly liable for damage caused by HNS carried on board a ship. However, shipowners can limit their liability based on the tonnage of their ships (Table 7). The Convention provides for compulsory insurance and direct action against insurers. The HNS Fund will provide additional compensation to a maximum amount, including the amount paid by

shipowner and their insurers. A Protocol to the HNS Convention is currently being developed that would allow a greater number of states to ratify the Convention and facilitate its entry into force.

Bunker Oil Spills from Non-tankers

The International Convention on Civil Liability for Bunker Oil Pollution Damage (Bunkers Convention, 2001) will enter into force on 21 November 2008. At the time of writing, only Norway among Arctic states is a party. However, many more states representing approximately 25 per cent of the global tonnage are parties. The international compensation regime for tankers does not include spills of oil carried as fuel in bunkers of ships other than oil tankers. The Bunkers Convention covers some of that omission. It applies to pollution damage caused by contamination resulting from the escape or discharge of bunker oil from a ship. For the purposes of the Convention, a "ship" is broadly defined as including "any seagoing vessel and seaborne craft, of any type whatsoever". As expected, the Bunkers Convention does not apply to pollution damage defined by the 1992 CLC respecting tankers.

Under Article 1(3) of the Bunkers Convention, the "shipowner" (defined broadly to embrace "the owner, including the registered owner, bareboat charterer, manager and operator of the ship") will be liable to pay compensation for "pollution damage" caused in the territory, territorial sea and EEZ of a state party. ("Pollution damage" is defined the same as in the 1992 CLC.) The Convention applies the principle of strict liability, and claims for compensation for pollution damage may also be brought directly against an insurer.

The obligation to obtain insurance rests solely upon the registered owner of a ship. Insurance, or other financial security to cover the liability for pollution damage, is compulsory for the registered owner of a ship having a gross tonnage greater than 1,000 registered in a state party. Nevertheless, a state party may declare that this requirement does not apply to ships operating exclusively within its territory or territorial sea. The Bunkers Convention preserves the right of the shipowner and insurer to limit liability under any applicable national or international regime, such as the Convention on Limitation of Liability for Maritime Claims, 1976 (LLMC 1976), as amended (Appendix D). In states where LLMC 1976 applies, shipowners and others may have no general right of limitation of liability for bunker pollution claims which do not involve physical damage to property or result in infringement of rights (e.g., economic loss arising from disruption to a business caused by an oil spill).

Unlike the 1992 CLC for oil tankers, the Bunkers Convention does not provide for a separate free standing limitation fund provided by shipowners to be exclusively available to satisfy bunker pollution damage claims. Thus bunker pollution damage claimants will have to prove their claims against any available limitation fund alongside other "property" claims arising out of the same incident. Further, there is no additional compensation internationally (like that available for tanker spills under the 1992 Fund Convention) when compensation under the Bunkers Convention is inadequate. The Bunkers Convention is accompanied by a Resolution (Annex 1) which urges all states to ratify or accede to the 1996 Protocol to the LLMC 1976 thus increasing the fund available for bunker pollution claims. Funds available for all claims (including those for bunker pollution damage) are greater under the 1996 LLMC Protocol than under LLMC 1976.

The United States Experience

Prior to the *Exxon Valdez* incident in March 1989, there was movement within the United States toward ratification of the two 1984 protocols that amended the international 1969 CLC and 1971 Fund Conventions. The *Oil Pollution Act of 1990* (OPA ’90) signed into U.S. law on 18 August 1990, rejected the international tanker liability and compensation regime (United States, 1990). OPA ’90 instituted new rules to promote oil tanker safety and focuses on five areas: (1) prevention, e.g., crew competence, double hulls, etc.; (2) preparedness, e.g., contingency plans, ship response plans and exercises, qualified individuals and oil spill response organizations; (3) response, primary responsibility is vested in the U.S. Coast Guard (USCG); (4) liability that serves as a real deterrent and compensation; and (5) research and development into response and prevention techniques and hardware.

OPA ’90 applies to both tank and non-tank ships and to any person owning, operating or chartering a ship. Under the Act, there may be more than one responsible party in a single incident. The shipowner is strictly liable for costs and damages resulting from oil spills, which will be covered by mandatory insurance (Table 7). Failing response by the shipowner to an incident, the US$1 billion Oil Spill Liability Trust Fund (OSLTF) provides federal resources for a rapid and effective response with recourse against the shipowner to recover any expenditure.

OPA ’90 is enforced by the USCG using both inducements and sanctions to engender compliance. Inducements include waiver of penalties and a reduction in regulatory burdens for responsible shipowners. Sanctions include administrative, civil, and criminal penalties to deter negligence or intentional misconduct. These sanctions, coupled with an effective enforcement programme, have a significant deterrent effect on potential polluters. In the event of an oil spill in U.S. waters, shipowners will be held strictly liable for costs and damages, with the possibility of unlimited liability in the most serious cases.

Structurally, the U.S. and international regimes are similar, yet they are far apart with respect to such key issues as to when shipowners may lose their right to limit liability, and the scope and extent of compensable damages (particularly natural resource damages). (Also noteworthy, unlike OPA’90, is the international regime’s lack of a separate limitation fund, as well as no supplementary compensation, for bunker pollution damage claims involving non-tank ships, given the risk of very significant bunker oil spills from non-tankers in light of industry trends.)

Both the 1992 CLC and OPA ’90 limit the liability for shipowners. However, it is much easier to break these limits in OPA ‘90. Also, in the United States, it would be a rare incident where responsible parties are deemed to have a complete defence. Under OPA ’90, the polluter pays for damages it causes. Under the 1992 CLC test (which differs from the 1969 CLC test) it is practically impossible for shipowners to be deprived of their right to limit liability. The international regime provides more protection than deterrence. In the United States, in addition to OPA ’90, coastal states may adopt more stringent oil spill liability laws, including cargo owner liability, in state territorial waters.

OPA ’90 provides for payment of natural resource damage claims from the OSLTF. The technically justified reasonable cost for reinstatement/restoration measures for which compensation is available under the international regime, might equate to primary restoration under the U.S. Natural Resource Damage Assessment (NRDA) regulations (United States, 1996). However, the U.S. regulations also include the diminution in values of those natural resources pending restoration *plus* the reasonable cost of assessing those damages. The

international conventions do not provide for these latter sorts of compensation provided by the U.S. NRDA regulations.

Regional Developments: The European Union and the Antarctic

In the aftermath of the *Erika* incident (France, December 1999), the European Commission (EC) proposed new measures, including penal sanctions as a deterrent (not related to compensation), directed against any person who has caused a pollution incident through gross negligence. The EC viewed the international regime as providing for inadequate compensation for environmental damages. The Erika 1 and Erika 2 packages of 2000 proposed amendments to the international regime to restrict the right of shipowners to limit their financial liability if accidents are due to their actual fault, as well as proposals to remove the *de facto* immunity of other key players (such as the charterer, operator, or manager of the ship) from compensation claims (EC, 2000a & b). The packages also proposed establishing a European COPE Fund should the then proposed international Supplementary Fund prove inadequate.

In January 2002, the EC issued a proposal for a directive on environmental liability to cover damage to biodiversity, soil pollution and damage to waters covered by the Water Framework Directive. It is noteworthy that the proposed damage assessment rules are similar to the U.S. NRDA regulations for estimating damages for injuries to natural resources.

The *Prestige* incident (Spain, November 2002) appeared to confirm that the measures proposed in the Erika 1 and 2 packages were well founded. In November 2005, the EC proposed a third package of legislative measures (Maritime Safety Package 3, or Erika 3), including a proposal for a directive on the civil liability and financial securities of shipowners (EC, 2005). The EC's particular concern is to remove the ceiling on civil liability set in the 1992 CLC. By proposing improvements to the international regime for civil liability and compensation of pollution, the EC seeks to ensure that maritime operators transport oil on board tankers of the highest standard. The proposed directive would incorporate the 1996 LLMC Protocol into EU (European Union) law. It would be compulsory for all shipowners to cover their civil liability for an amount no less than double the limitation amounts set out in LLMC 1996. Further, the EC seeks a mandate for negotiating within the IMO a revision of the LLMC 1996 for the purpose of reviewing the test for shipowners losing the right to limit liability. However, the EU Council of Ministers recently rejected the EC's proposed directive on civil liability for shipowners (Stares, 2008). Whether this is a fatal setback for this EC proposal, or not, remains to be seen. Certainly, another serious marine oil pollution incident would add fuel to this policy debate within the EU governing bodies.

Positive developments since 1999, including those within the international liability and compensation regime, have undoubtedly assisted some EU member states in their opposition to the proposed EC directive. As noted above in this chapter, an optional third tier of compensation from a new international Supplementary Fund is now available to 1992 Fund Convention state parties that want it. As well, in February 2006, the International Group of P & I Clubs had presented to the 1992 Fund a revised Small Tanker Oil Pollution Indemnification Agreement (STOPIA 2006) and a new Tanker Oil Pollution Indemnification Agreement (TOPIA 2006). Under STOPIA 2006, the limitation amount applicable to small tankers would, on a voluntary basis, be increased to 20 million SDR for tankers of 29,548 gross tonnage or less for pollution damage in all 1992 Fund Party states. TOPIA 2006 would result in the shipowner indemnifying,

on a voluntary basis, the Supplementary Fund for 50 percent of the compensation amounts paid by it. These agreements, while not contracts, are unilateral offers by shipowners which confer on the respective Fund the right of enforcement. Thus the 1992 Fund Assembly decided at its October 2005 session not to re-open the 1992 CLC and the 1992 Fund Convention to adjust the shipowner's limit of liability. Alternatively, at their February/March 2006 sessions, the Assemblies of the 1992 Fund and the Supplementary Fund, in effect accepted the International Group's proposals for a STOPIA 2006 and TOPIA 2006.

The action taken within the EU bodies has galvanized the IMO to improve the regulation of ship safety and the international liability and compensation regimes. Supporters of the IMO hope that changes in the international regimes will preclude all, or most of what otherwise might prove to be, in effect, a 'EurOPA' that would threaten the continued viability of the international regimes.

Efforts have also been undertaken to establish a liability regime in the Antarctic. In June 2005, a new annex was adopted under the Protocol on Environmental Protection to the Antarctic Treaty. Annex VI to the Protocol, Liability Arising from Environmental Emergencies (Liability Annex), is subject to ratification and is not in force. The Liability Annex takes a unique approach to liability: If an operator fails to take prompt and effective response action, the operator will be liable to pay the costs of the response action, if any, taken by parties to the Annex or those authorized by the Parties (Bloom, 2006). The Liability Annex specifically includes tourist, scientific research and governmental ships within its scope.

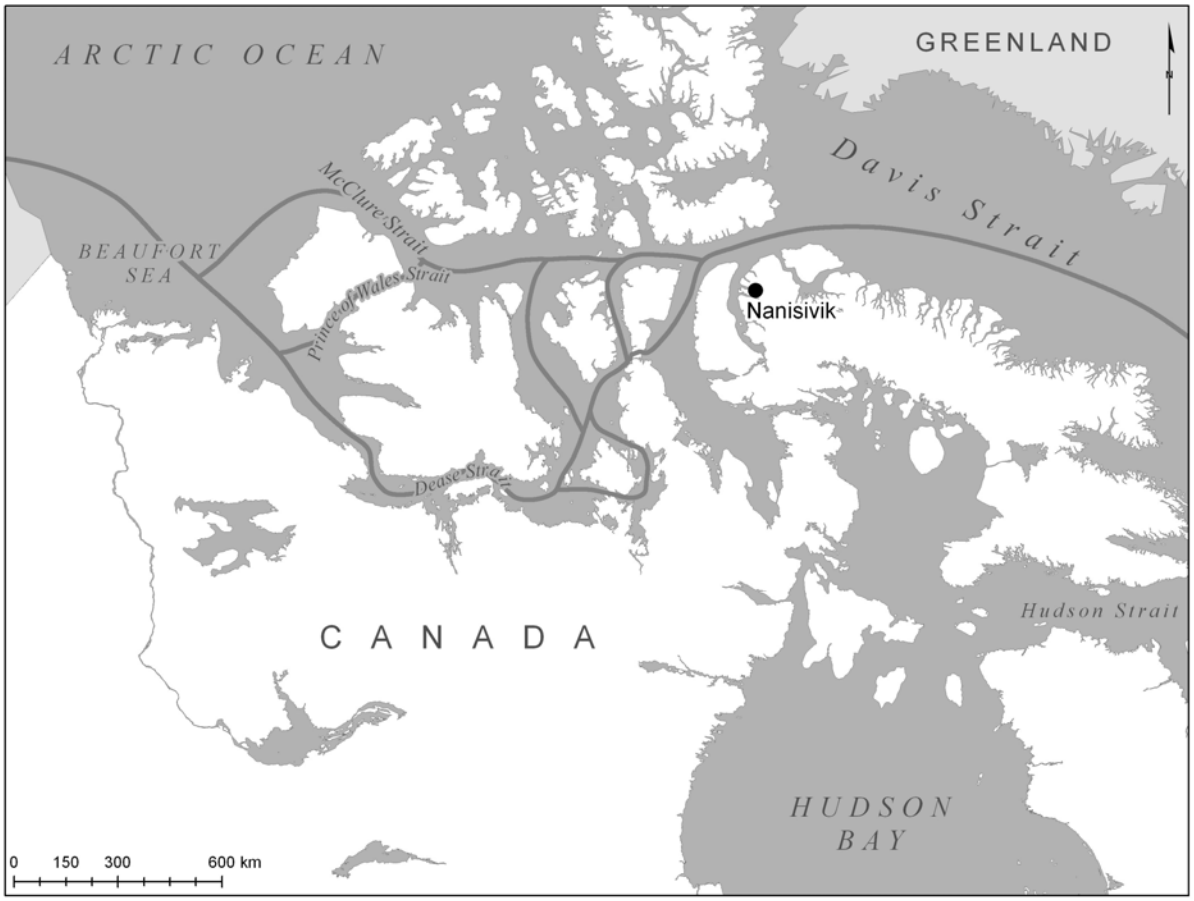
PART IV: SELECTED NATIONAL LEGAL FRAMEWORKS

While shipping standards as discussed above are largely adopted at an international level and with global application, both Canada and Russia have chosen to impose, founded upon Article 234 of UNCLOS, special shipping requirements for Arctic waters. The following overviews summarize some of the main legislative and regulatory measures developed by these two countries.

CANADA

Since the first recorded attempt to discover the Northwest Passage by John Cabot in 1497, explorers have sought to find a commercially viable passage through Canada's northern waters. The belief that a route lay to the far north persisted for several centuries, however it was not until 1906 that Roald Amundsen completed the first transit of the Northwest Passage. Currently, there are few complete transits of the Northwest Passage annually, although numerous vessels ply Canadian Arctic waters during the summer months. Spanning the entire North American continent from the Pacific to the Atlantic Ocean, there are several different routes through the Canadian Arctic archipelago, including the McClure Strait, Dease Strait and the Prince of Wales Strait, but not all of them are suitable for modern commercial ships (Figure 4).

Figure 4. Routes through the Canadian Arctic archipelago



Source: Map created by the Dalhousie University GIS Centre, 23 May 2008.

The national maritime administration of Canada is Transport Canada, and its principal responsibilities are performed through Marine Safety, a line organization of the department. Transport Canada's marine responsibilities include regulatory development and administration, navigational and marine safety, pollution prevention, security, and port state control. Transport Canada collaborates with several other departments and agencies. The Canadian Coast Guard, a special operating agency currently reporting to the Department of Fisheries and Oceans, deals with operational service matters. These operational services include ice breaking, boating safety, search and rescue, aids to navigation, environmental protection and response, and marine communications and traffic services. The Central and Arctic Region headquarters is located in Winnipeg, Manitoba. Environment Canada's responsibilities in the Arctic include provision of ice and meteorological services and protected areas such as wildlife areas and bird sanctuaries. The Parks Canada Agency is responsible for the implementation of policies and programs that relate to Canada's national parks, national marine conservation areas, and other national historic sites and heritage areas.

There are many Canadian laws that affect shipping in the Canadian Arctic. For example, from a protected area perspective there are at least four federal statutes applicable which could affect Arctic shipping: the *Oceans Act* (marine protected areas) (Canada, 1996), the *Canada*

Wildlife Act (marine wildlife areas) (Canada, 1985b), the *Canada National Marine Conservation Areas Act* (marine conservation areas) (Canada, 2002), the *Migratory Birds Convention Act, 1994* (migratory bird sanctuaries) (Canada, 1994a). The Department of Fisheries and Oceans, together with other federal departments, has produced the *Federal Marine Protected Areas Strategy* to promote a coordinated approach (Ottawa, 2005). However, the main parameters of shipping controls in the Arctic may be captured under five main themes (Appendix B). The *Arctic Waters Pollution Prevention Act* (AWPPA) (Canada, 1970) and Regulations (Canada, 1978b) stand as the primary shipping control vehicles. The *Canada Shipping Act, 2001* and Regulations serve a "secondary role." Marine security requirements and developments are a third tier of governance. Liability and compensation for ship-source oil pollution represents a fourth aspect of governance. A fifth category of shipping control involves non-legally binding documents, such as guidelines and manuals.

Current Legal Regime

Arctic Waters Pollution Prevention Act (AWPPA) and Regulations

Following a trial run of the Northwest Passage by the *SS Manhattan* in 1969, Canada responded to the threat of future foreign oil tanker transits in vulnerable Arctic waters by passing the AWPPA in 1970, which is still in force today. The Act established a 100-nautical mile pollution prevention zone in Arctic waters and prohibited all deposits of waste by any person or ship except as provided in regulations (s. 9). The Act authorized the Governor in Council (federal cabinet) to sub-divide Arctic waters into shipping safety control zones (s. 11) and to pass regulations for the control of shipping within the zones including construction, equipment and crewing standards (s. 12). Pollution prevention officers were given broad powers to board and inspect any ship within a shipping safety control zone and to direct ships to remain outside a zone or to anchor in a place selected by the officer in case of safety concerns (s. 14(4)). Consistent with this legislation, Canada's declaration accompanying the instrument of accession to MARPOL 73/78 stated:

> (a) The Government of Canada considers that it has the right in accordance with international law to adopt and enforce special non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered waters where particularly severe climatic conditions and the presence of ice covering such waters for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance.
>
> (b) Consequently, Canada considers that its accession to the Protocol of 1978, as amended, relating to the International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL 73/78) is without prejudice to such Canadian laws and regulations as are now or may in the future be established in respect of arctic waters within or adjacent to Canada (IMO, 2005, 96).

Although the United States and several European states issued communications to the IMO concerning Canada's declaration, none of those communications objected to it (IMO, 2005, 96).

Subsequently, a *Shipping Safety Control Zones Order* (Canada, 1978c) divided Canada's Arctic waters into 16 shipping safety control zones, and ASPPR (Canada, 1978a) have set out a complex array of shipping control measures. All ships are allowed to deposit sewage generated aboard (s. 28) and ships are largely prohibited from discharging oil or oily mixtures with narrow exceptions such as for the purpose of saving the loss of a ship and engine exhaust (s. 29). The owner or the master of a ship proposing to navigate within any zone may apply for an Arctic Pollution Prevention Certificate from a Canadian marine inspector or from a surveyor of a classification society outside of Canada, to indicate that the ship complies with the regulations when in Canadian waters (s. 13). Ships over 100 gross tonnage and carrying oil in excess of 453 m^3 are not allowed to navigate in any zone unless they meet special construction standards set out in schedules to the Regulations (ss. 3(1) and 6(1)).

No tanker is allowed to navigate in any zone without the services of a qualified ice navigator (s. 26(1)). The Regulations define qualified as having "served on a ship in the capacity of master or person in charge of the deck watch for a total period of at least 50 days, of which 30 days must have been served in Arctic waters while the ship was in the conditions that required the ship to be assisted by an ice-breaker or to make manoeuvres to avoid concentrations of ice ..." (s. 26(7)(b)).

The regulations have also established a zone/date system for ships carrying more oil than 453 m^3 (s. 6). Earliest and latest entry dates for each of the 16 shipping safety control zones are set corresponding to the ice capability of 14 categories of ships. For example, the most powerful Arctic Class 10 vessel could operate year round in all the zones while the least ice-capable, Type E ship (open water), would be excluded from entering the first six zones at any time of the year as those zones have the most severe ice conditions (DFO/CCG, 1999).

The categories include nine Arctic class ships (10, 8, 7, 6, 4, 3, 2, 1A and 1) with classifications based on the thickness in feet of ice that the vessel would have the power and strength to break, and five ships types (A, B, C, D and E). The types are based on the Finnish-Swedish (Baltic) rules where Type A ships can operate in thick first-year ice and Type E ships are considered open water vessels with no ice strengthening (Transport Canada, 1998a). To complicate matters, in 1995 Transport Canada issued the Equivalent Standards for the Construction of Arctic Class Ships which set construction standards for four classes of new ships with each of the four classes being the equivalent to an Arctic Class set out in the Regulations (Transport Canada, 1995). The categories (and Arctic Class equivalent) are as follows: CAC 1 (Arctic Class 10); CAC2 (Arctic Class 8); CAC3 (Arctic Class 6); and CAC4 (Arctic Class 3).

To provide more flexibility for ship entries in light of variable ice conditions year to year, Canada introduced the Arctic Ice Regime Shipping System (AIRSS) in 1996 (Transport Canada 1998a; Transport Canada 1998b). The System, having a legal foundation under section 6(3) of the ASPPR, allows ships to navigate outside the present zone/date system when ice conditions are suitable (DFO/CCG, 1999). The System uses a mathematical formula, considering concentrations of ice and ice types, to determine whether a ship can enter the ice regime in a particular zone. A ship choosing to follow the system based on actual ice conditions would be required to have a qualified ice navigator on board.

Canada, through the National Research Council of Canada, has conducted a reexamination of the zone/date intersection of the regulations in light of climate change in a recent study (Timco & Kubat, 2007). The data on which the zones are based is now 40 years old

and these have become dated. This report builds on earlier work the Canadian Hydraulics Centre (CHC) undertook on the ice regime system. The purpose of the report and research was to initiate a dialogue among the stakeholders to build a better Arctic shipping regime and that dialogue is ongoing.

Five other sets of regulations round out the control of shipping pursuant to the AWPPA. The *Arctic Waters Pollution Prevention Regulations* provide limited exceptions where wastes may be deposited into Arctic waters, for example when domestic waste deposit is permitted under territorial authorization or industrial waste is authorized under federal oil and gas legislation (Canada, 1978b, ss. 5 and 6). *Charts and Nautical Publications Regulations, 1995* require the master and owner of every ship of 100 tons or more to have on board the most recent editions of navigational charts, documents and publications (Canada, 1995, s. 4). *Steering Appliances and Equipment Regulations* try to ensure steering gear units are tested before departures of ships (Canada, 1983, s. 12) and require tankers and chemical or gas carriers to take special precautions including an alarm system for failure of any steering power unit and the capability of moving from automated steering to a manual method (s. 5). *Navigation Safety Regulations* set out various equipment requirements for ships navigating in shipping safety control zones including gyro-compasses (Canada, 2005, s. 66), radar (s. 67), echo-sounders (s. 68) and search lights (s. 76). *Ship Station (Radio) Regulations, 1999* require, among other things, that a non-Canadian ship navigating in a shipping safety control zone be equipped with a ship station and radio equipment in accord with the Regulations (Canada, 1999).

While UNCLOS, through Article 234, supports special coastal state powers over shipping in Arctic ice-covered waters out to 200 nautical miles, Canada has yet to extend its special Arctic legislation to cover waters beyond the 100-nautical mile pollution prevention zone. Recently, however, the Canadian federal government announced its intention to extend the application of the AWPPA to 200 nautical miles (Prime Minister of Canada, 2008a).

Canada Shipping Act, 2001 and Regulations

The *Canada Shipping Act, 2001*, while largely aimed at general control and registration of Canadian ships, is especially relevant to pollution control in the Arctic (Canada, 2001b). Part 9 of the Act allows regulations to be issued regarding pollution discharges and the management of ballast water for all vessels including foreign ships in Canadian waters (internal and territorial) and in the EEZ.

Ballast Water Control and Management Regulations, issued in 2006, are made explicitly applicable to shipping safety control zones in the Arctic as well as to waters of the EEZ (Canada, 2006, s. 1). The Regulations require ships to carry on board and to implement a ballast water management plan (s. 11) and set ballast water exchange requirements for ships involved in transoceanic (s. 6) and non-transoceanic navigation (s. 7). For a ship engaged in transoceanic navigation (navigating more than 200 nautical miles from shore where the water depth is at least 2,000 metres), the ship is generally prohibited from discharging ballast water taken on board a ship outside waters under Canadian jurisdiction unless the ship conducts the exchange before entering Canadian waters in an area situated at least 200 nautical miles from shore where the water depth is at least 2,000 metres. Where a ship cannot comply with the open ocean discharge requirement due to safety or stability concerns, the Regulations provide for special discharge zones in Canadian waters, two of which are in the North. A ship voyaging to a port, offshore

terminal or anchorage area in Hudson Bay is allowed to discharge ballast in an area in Hudson Strait east of 70° west longitude where the water depth is at least 300 metres. A ship voyaging to a port, offshore terminal or anchorage area in the High Arctic is allowed to discharge ballast water in an area in Lancaster Sound east of 80° west longitude where the water depth is at least 300 metres. For ships involved in non-transoceanic navigation (not navigating more than 200 nautical miles from shore where the water depth is at least 2,000 metres), their ballast water exchange is required to occur before entering Canadian waters in an area at least 50 nautical miles from shore where the water depth is at least 500 metres. The same two northern special discharge areas may be used by a ship involved in non-transoceanic navigation in case of stability or safety justifications.

Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals, issued in 2007, set discharge standards, based upon MARPOL, for oil and oily mixtures, noxious liquid substances, sewage, garbage and air emissions (Canada, 2007). For example, the Regulations authorize the discharge of oily bilge water if the undiluted oil content is no more than 15 ppm (s. 42(1)) and allow the discharge of an oily mixture from oil tanker cargo spaces with various MARPOL limitations, including that the discharge occur more than 50 nautical miles from land and the instantaneous rate of discharge of the oil in the effluent does not exceed 30 litres per nautical mile (s. 42(2)). However, the Regulations provide that the discharge standards for oil and oily mixtures, noxious liquid substances, sewage and garbage do not apply within Arctic shipping safety control zones. The regulatory standards are still applicable, however, to Arctic waters beyond the 100-nautical mile pollution prevention zone out to 200 nautical miles from the coastline. Consistent with the AFS Convention, the same Regulations address the use of organotin compounds and prescribe control measures for ships in waters under Canadian jurisdiction and for Canadian ships generally.

Although the *Canada Shipping Act, 2001* authorizes regulations to be passed establishing vessel traffic services (VTS) zones in an Arctic shipping safety control zone (s. 136) whereby vessel reporting and clearance would be mandatory, mandatory VTS zones have only been established for areas on the east and west coasts of Canada. Only a voluntary, non-regulatory VTS zone referred to as NORDREG, has been developed for Arctic Canada. Under NORDREG, ships of 300 tons or more are encouraged to follow various reporting procedures including the pre-entry provision of information about ice class, amount of oil on board (fuel and cargo) if such amount exceeds 453 m^3, date of the Arctic Pollution Prevention Certificate if carried and the name of the classification society. An exit report is also urged (CCG, 2007). Recently, the Canadian federal government announced plans to move NORDREG from the current "encouraged" reporting provisions to a mandatory reporting system for shipping entering Canadian waters (Prime Minister of Canada, 2008a).

While the *Canada Shipping Act, 2001* generally requires ships to enter into an arrangement with certified "Response Organizations" (ROs) who are to provide oil spill response services (s. 167), the Canadian Coast Guard (CCG) has only certified a network of four private-sector owned ROs to provide emergency response services for up to 10,000 tonne spills in waters south of 60° north latitude. Although no certified RO has been established for waters north of 60° latitude, the shipowner remains responsible as first responder. However, in terms of preparedness to combat oil pollution, the Canadian Coast Guard retains a primary response capacity in Arctic waters (SOPF, 2007, 46). During the shipping season, CCG icebreakers carry a limited inventory of first response spill equipment, and it is estimated that there is enough equipment within the region to respond to a 1,000 tonne oil spill (SOPF, 2007).

The *Canada Shipping Act, 2001* also establishes a framework for search and rescue operations in Canadian offshore waters. The Minister of Fisheries and Oceans is authorized to designate rescue coordinators and rescue coordinators are given broad powers to direct any vessel to take part in searches or to otherwise render assistance where a vessel or an aircraft is in distress or missing (s. 130).

At present, Canada's SAR capability in the eastern Arctic during the shipping season is coordinated by the Marine Rescue Coordination Centre (MRCC) in Halifax. For marine SAR, Canadian Coast Guard vessels operating in the Arctic would be tasked and military fixed wing aircraft may be deployed from Greenwood, Nova Scotia. Other aircraft at Iqaluit, Nunavut, and operated by Civil Aviation Search and Rescue (CASAR), in addition to helicopters from CCG ships, may participate in a SAR operation in the Arctic. To cover the central Arctic, military aircraft from Trenton, Ontario, may be deployed on a SAR mission and to cover the western Arctic, the RCC in Victoria, British Columbia, would coordinate operations.

The *Canada Shipping Act, 2001* has a specific provision for the reporting of dangerous ice conditions. Section 112 of the Act requires the master of a Canadian vessel, which encounters dangerous ice or subfreezing air temperatures associated with gale force winds and causing severe ice accretion on the superstructure of the vessel, to give notice of the danger to all vessels in the vicinity and to authorities onshore. The Canadian Ice Service, run by the federal Department of the Environment, provides an information service on sea ice and iceberg conditions and movements in the Canadian Arctic (Canada/CIS, n.d.). The same department also runs the Weatheroffice, which provides meteorological information on the Arctic (Canada/WO, n.d.). These information services provide important timely and accurate information to assist navigation in Canadian Arctic waters.

While the *Canada Shipping Act, 2001* allows regulations to be passed controlling or prohibiting navigation in order to protect the environment in a shipping safety control zone in the Arctic (s. 136), Canada has not adopted any mandatory routing requirements in the Arctic for commercial ships to date. Currently, ships can receive electronically ice maps and other information to assist them to select routes through the Canadian archipelago, depending on ice conditions. Ships have to have the freedom to seek out leads in ice cover and in heavy ice may require icebreaker assistance. Collision avoidance has not been an issue to date, as few ships operate in the Arctic and they communicate with each other as they work through ice. In the future, if traffic increases in an extended shipping season with more open water conditions, routing might be considered an option and one which could be exercised through the VTS.

Maritime Security

With respect to marine security, there are no specific requirements applicable in the Arctic. All ships must comply with the ISPS Code, which Canada has adopted into its domestic law through the *Marine Transportation Security Act* (Canada, 1994b) and the regulations made pursuant to it. The *Marine Transportation Security Regulations* (Canada, 2004) require all ships to meet a variety of reporting requirements and to develop shipboard security plans. As noted earlier, there is a compulsory 96 hour reporting requirement before entering Canadian waters. These requirements are not unique to the Canadian Arctic, but do apply. The security requirements are administered by Transport Canada Marine Security Branch, which is a separate directorate from Transport Canada Marine Safety. However, they have a close functional

working relationship. If there is a security threat the Minister of Transport may direct the vessel to a specific place. In the Arctic, this could be problematic because of remoteness of the region and limited number of ports accessible to commercial ships.

The Canadian government has made various commitments to enhance Canada's security and enforcement capability in the Arctic. Recent commitments include building new Arctic patrol ships, expanding aerial surveillance in the North, establishing a Canadian Forces Arctic Training Centre in Resolute Bay, Nunavut, and establishing a docking and refueling facility in Nanisivik, Nunavut, to serve as a staging area for naval vessels in the High Arctic and for use by CCG vessels as well (Prime Minister of Canada, 2007a & b). There is also made a budget commitment of CDN$720 million for construction of a new Polar Class icebreaker (Prime Minister of Canada, 2008b).

Liability and Compensation for Ship-source Oil Pollution

Canada's introduction of the AWPPA showed the world how strong its environmental concern could be, and the need for fundamental changes to traditional law in order to effectively deal with environmental problems. Currently in Canada, two acts govern civil liability and compensation for ship-source oil pollution in the Arctic: the *Marine Liability Act* (Canada, 2001a) and the AWPPA.

1. The Marine Liability Act

Statutory civil liability and compensation for ship-source pollution is provided for in Part 6 of the *Marine Liability Act* (MLA). The geographical application of Part 6 includes the territory of Canada, Canadian waters and the EEZ of Canada. While Canada is currently a state party to the 1992 CLC and the 1992 Fund Convention, it is the MLA that gives these international conventions, with important modifications, the force of law in Canada respecting the liability and compensation for spills from seagoing oil tankers (Convention ships).

Canadian domestic law on liability and compensation for ship-source oil spills goes further than these conventions. Even before the 1969 CLC and 1971 Fund Convention came into force internationally Canada had enacted domestic oil spill legislation under Part XX of the old *Canada Shipping Act* (Canada, 1985a). Part XX was one of the first national comprehensive regimes for oil spill response, liability and compensation in the western world. The principal elements of Part XX were:

- Establishing the strict liability of shipowners for the costs and damages for a discharge of oil.
- Allowing shipowners, in certain circumstances, to limit their liability.
- Creating a new national fund, the Maritime Pollution Claims Fund (MPCF), to be available for claims in excess of the shipowner's limit of liability.
- Giving the Minister of Transport the power to move or dispose of any ship and cargo discharging or likely to discharge oil.

This national regime existed in Canada between 1971 and 1989. During this period, Canada was not party to the international 1969 CLC and 1971 Fund Convention. In 1989 (following the

Exxon Valdez incident), Canada decided to increase its coverage for spills from seagoing oil tankers by accepting the international regime, while modifying and continuing its domestic regime. The Ship-source Oil Pollution Fund (SOPF) came into force on 24 April 1989, by amendments to the CSA and succeeded the MPCF. Canada joined the 1992 CLC and 1992 Fund Convention in 1999 through amendments to the CSA.

Part 6 the MLA, which came into force on 8 August 2001, applies, with some modifications, the 1992 CLC and the 1992 Fund Convention as part of Canadian law, and continues Canada's particular domestic regime that was previously found in the old CSA. Part 6 provides for the statutory liability of owners for oil spills from both Convention and other than Convention ships. Under Part 6 "ship" includes ships of all classes, and "owner," other than in relation to a Convention ship, is broadly defined and is not limited to "registered owner" as in the Conventions. "Oil" is defined to include petroleum fuel oil, sludge, oil refuse and oil mixed with water. Thus, for example, the Canadian regime covers bunker oil spills from ships of all classes. Subsection 51(1) of the MLA provides that the claims for which owners may be liable for a spill from their ships include oil pollution damage (including impairment to the environment), and cost and expenses of clean-up, preventive measures and monitoring, to the extent that both the measures taken and the costs and expenses are reasonable, and for any loss or damage caused by those measures. The owner of the ship is strictly liable under the Act. This statutory liability does not depend on proof of fault or negligence. Nevertheless, certain statutory defences are made available to the shipowner in subsection 51(3).

Under the MLA there are limitation periods for commencing proceedings to recover compensation. The Act provides for definite time limits ranging from two to six years from specified events depending on the circumstances: (1) action against a shipowner – subsection 51(6); (2) claim against the SOPF – subsection 85(1); and (3) claim for loss of income – subsection 88.

The MLA provides that Convention ships (carrying more than 2,000 metric tons of persistent oil) must have a certificate of insurance or other security for oil pollution liability as required by the 1992 CLC.

The MLA stipulates in section 62 that in incidents involving Convention ships a claimant may also commence an action directly against the owner's insurer in respect of a matter referred to in subsection 51(1). Section 62 also provides that, in that event, the insurer is entitled to establish the defences affecting the owner's liability set out in subsection 51(3) and, in addition, may establish as a defence that the occurrence resulted from the wilful misconduct of the owner. However, under the MLA there is no right of direct action against the insurer of a ship other than a Convention ship.

Under the MLA, owners of Convention ships and ships other than Conventions may limit their liability based on tonnage as determined by Part 6 and Part 3 of the Act respectively, using SDRs issued by the International Monetary Fund (IMF) in the calculation of same.

Uniquely, the MLA provides for a national fund in Canada, the SOPF. (The balance in the SOPF, a special account held by the Government of Canada, as at March 31, 2007, stood at some CDN$364 million.) Unlike the situation in other state parties to the 1992 Fund Convention (where individual corporations, etc., who have received in one calendar year more than 150,000 tonnes of persistent oil, must pay contributions directly to the International Fund), all Canadian contributions are paid out of the SOPF.

The liability of the SOPF for compensation claims is stipulated in section 84 of the Act. As a fund of last resort, the SOPF is liable for the matters referred to in subsection 51(1) of the MLA above, if:

- reasonable steps to recover from the shipowner and the International Fund have been unsuccessful;
- the owner and the international fund are not liable by reason of certain statutory defences;
- the claim exceeds the owner's limit of liability and, in the case of a Convention ship, to the extent the excess is not recoverable from the international fund;
- the owners are financially incapable of meeting their legal obligations under subsection 51(1), to the extent the obligation is not recoverable from the international fund;
- the cause of the oil pollution damage is unknown and the Administrator of the SOPF has been unable to establish that the occurrence that gave rise to the damage was not caused by a ship (a so-called mystery spill); or
- the Administrator is a party to a settlement in proceedings commenced by a claimant against shipowners or their insurers (the Administrator is, by the Act, made a party to all such proceedings).

The SOPF can also be a fund of first resort for claimants, including the Crown. Under section 85 of the Act any person (other than a response organization) may file a claim directly with the Administrator without going first to shipowners or their insurers. The Administrator must investigate and assess the claim. To the extent a claim is paid, the Administrator is then subrogated to the claimant's rights and is required to take reasonable measures to recover the amount of compensation paid from the shipowners, or their insurers, the International Fund, or any other person. Consequently, the Administrator is empowered by Part 6 to commence an action *in rem* against the ship or the proceeds of its sale to obtain security for the claim. The Administrator is entitled to obtain security either prior to or after receiving a claim. This power has been very useful in claims involving ships other than Convention ships where, pending the coming into force of the Bunkers Convention, there is still no right of direct action against a shipowner's insurer.

Finally, under section 88 of the Act, the SOPF may also be liable to a widely defined class of persons in the Canadian fishing industry for claims for loss of income resulting from an oil spill from a ship and not recoverable otherwise under Part 6. Consequential economic loss would be recoverable otherwise under Part 6. This particular statutory provision (section 88) would appear to provide sensible relief where persons of this class have suffered pure economic loss that is otherwise not recoverable as 'oil pollution damage' under Part 6, given the existing non-statutory law of damages in Canada. This should not be an issue where a Convention ship is involved because, as noted elsewhere in this chapter, the 1992 international regime has adopted a policy of accepting in principle claims for pure economic loss.

2. Arctic Waters Pollution Prevention Act

The Canadian liability and compensation regimes for Arctic waters is further complicated since the AWPPA and the *Arctic Waters Pollution Prevention Regulations* (AWPPR) (Canada, 1978b) made pursuant to the Act, also include civil liability provisions for ship-source pollution. Under the AWPPA, statutory civil liability for deposit of "waste" in Arctic waters applies to both the owner of a ship and owner of its cargo. The AWPPA provides that liability is for cost and

expenses incurred by the Crown to repair or remedy any condition, and reduce or mitigate damage, etc., resulting from such deposit, and all actual loss or damage incurred by other persons. Under the AWPPA these other persons are given priority ahead of the Crown in the recovery of claims. Under the AWPPA the joint and several liability of the shipowner and cargo owner is "absolute." This statutory liability does not depend on proof of fault or negligence. In particular, there are no statutory defences available to the owners of ship and cargo under the AWPPA. The limitation periods for commencing proceedings to recover compensation for costs and expenses and actual loss or damage under the AWPPA are two years from the time the deposit of waste occurred or first occurred or "could reasonably be expected to have become known to those affected thereby".

The AWPPA stipulates that a shipowner has to provide evidence of financial responsibility (where the quantity of waste to be carried exceeds 2000 tons) in a form that allows direct recovery action against his/her insurer. In this respect the AWPPR acknowledges that the insurer can be exonerated from liability in certain circumstances and if the insurance contract so provides. Both shipowner and cargo owner may limit the maximum amount of their joint and several liability as provided in the AWPPA and AWPPR, where maximum liability is calculated on the vessel's tonnage and using gold francs.

With both the AWPPA and MLA providing that the *Marine Liability Act* should prevail in case of any inconsistency between the Acts, some uncertainty surrounds where those inconsistencies exist. The most obvious inconsistencies include absolute (AWPPA) vs. strict liability (MLA) for shipowners, differing limitation of liability provisions, and variations in time limitations for commencing legal proceedings. In light of those inconsistencies, it seems likely that most marine compensation claims will be pursued under the MLA. The AWPPA remains a possible "fallback", especially for claims involving cargo owners and non-oil pollution damages from ships. However, at this time the AWPPA only applies to shipping pollution incidents within Canada's 100-nautical mile Arctic pollution prevention zone.

Other Codes and Guidelines for Arctic Shipping

The Guidelines for the Operation of Tankers and Barges in Canadian Arctic Waters (Transport Canada, 1997a) provide for an additional level of environmental protection against oil spills from all tank vessels. The guidelines apply to all tank vessels exceeding 150 gross registered tons operating in shipping safety control zone waters, as well as Hudson, Ungava and James Bays. In addition to specific constructions standards for tankers and barges, the Guidelines include provisions for an onboard ice navigator, crew training, oil clean-up equipment and emergency response plans.

The Arctic Waters Oil Transfer Guidelines (Transport Canada, 1997b) set out the operational standards for all oil transfers exceeding 500 m^3 in Arctic waters (north of 60^o latitude), whether between two ships or a ship and shore terminal/storage depot. The aim of the guidelines is to prevent cargo/fuel oil spillage and the resulting environmental damage. The guidelines call for advance notice and qualified supervision of such transfers, and completion and reporting of transfer checklists.

The Guidelines for Operation of Passenger Vessels in Canadian Arctic Waters (Transport Canada, 2005) provide Arctic cruise ship operators with information on all the relevant Canadian and territorial government agencies to contact for advice and approvals in planning cruises in

Canadian Arctic waters. Cruise ships entering Canadian Arctic waters must comply with all relevant marine safety, security, pollution prevention and customs regulations. Cruise ships must fall within the legal entry limit set in the ASPPR for the various shipping safety control zones for their proposed itinerary. The guidelines encourage tour operators to conserve the Arctic environment and suggest that operators and tourists should consult the World Wildlife Fund for Nature International (WWF) codes of conduct for operators and tourists respectively (WWF Arctic Program, http://www.panda.org/arctic).

In Canada, the National Place of Refuge Contingency Plan (PORCP) (Transport Canada, 2007b) implements the IMO Refuge Guidelines. PORCP replaces the previous *ad hoc* response process involving the Regional Environmental Emergencies Team (REET), port authorities and the provinces. PORCP applies to all situations where a ship is in need of assistance and requests a place of refuge in Canadian waters, including internal waters, the territorial sea and the EEZ, and is to be applied within the framework of existing local, national and international law. PORCP provides a decision-making risk assessment tool for Transport Canada's Marine Safety Regional Directors. Although regional procedures and arrangements for the Canadian Arctic have not yet been implemented, PORCP expressly includes ice issues as criteria for selecting suitable places of refuge along with other conditions. PORCP specifically notes the need for close collaboration with Denmark and the United States in dealing with incidents in boundary waters or where the outcome could have an impact on the Greenland or the United States (Canada/Denmark, 1983; Canada/United States, 2003). Each Transport Canada marine safety zone is to put in place a risk assessment team to respond to such requests.

Moreover, the *Canada Marine Act* grants port authorities significant traffic control powers they could utilize when a port entry is requested. Ships may be requested information before they are given clearance to enter a port (Canada, 1998, s. 56(2)). The port authority may empower its officials to provide traffic clearances; direct the master, pilot or any person in charge of the ship to provide information on this ship; and direct a ship to leave a dock, berth or other port facility, or to leave or refrain from entering any area, to proceed to or remain at a specified location (s. 58). These powers may be exercised, among other, where there is actual or threat of pollution or hazard to life or property, an obstruction to navigation, or congestion to navigation which poses an unacceptable risk to shipping, navigation, the public or the environment (s. 58(2)).

Ice Navigation in Canadian Waters contains operational guidelines and also serves as a reference and introductory training manual for ships operating in Canadian waters in which ice may be encountered (DFO/CCG, 1999). Every ship of 100 gross tonnage or over, navigating in Canadian waters in which ice may be encountered, is required to carry and make proper navigational use of this document.

The *Marine Environmental Handbook – Arctic, Northwest Passage* gives detailed information concerning Arctic marine environmental issues and concerns specifically in the Northwest Passage and serves as a reference manual, particularly for cruise ships (DFO, 1999). The Handbook includes various suggested navigational practices such as staying at least ten miles away from shore on the north and south coasts of Lancaster Sound in order to avoid the fall migration routes for marine mammals.

RUSSIAN FEDERATION

Ever since the existence of a northeastern passage was proven in 1648 and the mapping of the northern coastline completed following the expeditions of Vitus Bering (1725–1728) and the Great Northern Expedition (1732–1743) (Granberg et al., 2006a, 10; Koroleva et al., 1995, 4 & 61), Arctic marine shipping above the Eurasian continent has been developed subsequently by Imperial Russia, the Soviet Union and, at present, the Russian Federation. A first initiative to open up the Russian Arctic to foreign navigation was made by the then Soviet Minister of Merchant Marine, Bekayev, on 28 March 1967 during the height of the Cold War (Armstrong, 1970, 183). The fact that the so-called sector decree (Russian Federation, 1926), stating that all lands and islands already discovered or still to be discovered in the Soviet sector as belonging to the USSR, was initially interpreted by the Soviet Union as including ice blocks and surrounding seas (Korovin, 1926, 46), underlies the importance of this 1967 initiative. This first offer to open up the Northern Sea Route, however, was never taken up by foreign shipowners. It appears to have been tacitly withdrawn in the wake of the Suez Canal crisis, apparently to avoid offending Russia's Arab allies by appearing to provide an alternative route to the Suez Canal (Armstrong, 1972, 119).

Two decades later, in October 1987, Gorbachev renewed the offer: "Depending on the evolution of the normalization of international relations, we could open the Northern Sea Route for foreign shipping subject to the use of our icebreaker pilotage" (Gorbachev, 1987, 3). It took another two years for the first foreign currency to be generated by the Northern Sea Route (Ovchinnikov, 1989, 1). Even then, however, no foreign ship was involved. Instead, the Soviet ship *Tiksi* was chartered for hard currency by the foreign owners of the goods to be transported from Hamburg to Osaka using the Northern Sea Route during the summer of 1989 (Franckx, 1991, 38). It was not until the politically tumultuous summer of 1991 that a foreign ship, the French *Astrolabe*, made a through passage (Franckx, 1992, 140–144). Earlier that same year, an article in *Pravda*, entitled "Flags in Hot Ice: For the First Time the Northern Sea Route Opened for Foreign Shipping," confirmed the adoption of *Regulations for Navigation on the Seaways of the Northern Sea Route* (Russian Federation, 1990) to become operational on 1 June 1991 (Chertkov, 1991, 6). The *Astrolabe*, receiving its official authorization on 1 July 1991, must therefore have been one of the first ships to have made use of these 1990 Regulations. It took a long time to publish these regulations, even though they had been approved by the USSR Minister of Merchant Marine on 14 September 1990 on instruction of a Decree of the Council of Ministers of 1 June 1990 (Franckx, 1992, 137).

Current Legal Regime

The current legal regime of Arctic marine shipping in the Northern Sea Route is still based on these same 1990 Regulations (Kolodkin et al., 2007, 264–266; Egorov et al., 2006, 493). According to the Head of the Administration on the Northern Sea Route, three other texts adopted in 1996 regulate the present-day legal regime of this sea route, namely the 1996 Guide to Navigation (Russian Federation, 1996a), the 1996 *Regulations Concerning Icebreaking and Pilot Guidance* (Russian Federation, 1996b), and the 1996 *Requirements Relating to the Design, Equipment, and Supply of Ships* (Russian Federation, 1996c) (Gorshkovky, 2003, 67–68 & 71). This basic legal framework applicable to foreign shipping in the Northern Sea Route, has

apparently not changed much up till present (Appendix B). Indeed, the Russian Ministry of Transport still makes many of these documents available through their official webpages (<www.mintrans.ru>) in exactly the same version as they were adopted more than ten years ago. Besides this basic framework a number of other related enactments exist, which will not be covered here (for a listing see for instance Granberg et al., 2006a, 24–25).

1990 Regulations

The 1990 Regulations (Russian Federation, 1990) define the Northern Sea Route as follows:

> [T]he essential national transportational line of the USSR that is situated within its inland seas, territorial sea (territorial waters), or exclusive economic zone adjacent to the USSR Northern Coast *and includes seaways suitable for leading ships in ice*, the extreme points of which are limited in the west by the Western entrances to the Novaya Zemlya Straits and the meridian running north through Mys Zhelaniya, and in the east (in the Bering Strait) by the parallel 66° N and the meridian 168°58'37" W (Art. 1 (2)). [emphasis added]

This definition raises the difficult question of whether or not the Northern Sea Route, and by implication the application of these regulations, is limited to the 200 nautical mile EEZ limit, or extends beyond that limit into the high seas as well. Given the legislative antecedents, as well as their interpretation in the Soviet doctrine, it was believed that the latter option was the more probable one (Franckx, 1993, 189–190). This is confirmed by later Russian writings (Lukashuk, 2005, Chapter VI, para. 10).

The unitary character of this transport route is not undermined by the presence of ships in these parts of the high seas as it is impossible to traverse the route in either direction without navigation through waters falling under Russian sovereignty (Kolodkin et al., 2007, 264). This definition also clarifies the distinction between the Northern Sea Route and other concepts such as north-eastern passage or northeast passage, since the Northern Sea Route is said to form a basic part of those other, much broader concepts (Granberg et al., 2006a, 9). Or stated negatively, if ships want to sail between ports of Europe, Asia and America by only making use of the north-eastern passage or northeast passage, they have to remain outside so-called Russian waters and the Northern Sea Route (Koroleva et al., 1995, 49 & 99). However, the northern boundary of the route remains undefined and includes high latitude routes, even those crossing the North Pole (Koroleva et al., 49 & 99, as well as maps on 50 & 100). The incorporation of Article 234 of UNCLOS into Soviet legislation led to similar uncertainties as to its exact scope of application (Franckx, 1993, 178–179 and 188–189). The new Russian legislation on the EEZ, the *1998 (December) Federal Act* (Russian Federation, 1998a, Art. 32), states that the limits of such areas will be published in Notices to Mariners. It seems therefore safe to conclude that the door is still left open for the possible application of these 1990 Regulations beyond the 200-mile zone. Also the western lateral boundary of the Northern Sea Route has become unclear after some recent high level statements (Franckx, 2008). The question here is whether the field of application of the legal regime of the Northern Sea Route also includes the south-eastern, ice-covered part of the Barents Sea (Gorshkovsky, 2003, 67; Granberg et al., 2006a, 10), or not.

Further Russian federal acts also include definitions of the Northern Sea Route. The *1998 (July) Federal Act* includes a special article on the Northern Sea Route in a chapter on the legal regime of sea ports, internal waters and the territorial sea (Russian Federation, 1998b). Article 14 reads:

> Navigation on the seaways of the Northern Sea Route, the historical national unified transport line of communication of the Russian Federation in the Arctic, including the Vil'kitskii, Shokal'skii, Dmitrii Laptev and Sannikov Straits, shall be carried out in accordance with this Federal Act, other federal laws and the international treaties to which the Russian Federation is a party and the Regulations for Navigation of the Seaways of the Northern Sea Route approved by the Government of the Russian Federation and published in Notices to Mariners.

The *1998 (December) Federal Act* adopted only a few months later does not have a similar provision even though by far the longest part of the Northern Sea Route runs through the Russian EEZ (Figure 5).

Essentially, the basic aim of these 1990 Regulations is to allow navigation on a non-discriminatory basis for ships of all states, while giving careful consideration to environmental concerns (Arts. 2 and 1(4)). The 1990 Regulations provide the framework within which these operations have to take place. Requests are to be addressed to the Administration of the Northern Sea Route (Art. 3). The ship and the master of the ship will have to meet special requirements; if the latter does not have the required experience, a state pilot will be assigned (Art. 4). Civil liability of the owner for environmental damage must be secured before entering the area (Art. 5). Under certain circumstances, the ship may be inspected while en route (Art. 6). Once allowed to use the Northern Sea Route, the ship must follow the route assigned to it unless otherwise instructed. The ship will be guided by means of either shore-based, aircraft, conventional, icebreaker leading or icebreaker assisted pilotage, and appropriate radio contact must be maintained (Art. 7). Compulsory ice breaking pilotage is provided for in the Vil'kitskii, Shokal'skii, Dmitrii Laptev and Sannikov Straits (Art. 7(4)). The Administration of the Northern Sea Route (Moscow) and two regional headquarters located in the ports of Dikson and Pevek exercise general control of shipping operations (Art. 8). Navigation may be temporarily suspended (Art. 9) and ships not complying with the above-mentioned requirements may be ordered to leave the Northern Sea Route along a specified route (Art. 10). Finally, the Administration of the Northern Sea Route and their Marine Operations Headquarters are not liable for damage suffered by a ship or property located on board of it unless one can prove their negligence (Art. 11).

The Russian Federation is a party to MARPOL 73/78 (to all Annexes except VI) and the 1992 Fund Convention. According to Brubaker, there is an ongoing process of harmonization of national law with CLC, the 1976 Protocol, the 1992 Protocol and the HNS Convention (Appendix D) (Brubaker, 2005, 88). When this country overhauled its Commercial Navigation Code in 1999, totally new rules on liability and compensation were adopted based on the 1996 HNS Convention. However, problems remain with respect to the practical implementation in Russian law of the compulsory insurance certificate (conditions, form and issuing authority) as far as the Northern Sea Route is concerned and authors have recommended that the 1990 Regulations should be amended in this respect (Egorov et al., 2006, 496–497).

Figure 5. Northern Sea Route passageways

Source: Map created by the Dalhousie University GIS Centre, 23 May 2008.

These regulations only provide a general framework for shipping operations in the Northern Sea Route. Details, especially fee rates for foreign ships using the services rendered, even though duly foreseen (Art. 8(4)), were initially only predicted for July 1992 (Ivanov & Ushakov, 1992, 17). As indicated below, they have recently been augmented.

1996 Guide to Navigation

The 1996 Guide to Navigation (Russian Federation, 1996a), a sizeable document of more than 300 pages, was prepared by Russia under the International Northern Sea Route Programme, a joint Norwegian-Japanese-Russian venture which ran from 1993 to 1999 (Tsoy, et al., 2004, 7). It consists of three main parts. The first part, a general overview, outlines the geographical, navigation and hydro-meteorological conditions, concluding with the full text of the 1990 Regulations (Russian Federation, 1996a, 81–84) and the 1996 Regulations (Russian Federation, 1996a, 84–89). The second, and most substantial, part consists of a detailed navigational description of the Kara, Laptev, East Siberian and Chuckchi Seas with their straits and islands. This part concludes with a listing of visual and radio aids to navigation, including

floating, radio and lighted aids to navigation. The third part consists of a reference section on the practice of ice navigation in different conditions, with or without the assistance of icebreakers, and a section on salvage and rescue support. This part closes with the full text of the 1996 Requirements (Russian Federation, 1996a, 317–323) as well as illustrations of the visual aids to navigation, different straits and islands, and ice manoeuvres. Despite the extensive descriptions in this document, it does not replace nautical charts or other more detailed nautical publications.

1996 Regulations

All ships intending to use the Northern Sea Route should submit a request at least four months in advance, including detailed information on the ship, possible deviations from the 1996 Requirements (see below), certification of insurance of liability for possible pollution damage, and approximate date and purpose of the voyage, to the Administration of the Northern Sea Route (Russian Federation, 1996b, Art. 2(1)). For an additional fee, this timeframe may be shortened to one month, but in either case the owner receives an answer within 10 days (Art. 2(3)). If the response is positive, an inspection needs to take place at the expense of the owner (Art. 2(4)). Ships not completely satisfying the 1996 Requirements, as well as floating structures, can be guided through the Northern Sea Route for an additional fee (Art. 2(5)). At least 10 days before entering the route, the ship must inform the Administration of the Northern Sea Route of the estimated time of arrival (Art. 2(5)), and a corrected time of two to five days before arrival (Art. 2(7)). In addition, contact information with respect to the ship and the latter's draft, this notification contains mostly information on cargo and crew (Art. 2(6)). When entering the Northern Sea Route, at least two pilots need to be taken on board, and the ship is brought under the control of the West or East Marine Operations Headquarters for ice breaking support and organization (Art. 2(8) & (13)). Despite the instructions given by the guiding icebreaker or the advice and recommendations of the ice pilot, the master retains ultimate responsibility for the ship (Art. 3(2) & (3)). When a ship does not comply with these requirements, it can either be expelled from the route (Art. 2(17)), forced back into a convoy (Art. 2(18)), or possibly rely on delayed assistance (Art. 2(21)). In all these cases, the extra expenses incurred will be borne by the master of the ship. The ship, which is required to have the most recent nautical charts and navigational publications on board (Art. 4(2)), must report at least twice a day to Marine Operations Headquarters (Art. 2(22)). The position of the ship, which is instructed even in clear or open water not to deviate considerably from the recommended route (Art. 4(6)), is thus closely monitored by Russian authorities at all times.

1996 Requirements

Given the extremely hazardous navigation conditions that can be encountered when sailing the Northern Sea Route, a detailed set of requirements have been adopted to ensure the safety of navigation and to protect the Arctic marine environment from pollution. These requirements, which must be fulfilled before entering the Northern Sea Route (Russian Federation, 1996c, Art. 2(10) & (11)), as referred to in the 1996 Regulations, apply to all ships with gross tonnage of 300 tonnes (registered).

At a minimum, the latter must possess at least the Ice Classes L1, UL or ULA of the Russian Federation Register of Shipping (Art. 2(2)), corresponding approximately to the 1A, 1AS and AC1 ice class of the Lloyd's Register (Tsoy & Yakovlev 2005: 20). Additional requirements are provided with respect to the hull, which must be of a double-bottom type that normally cannot be used for storage of petroleum products or other harmful substances (Art. 3(1)). Secondly, both the machinery plant and propeller blades must fulfil certain specific requirements (Art. 4(1)–(6)). Thirdly, equipment to treat waste water must be on board, as well as a bilge water separator, together with storage tanks sufficient for a 30-day navigation period (Art. 5(1)–(3)).

Fourthly, special requirements apply to the stability of the ship because of icing and under ice conditions, e.g., potential ice accretion on horizontal and lateral surfaces of the ship, or when damaged (Art. 6(2) & (5)). Fifthly, minimal navigation and communications equipment must be present (Art. 7(1)–(3)). Sixthly, certain provisions and emergency facilities are required, e.g., a double store of fuel and lubricants sufficient for 30 days, spare parts and certain tools such as portable gas-welding equipment (Art. 8(1)–(3)). Finally, as regards crew, its size must be sufficient to allow for a three-shift watch, and the master should at least have a 15-day experience of steering ships under ice conditions along the Northern Sea Route (Art. 9(1)–(2)).

Russian ship-source pollution standards for the Northern Sea Route are stricter at least in some dimensions than normal MARPOL requirements. While the 1996 Requirements allow for discharges of bilge water if the petroleum content is less than 15 ppm, other petroleum contaminated discharges, such as ballast water from tankers, is prohibited (s. 5.2). Garbage disposal at sea is prohibited (Kitagawa, 2001).

Recent Changes and Future Legal Regime

Although most of the present-day legal regime applicable to foreign shipping in the Northern Sea Route dates back to the early 1990s, a few recent additions should nevertheless be mentioned. First, as predicted (Juurmaa, 2006, 65), the fees to be paid by foreign ships for the services rendered were recently augmented. Fees depend upon the cargo being transported, and range from a low of US$5.97 per ton (timber products) and a high of US$103.99 per ton (vehicles). Special rates, varying between US$10.01 for bulk liquid cargo and US$19.62 for other cargoes, are provided for the transport of cargo to the Far North areas carried out according to the federal budget and regional funds (Russian Federation, 2005, Tables 1 & 3). The ice breaking fees also create a difficulty under the new economic conditions prevailing in the Russian economy. They have been increasing regularly. By early 1994, for instance, they had increased 1,376 times when compared to 1989 (Granberg et al., 2006a, 23). They are predicted to increase further in a near future (Granberg et al., 2006b, 519). New legislative initiatives, discussed below, explicitly include ice breaking costs in the determination of the fees to use the Northern Sea Route (Egorov et al., 2006, 500).

Furthermore, the number of open ports in the Arctic has increased substantially. Initially, only the port of Igarka had been opened to foreign ships, the Russian government later started to publish yearly lists of open ports (Granberg et al., 2006a, 19). At present, this list includes 41 Arctic ports open to foreign ships, and additional ports where regulated visits for foreigners on board foreign cargo ships or tankers with Russian crew members are allowed (Russian

Federation, 2006b). The opening of Arctic ports on a permanent basis is still an objective for the future (Granberg et al., 2006b, 518).

There are indications that this legal framework was being overhauled in a piecemeal fashion (Tsoy, 2005, 39–41). However, more fundamental changes with respect to the Arctic marine shipping appear to be in the pipeline in Russia. First, a draft law was submitted to the State Duma in 1998, entitled "On the Arctic Zone of the Russian Federation", which would have consolidated Russian sovereignty over its Arctic waters by relying once again on the sector theory (Kovalev, 2004, 180). This draft, however, did not succeed, but seems to have been replaced by a new draft law on the Northern Sea Route (Kolodkin et al., 2007, 269). According to these authors, one of which participated in the actual preparation of this piece of draft legislation, the new draft law provides for an authorization procedure for foreign warships and possibly even ships carrying nuclear weapons or radioactive material, as well as other environmentally harmful substances. Overflight by foreign warplanes would be prohibited and the conduct of hydrographical surveys strictly regulated above or in the Northern Sea Route (Kolodkin et al., 274–275). This legislative activity seems to be moving along a course set out by the Russian maritime doctrine adopted by President Vladimir Putin in 2001 (President of Russia, 2001). In this doctrine, where the Arctic receives ample attention, the order of things is clear. First one should secure the national interests of the Russian Federation with respect to the Northern Sea Route, its central state administration, the ice breaking service, and only in last order should one consider "the granting of equal access for interested shippers, including foreigners" (President of Russia, 2001). It is therefore likely that substantial changes are coming to the legal regime applicable to foreign shipping in the Russian Arctic in the not too distant future.

CONCLUSION

This report has described governance of Arctic marine shipping as involving a complex array of international agreements and practices in the areas of law of the sea, maritime safety and seafarer rights and training, marine environmental protection, and liability and compensation, which are facilitated or serviced by several international organizations. Private actors and their contractual arrangements for the carriage of goods by sea, marine insurance and salvage add a further governance overlay. Special national legislative and regulatory regimes of Canada and the Russian Federation round out the governance mosaic.

This report concludes with a summary of key findings and suggestions for further research.

KEY FINDINGS

Public International Law of the Sea

1. The 1982 Law of the Sea Convention establishes the over-arching legal framework for governance of shipping in the Arctic. The Convention has struck a balance among powers of coastal states, flag states and port states to exercise jurisdiction over shipping. The legislative and enforcement jurisdiction of coastal states over foreign ships varies according to the maritime zones (internal waters, territorial sea, contiguous zone and EEZ).

2. The jurisdictional status of some Arctic waters remains controversial. Differing national viewpoints over what waters may legitimately be claimed as internal and what waters constitute international straits have yet to be fully resolved and could give rise to future disputes concerning the exercise of jurisdiction over shipping activities.

3. The extent of coastal state powers to control foreign shipping in the Arctic has been substantially bolstered by Article 234 of UNCLOS. However, the precise geographical scope of coverage (waters covered by ice most of the year) and the breadth of regulatory powers, in particular to unilaterally impose special construction, crewing and equipment standards, could give rise to differing interpretations.

International Public Maritime Law

Maritime Safety Standards

4. Within its global mandate for the safety of international shipping and marine environmental protection, the IMO has focused attention on Arctic shipping and developed international voluntary Guidelines for Ships Operating in Arctic Ice-covered Waters (Arctic Guidelines) for safety of ships and seafarers in the Arctic. The Guidelines are currently under review by a correspondence group of the IMO Design and Equipment Sub-Committee, which provides an opportunity to assess and strengthen guidance in the area of ship construction, equipment and operations and possibly to consider the need for a legally-binding code.

5. Safe navigation in ice-covered waters depends much on the knowledge and skill of the ice navigator. The Arctic Guidelines urge all ships operating in ice-covered waters to have on board at least one ice navigator with documentary evidence of completing an approved training programme in ice navigation. Currently, most ice navigator training programs are *ad hoc* and there are no uniform international training standards. Arctic states may wish to consider if it would be practical and beneficial to develop training for navigation in polar conditions and training in Arctic safety and survival for seafarers that could be incorporated into IMO's Standards of Training, Certification and Watchkeeping (STCW 78/95).

6. The International Association of Classification Societies (IACS) has developed Unified Requirements for member societies addressing essential aspects of construction for ships of Polar Class. The provisions apply to ships contracted for construction on and after 1 March 2008, but are not mandatory. The IACS polar rules are incorporated into the IMO Arctic Guidelines. Arctic states could consider making the harmonized Polar Classes mandatory.

7. Specific international construction requirements for cruise ships operating in polar waters have not been adopted. The cruise ship industry has formed a Cruise Ship Safety Forum to further develop specific design and construction criteria for new vessels, but it remains to be seen how navigation in polar waters will be addressed.

8. As international shipping in the Arctic increases, situations of interactions between ships in the vicinity of one another will be governed by the International Regulations for Preventing Collisions at Sea (COLREGS). COLREGS do not include rules for ships navigating in ice-covered waters, and the application of some rules may need to be considered with reference to ice navigation.

9. The International Maritime Dangerous Goods Code is a uniform international code for the transportation of dangerous goods by sea and covers safe packing and stowage of goods and segregation of incompatible substances. The Code may need to be reviewed for the purpose of identifying any chemicals which may have a dangerous reaction if exposed to extremely low temperatures during transportation in the Arctic.

Marine Environmental Protection Standards

10. MARPOL 73/78 establishes international standards for waste management and pollutant discharges from ships and is applicable to Arctic waters. The Convention sets out minimum standards but coastal states may unilaterally impose more stringent requirements in their EEZ pursuant to Article 234 of UNCLOS. At this time, national standards for regulating ship-source pollution in the Arctic are not consistent.

11. As transpolar shipping continues to grow, Arctic states may wish to consider the adequacy for the Arctic for existing marine environmental standards set by MARPOL, in particular discharge standards. Stricter environmental standards could be established through the IMO by various means including designation of the Arctic Ocean beyond national jurisdiction as a “special area” under MARPOL where more stringent than normal standards could apply to oil, noxious liquid substances and garbage from ships.

12. All Arctic states are parties to the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990. The Convention sets out a framework for cooperation which Arctic states could further apply in the Arctic, possibly through the Arctic Council’s Emergency Prevention Preparedness and Response (EPPR) Working Group.

13. For onboard pollution emergency planning under the OPRC in Arctic waters, the shipboard oil pollution emergency plan (SOPEP) should include a written procedure to effect damage repair and mitigate pollution. Crews should be trained in damage control and materials to be used for this purpose should be on board.

14. With an increase in international shipping, it is likely that ships in need of assistance may need to request refuge in sheltered waters of Arctic states. There are likely to be significant practical difficulties to be encountered in finding and supporting suitable places of refuge for ships in need of assistance in the Arctic and providing them with the necessary support.

15. As international shipping in the Arctic grows and new ports are developed within the Arctic Circle, it may be necessary for the maritime authorities of regional states to consider whether they should coordinate port state control enforcement efforts through a new dedicated MOU or whether existing MOUs are sufficient to enforce the higher regulatory standards applicable to the Arctic. Arctic states would need to consider what "uniform" standards would be enforced through port state control.

16. Expanded international shipping in the Arctic Ocean increases the possibility of introduction of alien species and other pathogens through the discharge of ballast water. The Ballast Water Convention provides a framework for measures to protect marine areas from the hazards posed by ballast water, and encourages establishment of regional agreements such as the Guidelines for Ballast Water Exchange in the Antarctic.

International Private Maritime Law

Carriage of Goods

17. The movement of goods and passengers by sea is largely regulated by the form of the carriage contract with the carrier. The international customs and practices of the shipping, cruise and merchant communities are more likely to govern the Arctic movement of goods and passengers than international public maritime law.

18. Several Arctic states are party to international private law conventions which provide standard carriage terms of relevance to Arctic shipping, such as the Hague or Hague/Visby Rules respecting goods and the Athens Convention respecting passengers. Many standard contract clauses have also been developed by industry bodies. For example, "ice clauses" are commonly included in contracts for the movement of cargoes in bulk to or from northern ports. These clauses give the carrier liberty to deviate from the contracted voyage to prevent the ship from becoming icebound.

Liability and Compensation

19. The international liability and compensation regime is quite fragmented and limited. Separate conventions address: oil pollution liability and compensation from tankers; damages from the spill of bunker fuel carried in non-tankers, such as cargo ships; and hazardous and noxious substance spills from ships. The Bunkers Convention and HNS Convention are not yet in force because of an insufficient number of ratifications. Among the Arctic states, only Norway has ratified the Bunkers Convention and only the Russian Federation has ratified the HNS Convention. None of the conventions address damage to the high seas beyond national jurisdiction.

20. While seven Arctic states have adopted the 1992 Civil Liability and Fund Conventions for oil pollution compensation from oil tankers, the United States has chosen not to become a Party resulting in substantial differences in liability and compensation approaches. For example, although the international oil pollution liability and compensation regime provides that compensation for environmental damages (other than for loss of profit) shall be limited to actual restoration costs. U.S. regulations under the Oil Pollution Act of 1990 provide compensation for diminution in value of natural resources in addition to the cost of assessing such damages.

Salvage

21. In the Arctic, there is little or no governmental or commercial salvage response to support commercial shipping. This is possibly less the case on the Northern Sea Route, where the Russian Federation maintains a substantial fleet in support of shipping. Generally, there is limited infrastructure for ship repair and/or salvage and pollution countermeasures capability based in the Arctic basin.

22. In the event of a salvage operation, in general, but possibly less so in the case of the Northern Sea Route, there is neither an extensive pool of ships of opportunity to draw upon nor one company or consortium of companies with significant Arctic salvage experience. There have been very few incidents requiring Arctic salvage in the recent past, but this lack of a salvage capability is a concern to marine insurers.

Marine Insurance

23. The availability and cost of marine insurance is a major restraint on Arctic marine shipping. A major constraint continues to be the lack of an actuarial record to enable insurers to assess and cost the risk. However, the insurance industry appears to be willing to underwrite Arctic shipping on a case-by-case basis. The London market has published seasonal additional premiums for ships sailing to the Arctic.

Selected National Legal Frameworks

Canada

24. Canada, a leading proponent of extending coastal state legislative and enforcement jurisdiction over foreign shipping within 200 nautical mile zones, has yet to fully implement the control powers recognized in Article 234 of UNCLOS. Special ship construction, equipment and crewing requirements and near zero oil pollution discharge standards, established through the *Arctic Waters Pollution Prevention Act* and its regulations, have only been applied to the 100 nautical mile pollution prevention area and not extended to 200 nautical miles from Arctic coastlines. The *Canada Shipping Act, 2001* and its regulations apply MARPOL pollution standards to the marine area outside the 100 nautical mile zone out to 200 nautical miles, the outer limit of Canada's EEZ in the Arctic.

25. The *Canada Shipping Act, 2001* authorizes regulations to be passed establishing vessel traffic services (VTS) zones in an Arctic shipping safety control zone (s. 136) whereby vessel reporting and clearance would be mandatory. Only a voluntary, non-regulatory VTS zone referred to as NORDREG, has been developed for Arctic Canada.

The Russian Federation

26. The Russian Federation has an official policy of opening the Northern Sea Route for foreign shipping, albeit under certain conditions. The exact geographical scope of the legal regime applicable to the Northern Sea Route remains unclear. In its extreme reading its means all waters bordered by a line running from the northern tip of Novaya Zemlya to the North Pole and back to the Bering Strait, possibly including the southeastern, ice-covered part of the Barents Sea.

27. The way in which fees for servicing ships transiting the Northern Sea Route are calculated remains far from transparent when compared with other countries. The non-discrimination issue (unlikelihood that Russian ships have to pay the same high rates that are charged to foreign ships for the same services), seems to have been addressed recently by the Russian Federation with the introduction of separate rates for ships transporting cargo to the Far North under federal or regional financial assistance programs.

28. The present-day legal regime applicable to foreign shipping has basically remained unchanged since its creation during the first half of the 1990s. A major overhaul (perestroika) of this regime is to be expected in the not too distant future.

Further Research

A large amount of research on Arctic shipping has already been carried out. In particular, the International Northern Sea Route Programme (INSROP) undertaken by Norway, Russia and Japan, with international participation, during the period 1993–1999, produced a very significant data base covering almost all aspects of Arctic navigation. This was followed by a further broad-based Arctic navigation project, sponsored by the European Union entitled Arctic Operational Platform (ARCOP) that, during the period 2001–2005, further developed, expanded and enhanced the knowledge base in the area. This work was again taken up by the Ship and Ocean Foundation of Japan under the Japan Northern Sea Route-Geographic Information system (JANSROP-GIS) project which is still ongoing. The findings of these projects have formed the best available knowledge base on Arctic navigation and its governance at the present time. This research has significantly assisted the preparation of this technical report for the Arctic Marine Shipping Assessment.

While this technical report has undertaken a broad exploratory overview of the many facets of Arctic marine shipping governance, it does not purport to address comprehensively or exhaustively all the issues raised. Additional research may be useful and necessary to provide a more complete picture. Possible research activities could include, among others:

1. Comparative investigation of national construction and equipment standards for ships and their consistency with IACS Unified Requirements for Polar Class ships.

2. Comparative examination of the extent to which states have followed the IMO Arctic Guidelines.

3. Review of national approaches to controlling marine pollution from ships not subject to the Arctic Guidelines and not strictly bound by international standards, namely, warships, naval auxiliaries and other vessels owned or operated by a state and used only on government non-commercial service.

4. A comparative study of how Arctic states are addressing liability and compensation, especially for bunker fuel spills and hazardous and noxious substance incidents, since of the Arctic states only Norway has adopted the Bunkers Convention and only the Russian Federation has ratified the HNS Convention.

5. Drawing on IMO ships' routings from other regions, an examination into how Arctic states have addressed or could address ship routings in the Arctic in order to protect sensitive areas of the marine environment and meet concerns of indigenous communities and organizations.

6. Survey of existing and potential fee systems for ice breaking and other services, such as navigational aids and search and rescue, provided by Arctic states.

7. Comprehensive look at the contingency planning and response capabilities of Arctic states for shipping-related emergencies and pollution incidents.

8. Survey of ballast water practices and invasive species threats related to Arctic shipping and a comparison of national approaches to ballast water exchanges and treatments.

9. Review of how bilateral and regional cooperation in addressing Arctic marine shipping might be enhanced drawing from other international approaches and experiences.

10. Examination of national search and rescue capabilities in the Arctic for various types of shipping and the adequacy of cooperative search and rescue agreements and arrangements.

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Appendix A. List of International Maritime and Other Conventions

I. Maritime Safety

International Convention on Load Lines, 1966 [Load Lines Convention]

International Convention on Load Lines Protocol, 1988 [LL Protocol]

Convention on the International Regulations for Preventing Collisions at Sea, 1972 [COLREGS]

International Convention for the Safety of Life at Sea, 1974 [SOLAS Convention]

Protocol to the International Convention for the Safety of Life at Sea, 1978 [SOLAS Convention]

Protocol to the International Convention for the Safety of Life at Sea, 1988 [SOLAS Convention]

International Convention on Maritime Search and Rescue, 1979 [SAR Convention]

Convention on the International Maritime Satellite Organization, 1976 [INMARSAT Convention]

The Torremolinos International Convention for the Safety of Fishing Vessels, 1977 [SFV Convention]

Torremolinos International Convention for the Safety of Fishing Vessels Protocol [1993 SFV Protocol]

II. Marine Environment

International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 [Intervention Convention]

Protocol to the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1973 [Intervention Protocol]

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 [London Convention]

Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1996

International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto 1973/78 [MARPOL (1973/78)]

Memorandum of Understanding on Port State Control in Implementing Agreements on Maritime Safety and Protection of the Marine Environment, 1982

International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 [OPRC]

Convention on Biological Diversity, 1992 [CBD]

Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 [HNS Protocol]

International Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001 [AFS Convention]

International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 [Ballast Water Convention]

International Convention on the Removal of Wrecks, 2007 [Wreck Removal Convention]

III. Seafarers

i. ILO Conventions

Minimum Age (Sea) Convention, 1920 (No. 7)

Unemployment Indemnity (Shipwreck) Convention, 1920 (No. 8)

Placing of Seamen Convention, 1920 (No. 9)

Medical Examination of Young Persons (Sea) Convention, 1921 (No. 16)

Seamen's Articles of Agreement Convention, 1926 (No. 22)

Repatriation of Seamen Convention, 1926 (No. 23)

Officers' Competency Certificates Convention, 1936 (No. 53)

Holidays with Pay (Sea) Convention, 1936 (No. 54)

Shipowners' Liability (Sick and Injured Seamen) Convention, 1936 (No. 55)

Sickness Insurance (Sea) Convention, 1936 (No. 56)

Hours of Work and Manning (Sea) Convention, 1936 (No. 57)

Minimum Age (Sea) Convention (Revised), 1936 (No. 58)

Food and Catering (Ships' Crews) Convention, 1946 (No. 68)

Certification of Ships' Cooks Convention, 1946 (No. 69)

Social Security (Seafarers) Convention, 1946 (No. 70)

Paid Vacations (Seafarers) Convention, 1946 (No. 72)

Medical Examination (Seafarers) Convention, 1946 (No. 73)

Certification of Able Seamen Convention, 1946 (No. 74)

Accommodation of Crews Convention, 1946 (No. 75)

Wages, Hours of Work and Manning (Sea) Convention, 1946 (No. 76)

Paid Vacations (Seafarers) Convention (Revised), 1949 (No. 91)

Accommodation of Crews Convention (Revised), 1949 (No. 92)

Wages, Hours of Work and Manning (Sea) Convention (Revised), 1949 (No. 93)

Wages, Hours of Work and Manning (Sea) Convention (Revised), 1958 (No. 109)

Accommodation of Crews (Supplementary Provisions) Convention, 1970 (No. 133)

Prevention of Accidents (Seafarers) Convention, 1970 (No. 134)

Continuity of Employment (Seafarers) Convention, 1976 (No. 145)

Seafarers' Annual Leave with Pay Convention, 1976 (No. 146)

Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147)
Protocol of 1996 to the Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147)

Seafarers' Welfare Convention, 1987 (No. 163)

Health Protection and Medical Care (Seafarers) Convention, 1987 (No. 164)

Social Security (Seafarers) Convention (Revised), 1987 (No. 165)

Repatriation of Seafarers Convention (Revised), 1987 (No. 166)

Labour Inspection (Seafarers) Convention, 1996 (No. 178)

Recruitment and Placement of Seafarers Convention, 1996 (No. 179)

Seafarers' Hours of Work and the Manning of Ships Convention, 1996 (No. 180)

Maritime Labour Convention, 2006 [MLC]

Convention Concerning Work in the Fishing Sector, 2007 [Work in Fishing Convention]

ii. IMO Conventions

International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 [STCW]

International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995 [STCW-F]

IV. Carriage of Goods and Passengers

International Convention for the Unification of Certain Rules of Law Relating to Bills of Lading, 1924 [Hague Rules]

Protocols to Amend the International Convention for the Unification of Certain Rules of Law Relating to Bills of Lading, 1968/69 [Hague-Visby Rules]

Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea, 1974

> *Protocol to the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea,* 1976
>
> *Protocol to the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea,* 1990
>
> *Protocol of 2002 to the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea,* 2002 [Athens Protocol]

International Convention for Safe Containers, 1972 [CSC Convention]

United Nations Convention on the Carriage of Goods by Sea, 1978 [Hamburg Rules]

United Nations Convention on International Multimodal Transport of Goods, 1980 [Multimodal Rules]

Draft Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea, 2008 [UNCITRAL Draft Convention]

V. Liability and Compensation

International Convention on Civil Liability for Oil Pollution Damage, (1969). [CLC Convention]

> *Protocol to the International Convention on Civil Liability for Oil Pollution Damage,* 1976 [CLC Protocol]
>
> *Protocol to Amend the International Convention on Civil Liability for Oil Pollution Damage,* 1992 [CLC Protocol]

International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971 [Fund Convention]

> *Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage,* 1976 [Fund Convention]
>
> *Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage,* 1992 [Fund Convention]
>
> *Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage*, 2003 [Supplementary Fund Protocol]

Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971 [Nuclear Convention]

Convention on Limitation of Liability for Maritime Claims, 1976 [LLMC]

> *Protocol of 1996 to amend the Convention on Limitation of Liability for Maritime Claims*, 1996 [LLMC Protocol]

International Convention on Salvage, 1989 [Salvage Convention]

International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996 [HNS Convention]

International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 [Bunkers Convention]

VI. Other Instruments

Convention on the International Maritime Organization, 1958 [IMO Convention]

Convention on Facilitation of International Maritime Traffic, 1965 [FAL Convention]

International Convention on Tonnage Measurement of Ships, 1969 [Tonnage Convention]

United Nations Convention on the Law of the Sea, 1982 [UNCLOS]

Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, 1988 [SUA Convention]

> *Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf*, 1988 [SUA Protocol 1988]
>
> *Protocol to the Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation*, 2005 [SUA 2005]
>
> *Protocol to the 1988 SUA Protocol*, 2005 [SUA Protocol 2005]

Appendix B. List of Laws and Regulations

Canada

Arctic Shipping Pollution Prevention Regulations, C.R.C., c. 353.

Arctic Waters Pollution Prevention Act, R.S.C. 1985, c. A-12.

Arctic Waters Pollution Prevention Regulations, C.R.C., c. 354.

Ballast Water Control and Management Regulations, S.O.R./2006-129.

Canada Marine Act, S.C. 1998, c. 10.

Canada National Marine Conservation Areas Act, S.C. 2002, c. 18.

Canada Shipping Act, 1985, R.S.C. 1985, c. S-9.

Canada Shipping Act, 2001, S.C. 2001, c. 26.

Canada Wildlife Act, R.S.C. 1985, c. W-9.

Charts and Nautical Publications Regulations, S.O.R./95-149.

Marine Liability Act, S.C. 2001, c. 6.

Marine Transportation Security Act, S.C. 1994, c. 40.

Marine Transportation Security Regulations, S.O.R./2004-144.

Migratory Birds Conventions Act, 1994, S.C. 1994, c. 22.

Navigation Safety Regulations, S.O.R./2005-134.

Oceans Act, S.C. 1996, c. 31.

Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals, S.O.R./2007-86.

Ship Station (Radio) Regulations, 1999, S.O.R./2000-260.

Shipping Safety Control Zones Order, C.R.C., c. 356.

Steering Appliances and Equipment Regulations, S.O.R./83-810.

European Union

Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 Establishing a Community Vessel Traffic Monitoring and Information System and Repealing Council Directive 93/75/EEC, *Official Journal*, L208 (5 August 2002), 10–27.

Regulation (EC) No. 782/2003 of the European Parliament and of the Council of 14 April 2003 on the Prohibition of Organotin Compounds on Ships. OJEU L115/1, 9 May 2003.

Russian Federation

Decree of the Presidium of the Central Executive Committee of the U.S.S.R. of 15 April 1926, *On the Proclamation of Lands and Islands Located in the Northern Arctic Ocean as Territory of the U.S.S.R.*, 32 Sobranie Uzakonenii i Rasporiazhenii Raboche-Krest'ianskogo Pravitel'stva S.S.S.R. (Collected Laws and Decrees of the Workers and Peasants Government of the U.S.S.R.) 203 (1926). For an English translation see Koroleva, Markov & Ushakov, 1995, 105.

Federal Act on the Exclusive Economic Zone of the Russian Federation, 17 December 1998, as amended, No. 191- ФЗ. English translation retrieved from United Nations Division for Ocean Affairs and Law of the Sea: http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/RUS_1998_Act_EZ.pdf.

Federal Act on the Internal Maritime Waters, the Territorial Sea and Contiguous Zone of the Russian Federation, 31 July 1998, No. 155- ФЗ, as last amended on 8 September 2007, No. 261-ФЗ. English translation retrieved from United Nations Division for Ocean Affairs and Law of the Sea: http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/RUS_1998_Act_TS.pdf.

Instruction of the Government of the Russian Federation, on the authorization for cargo ships and tankers flying a foreign flag during 2007–2008 to call at Arctic ports and points, located on the Territory of the Russian Federation, 29 December 2006, No. 1855-p. Russian text retrieved from: http://www.morflot.ru/html/sevmorput/Document/Rasp_Pravit_1855_r.doc.
Note to the Secretary-General of the United Nations, dated 21 February 2007, p. 2. Retrieved 6 January 2008 from Commission on the Continental Shelf: http://www.un.org/Depts/los/clcs_new/submissions_files/nor06/rus_07_00325.pdf.

Regulations for icebreaker and pilot guiding of vessels through the Northern Sea Route. English version published in the 1996 Guide to Navigation, 84–89. Retrieved from: http://www.morflot.ru/html/sevmorput/Document/RULES%20OF%20NAVIGATION.doc.

Regulations for navigation on the seaways of the Northern Sea Route, 14 September 1990, Izveshcheniia Moreplavateliam (Notices to Mariners), No. 29 of 18 June 1991. For an English translation see Koroleva, Markov & Ushakov 1995, 133–139 and Franckx, 1993, 315–318.

United States

United States Oil Pollution Act of 1990 (OPA 1990). 33 United States Code (USC) 2701, Public Law 101-380, August l8, l990.

Natural Resource Damage Assessment Regulations. 43 CFR Part 11 (1995), as amended at 61 Fed. Reg. 20609, May 7, 1996.

Maritime Transportation Security Act, 116 STAT. 2064 ; and regulations 33 C.F.R. Table 160.206.

Appendix C. National Maritime Boundaries in the Arctic

Maritime Boundary Agreements			
States	**Date**	**Area Delimited**	**Notes**
Norway-Russian Federation	1957	Maritime boundary in the Varanger Fjord	Agreement between Norway and the Soviet Union concerning the Sea Frontier in the Varanger Fjord, done at Moscow, 27 February 1957, entered into force 17 March 1958, 312 *U.N.T.S.* 289
United States – Russian Federation	1990	Territorial sea and the 200 nautical mile zones in the Arctic Ocean and Chukchi Sea	Agreement between the United States and the Soviet Socialist Republic on the Maritime Boundary, done at Washington, 1 June 1990, provisionally in force 15 June 1990, reprinted in (1990), 29 *I.L.M.* 941. The Agreement is not yet in force because of opposition within the Russian Federation.
Denmark (Greenland) and Norway (Svalbard)	2006	Continental shelf Fisheries zone	Agreement between Norway and Denmark together with the Home Rule Government of Greenland Concerning the Delimitation of the Continental Shelf and the Fisheries Zones in the Area between Greenland and Svalbard, done at Copenhagen, 20 February 2006, entered into force 2 June 2006.
Iceland and Norway (Jan Mayen)	1981	Fisheries zone Continental shelf	Rolston & McDorman, 1988, 33–34. Iceland – Norway: Agreement on the Continental Shelf between Iceland and Jan Mayen, done at Oslo, 22 October 1981, entered into force 2 June 1982, reprinted in (1982), 21 *I.L.M.* 1222.
Denmark (Greenland) – Norway (Jan Mayen)	1995	Continental shelf Fisheries zone	Agreement between Denmark and Norway concerning the Delimitation of the Continental Shelf Area between Jan Mayen and Greenland and Concerning the Boundary between the Fishery Zones in the Area, done at Oslo, 18 December 1995, entered into force 18 December 1985, reprinted in United Nations, Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, (1996), Vol. 31 *Law of the Sea Bulletin*, at p. 59. (implementation of the 1993 International Court of Justice case between the two States)
Denmark (Greenland) and Iceland	1997	Fisheries zone Continental shelf	Agreement between Denmark along with the Local Government of Greenland and Iceland on the Delimitation of the Continental Shelf and Fishery Zone in the Area between Greenland and Iceland, done at Helsinki, 11 November 1997, entered into force 27 May 1998, reprinted in United Nations, Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, (1999), Vol. 35 *Law of the Sea Bulletin*, at p. 35.
Canada and Denmark (Greenland)	1973	Continental shelf boundary from Davis Strait to the Lincoln Sea that terminates in the Robeson Channel	Agreement between Canada and Denmark relating to the Delimitation of the Continental Shelf between Greenland and Canada, done at Ottawa, 17 December 1973, entered into force 13 March 1974, 950 *U.N.T.S.* 147.

Denmark (Faroe Islands), Iceland and Norway	2006	Continental shelf beyond 200 nautical miles	Agreed Minutes on the Delimitation of the Continental Shelf beyond 200 nautical miles between the Faroe Islands, Iceland and Norway in the southern part of the Banana Hole of the Northeast Atlantic, done at New York, 20 September 2006, available at <www.regjeringen.no/nb/dep/ud/dok/lover_regler/retningslinjer/2006/Agreed-Minutes.html?id=446839> (accessed on 6 January 2008).
Maritime Boundary Disputes			
Norway – Russian Federation	Barents Sea and secondary area in the Arctic Ocean	The dispute over the 200 nautical mile zone boundary primarily is in the Barents Sea but extends into the Arctic Ocean. The Russian maritime boundary claim is based on a degree of longitude associated with a sector line. The Norwegian claim is based on equidistance that gives full weight to Svalbard.	
Canada – United States	Beaufort Sea	Approximately 6,250 square nautical miles of overlapping claimed territorial sea and 200 nautical mile zones. Canada has delineated its 200 nautical mile zone using the 141st west meridian. The U.S. position is that the maritime boundary is an equidistance line.	
Canada – Denmark (Greenland)	Lincoln Sea	Both Canada and Denmark (Greenland) accept that equidistance should be used to delineate their overlapping 200 nautical mile zone claims (Pharand, 1993: 179). Disputed area is a modest 65 sq. nm split between two areas, which arises because of the differing views over the base points to be used in determining the equidistance line (Gray 1994: 138).	
Overlapping Extended Continental Shelf Claims			
Norway – Russian Federation	Continental shelf areas beyond the 200 nautical mile limits in the Arctic Basin and the Barents Sea	Within the Arctic Basin, both states claim a continental shelf area beyond their 200 nautical mile zones. Respecting the possible overlapping continental shelf areas in the Arctic Basin, Norway has indicated that the Russian Federation has no objection to its 2006 submission to the CLCS and that the submission and the recommendations of the CLCS are without prejudice to an eventual maritime boundary agreement. The Russian Federation clarified its position regarding Svalbard noting that "The recommendations of the Commission in regard to the submission made by Norway shall be without prejudice to the provisions of the Treaty concerning Spitsbergen of 1920 and, accordingly, to the regime of the maritime areas adjacent to Spitsbergen" (Russian Federation, 2007). The seafloor beneath the "Loophole" beyond 200 nautical miles in the Barents Sea also involves overlapping claims.	
Norway (Svalbard) – Denmark (Greenland)	Continental shelf areas beyond the 200 nautical mile limits in the Arctic Basin	Referred to in Norway's' submission to the CLCS, where it is indicated that Denmark (Greenland) does not object to the CLCS considering the Norwegian proposed outer limit in this area and that a maritime boundary will be negotiated subsequent to the engagement of the CLCS.	
Canada – United States	Continental shelf areas beyond the 200 nautical mile limits in the Arctic Basin	Possible overlapping claim on the continental shelf beyond 200 nautical miles in the Beaufort Sea.	
Canada – Denmark (Greenland)	Continental shelf areas beyond the 200 nautical mile limits in the Arctic Basin	Possible overlapping claim on the continental shelf area beyond 200 nautical miles.	

Russian Federation - Denmark (Greenland) and Russian Federation-Canada	Continental shelf areas beyond the 200 nautical mile limits in the Arctic Basin	In response to the submission by the Russian Federation of documentation respecting its proposed outer limit of the continental shelf in the Arctic to the Commission in 2001, both Canada and Denmark explicitly noted that the Russian submission and recommendations by the Commission were "without prejudice to the delimitation of the continental shelf" between the two States.

Appendix D. Ratifications of International Maritime Law Agreements and Instruments

Arctic States	Safety						Environment												Seafarers									
		SOLAS					London		MARPOL 73/78						OPRC				ILO								IMO	
	COLREGS 1972*	Convention 1974*	Protocol 1978*	Protocol 1988*	SAR 1979*	Load Lines 1966*	London Convention 1972*	Protocol 1996*	Annex I/II*	Annex III*	Annex IV*	Annex V*	Protocol 1997 (Annex VI)*	Salvage 1989*	Convention 1990*	OPRC/NHS 2000	Anti-fouling 2001**	Ballast Water 2004	Wreck Removal 2007	C147 1976*	P147 1996 Protocol*	C163 1987*	C164 1987*	C166 1987*	C180 1996*	C188 2007	Maritime Labour 2006	STWC Convention 1978*	STWC-F Convention 1995
Canada	√	√	--	--	√	√	√	√	√	√	--	--	--	√	√	--	--	--	--	√	--	--	--	--	--	--	--	√	--
Denmark	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	--	√	--	--	√	√	√	--	--	√	--	--	√	√
Finland	√	√	√	√	√	√	√	--	√	√	√	√	√	√	√	--	--	--	--	√	√	√	√	--	√	--	--	√	--
Iceland	√	√	√	√	√	√	√	√	√	√	--	√	--	√	√	--	--	--	--	√	--	--	--	--	--	--	--	√	√
Norway	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	--	√	√	--	√	√	√	√	--	√	--	--	√	√
Russian Federation	√	√	√	√	√	√	√	--	√	√	√	√	--	√	--	√	--	--	--	√	--	√	--	--	--	--	--	√	√
Sweden	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	--	--	√	√	√	√	--	√	--	--	√	--
United States	√	√	√	√	√	√	√	--	√	√	--	√	√	√	√	--	--	--	--	√	--	--	--	--	--	--	--	√	--

Abbreviations: (√) = Ratification; (--) = Not Party; (D) = Denounced; (R) = Revoked; (a) = Accession, (A) = Approval; * = In Force; ** In Force 17 September 2008; C188 = Work in Fishing Convention; C180 = Seafarers' Hours of Work and the Manning of Ships Convention; C166 = Repatriation of Seafarers Convention; C164 = Health Protection and Medical Care (Seafarers) Convention; C163 = Seafarers' Welfare Convention; P147 = Protocol of 1996 to the Merchant Shipping (Minimum Standards) Convention; C147 = Merchant Shipping (Minimum Standards) Convention (data as of 6 October 2008)

Appendix D, *continued*

Arctic States	Carriage of Goods and Passengers											Liability and Compensation										
	Athens								CSC			CLC			FUND				LLMC			
	Convention 1974*	Protocol 1976*	Protocol 1990	Protocol 2002	Hague Rules 1924*	Hague-Visby Rules 1968*	SDR Protocol 1979*	Hamburg Rules 1978*	Convention 1972*	CSC Amendments 93	Multimodal Transport 1980	Convention 1969*	Protocol 1976*	Protocol 1992*	Convention 1971	Protocol 1976*	Protocol 1992*	Protocol 2003*	Convention 1976*	Protocol 1996*	HNS 1996	Bunkers 2001**
Canada	--	--	--	--	R	--	--	--	√	--	--	D	√	√	D	√	√	--	--	√	--	--
Denmark	--	--	--	--	D	√	a	--	√	--	--	D	√	√	D	√	√	√	D	√	--	--
Finland	--	--	--	--	D	√	√	--	√	--	--	D	√	√	D	√	√	√	D	√	--	--
Iceland	--	--	--	--	--	--	--	--	√	--	--	D	√	√	D	√	√	--	--	--	--	--
Norway	--	--	--	--	D	√	√	--	√	--	--	D	√	√	D	√	√	√	D	√	--	√
Russian Federation	√	√	--	--	--	a	a	--	√	--	--	D	√	√	D	√	√	--	--	√	√	--
Sweden	--	--	--	--	D	√	√	--	√	--	--	D	√	√	D	√	√	√	D	√	--	--
United States	--	--	--	--	√	--	--	--	√	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations: (√) = Ratification; (--) = Not Party; (D) = Denounced; (R) = Revoked; (a) = Accession, (A) = Approval; * = In Force; ** In Force 21 November 2008

Source: Table compiled by the authors from IMO Status of Conventions by country, <http://www.imo.org/Conventions/mainframe.asp?topic_id=248> (data as of 6 October 2008), Comité Maritime International, *Yearbook 2005–2006*, Antwerp, CMI, December 2006, <http://www.comitemaritime.org/year/2005_6/pdffiles/YBK05_06.pdf>, and ILOLEX Database of International Labour Standards, http://www.ilo.org/ilolex/index.htm (as of 1 April 2008).