Outcomes of the Arctic Council’s Arctic Marine Shipping Assessment (AMSA)

GEOS 615 Sea Ice ~ UAF

18 November 2010

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Chair, Arctic Marine Shipping Assessment (2005-09)
Topics ~ GOES 615 Presentation:

- Changing Arctic Marine Access
- Current Arctic Marine Use
- Arctic Marine Shipping Assessment 2009 Report
- Post-AMSA Workshop Report
2004 – 2009

Arctic Council ~ Intergovernmental Forum
AMSA Lead Countries for PAME ~ Canada, Finland & USA
AMSA Focus ~ Marine Safety & Marine Environmental Protection
13 Major Workshops & 14 Town Hall Meetings

Key Challenge ~ Many Non-Arctic Stakeholders
Table of Contents

• Executive Summary with Recommendations
• Arctic Marine Geography Climate & Sea Ice
• History
• Governance
• Current Use/Database
• Scenarios to 2020 & 2050
• Human Dimensions
• Environmental Impacts
• Infrastructure

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11 September 2007
Winter & Spring Months 2007

1 January 2007

1 March 2007

1 April 2007

1 June 2007
Arctic Ocean Bathymetric Chart

NP

~ 1500 nm

~ 600 nm
Northern Sea Route

Northwest Passage

Central Arctic Ocean Route (2100 nm)

Sea Ice

Sea Ice

Cold Climate

Ice-Free Ops

MULTIPLE ROUTES & MODES

by Mapping Solutions, Anchorage 2005 for L. Brigham, USARC
Today’s Arctic Commercial Marine Use

- High Grade Iron Ore??
- Zinc & Coal
- nickel & Copper
- World’s Largest Nickel & Palladium Mine
- World’s Largest Zinc Mine
- Baffin Bay
- Davis Strait
Today’s Arctic Commercial Marine Use

- Hard Minerals
  - Gulf of Alaska
- Marine Tourism

- High Grade Iron Ore??
- Zinc & Coal
- Nickel & Copper
- Marine Tourism
Arctic Cruising
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
Объем транспортировки – 12 млн.т сырой нефти в год
Навигационный период – 365 дней
Порт назначения – порты Европы и Северной Америки

Танкер усиленного ледового класса дедвейтом 70 646,6 тонн
Толщина льда 1,2 – 1,8 м.
Средняя продолжительность ледового периода – 213 дней.

Варандейский нефтяной отгрузочный терминал

Варандейский нефтяной отгрузочный терминал предназначен для экспортной перегрузки нефти, добываемой на Варандейском месторождении Тимано-Печорской нефтегазоносной провинции. Терминал представляет собой уникальное не имеющее аналогов в мировой практике, систему морской транспортировки больших объемов нефти в Арктике.

Вот что говорит о возможности нефтяной отрасли Криловская эксплуатация нефти, приповерхностный лед: качество по кратчайшему морскому пути до Европеского и Североамериканского рынков. Терминал является важной элементом инфраструктуры, который позволяет вести крупномасштабных месторождений в Тимано-Печорской нефтегазоносной провинции.

Месторождения Тимано-Печорской нефтегазоносной провинции

Береговой резервуарный парк 325 000 м³
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
- Summer Sealift

![Map of Arctic Ocean Marine Routes](image)
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
- Summer Sealift
- Exploration/Science

Zinc & Coal
Nickel & Copper
High Grade Iron Ore??
Linkages to the Global System

- International Fishing
- Global Marine Tourism industry
- Hard Minerals ~ Zinc, Nickel, Tin, Copper, High Grade Iron Ore, etc.
- Hydrocarbons ~ Offshore Oil & Gas
- Regional Trade to Northern Communities
- Research & Exploration
Summer Northeast Passage
2009 Voyages of Beluga Fraternity & Beluga Foresight
Icebreaker Transits to the North Pole &
Trans-Arctic Voyages (1977-2010):

- 83 Transits to the North Pole (70 Russia, 6 Sweden, 3 USA, 2 Germany, 1 Canada, 1 Norway)
- Single Non-summer NP Voyage (Sibir Voyage May-June 1987)
- 39 Ship Transits to the NP in 2004-2010

‘Clear Evidence of Central Arctic Ocean Navigation’

25 May 1987 ~ North Pole
Soviet Nuclear Icebreaker Sibir
‘A Walk Around the World!’
AMSA Scenarios: Plausible Futures for Arctic Navigation to 2050

~ Complexity ~
AMSA Key Uncertainties for Future Arctic Marine Transportation

- Stable legal climate
- Radical change in global trade dynamics
- Climate change is more disruptive sooner
- Safety of other routes
- Socio-economic impact of global weather changes
- Oil prices (55-60 to 100-150 USD?)
- Major Arctic shipping disasters***
  - Limited windows of operation (economics)
  - Rapid climate change
- Maritime insurance industry
- China, Japan & Korea become Arctic maritime nations
  - Transit fees
- Conflict between indigenous & commercial use
- Arctic maritime enforcement
- Escalation of Arctic maritime disputes
  - Shift to nuclear energy
  - New resource discovery
    - World trade patterns
  - Catastrophic loss of Suez or Panama Canals
  - Global agreements on construction rules and standards
“Stricken cruise ship off Antarctic evacuated”

MSNBC - 11/23/07
Groundings ~
Canadian Arctic
Aug-Sept 2010
Scenarios on the Future of Arctic Marine Navigation in 2050

**Arctic Race**
High demand and unstable governance set the stage for an economic ‘rush’ for Arctic wealth and resources.

**Arctic Saga**
High demand and stable governance lead to a healthy rate of development, includes concern for preservation of Arctic ecosystems & cultures.

**Polar Lows**
Low demand and unstable governance bring a murky and under-developed future for the Arctic.

**Polar Preserve**
Low demand & stable governance slow development in the region while introducing an extensive eco-preserve with stringent “no-shipping zones”.

AMSA/GBN Scenarios Workshops ~ April & July 2007
The Future of Arctic Marine Navigation in 2050
Wild Cards
‘Wild Card’ Issue 1 ~ Multiple Ocean Use Management & Enforcement

Bowhead Whale Migrations & Arctic Marine Operations

Winter
Summer
Fall
Spring

Possible Arctic Shipping Routes
New northern passages could significantly boost levels of low-lying ozone as ship exhausts pump pollutants into the pristine environment.

Emissions of nitrogen oxides and carbon monoxide from ships could triple ozone levels, making them comparable to those in industrialized regions today.
The ILULISSAT Declaration

- Conference of 5 Coastal States Bordering on the Arctic Ocean (Canada, Denmark & Greenland, Norway, Russia, USA)
  - 27-29 May 2008 ~ Ilulissat, Greenland
  - LOS/UNCLOS Provides ‘Solid Foundation’
  - ‘We therefore see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.’

‘Wild Card’ Issue 3 ~ Continuing Challenge
“Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle”

- 13% Undiscovered Oil
- 30% Undiscovered Natural Gas
- 20% Undiscovered Natural Gas Liquids

http://pubs.usgs.gov/fs/2008/3049/

‘Wild Card’ Issue 4A ~ New Resource Discoveries
Probability of Presence of Undiscovered Oil and/or Gas Fields

Coastal Seas

PROBABILITY (percent)

100
50–100
30–50
10–30
<10
Area of low petroleum potential

USGS (2008)
‘Wild Card’ Issue 5 ~ New Technology

Aker Arctic Technology
Future Convoy Requirements?

Icebreaking (Double Acting) Container Ship
Norilskiy Nickel in the Kara Sea
March 2006
Future Arctic Marine Transport Modes

Churchill to Murmansk Route
Future Arctic Marine Transport Modes

Churchill to Murmansk Route
Selected AMSA Key Findings

A ~ UNCLOS: Fundamental framework & IMO ~ Competent UN agency

B ~ Winter Arctic sea ice cover remains

C ~ No special, mandatory IMO environmental standards

D ~ Today ~ nearly all destination traffic

E ~ Key drivers: Natural resource development & regional trade plus governance

F ~ Future Arctic transport: many factors of uncertainty

G ~ Arctic residents: concerns & recognition of benefits

H ~ Most significant threat: release of oil

I ~ General lack of marine infrastructure (exceptions: coast of Norway & northwest Russia)
Enhancing Arctic Marine Safety

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

AMSA RECOMMENDATIONS ~ THEMES
Enhancing Arctic Marine Safety

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

- Arctic State Linkages
- IMO Measures
- Uniformity of Governance
- Passenger Ships
- SAR Agreement
AMSA RECOMMENDATIONS ~ THEMES

- Indigenous Use
- Community Engagement
- Invasive Species
- Special Marine Areas
- Oil Spill Prevention
- Marine Mammal Impacts
- Air Emissions

Enhancing Arctic Marine Safety
- Arctic State Linkages
- IMO Measures
- Uniformity of Governance
- Passenger Ships
- SAR Agreement

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

AMSA MARINE SHIPPING ASSESSMENT

AMSA RECOMMENDATIONS ~ THEMES
Enhancing Arctic Marine Safety

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

AMSA RECOMMENDATIONS ~ THEMES

- Arctic State Linkages
- IMO Measures
- Uniformity of Governance
- Passenger Ships
- SAR Agreement

- Infrastructure Deficit
- Arctic Marine Traffic System
- Environmental Response Capacity
- Hydrographic, Met & Ocean Data

- Indigenous Use
- Community Engagement
- Invasive Species
- Special Marine Areas
- Oil Spill Prevention
- Marine Mammal Impacts
- Air Emissions
AMSA Recommendation from the Arctic States
~ IIIB. Arctic Marine Traffic System

~ “Comprehensive system to improve monitoring & tracking”

~ Near, real-time data shared among the Arctic States
~ Vessel ID, tracks, data fusion & analyses, detection of any anomalies
Bering Strait Region shipping by vessel type: 1 May – 6 September 2010
AMSA 2009:

• Baseline Assessment

• Arctic Council Policy Document
  ~ Negotiated Text Approved 29 April 2009 ~

• Strategic Guide

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CONSIDERING A ROADMAP FORWARD: THE ARCTIC MARINE SHIPPING ASSESSMENT
Enhancing Arctic Marine Safety

I. Enhancing Arctic Marine Safety

I.A. Linking with International Organizations

ROADMAP AND ACTIONS
- COMPETENCIES to bring together experts on shipping from the Arctic states to identify common interests and develop unified positions and approaches.
- Identify an Arctic state lead country to facilitate an IMO meeting of experts on Arctic safety issues.
- For a consistent approach on Arctic shipping issues, the Arctic states should coordinate:
  1. Input from all sectors and stakeholders in each state including regional interests.
  2. Input from different government agencies who attend various international organizations (for example IMO, ILO and WHO).
  3. Input from stakeholders and government departments who attend a particular organization (such as IMO).

KEY ISSUES
- Taking into consideration the opinions and ideas of other interested stakeholders before approving international agreements (such as IMO), the Arctic states may have a potential lead position.
- Knowing who is and is not represented at the international organizations.
- Early, proactive actions and improve communications on all Arctic shipping issues.

I.B. IMO Measures for Arctic Shipping

ROADMAP AND ACTIONS
- Guidelines have been updated to become the IMO “Guidelines for ships operating in polar waters.”
- Arctic Council to send a letter to Arctic state interests or a whole to promote the December 2009 IMO Assembly resolution applying guidelines to polar waters.
- Arctic states to promote the application of the polar guidelines with industry and others as appropriate, to national and international interests.
- IMO Maritime Safety Committee (MSC) has tasked the Design and Equipment Subcommittee to develop a mandatory polar code in 3 sessions (Fall 2013, Autumn 2015, and Spring 2017).
- Adoption will be by ILO or implied amendment to SOLAS and MARPOL Conventions.
- Having a named polar code is to become mandatory, the Arctic states encourage other interested states/parties to participate, engage and support adoption and implementation of the polar code.
- Inflated for communication and consensus building for the mandatory polar code are the Consultative Parties of the Arctic Treaty.

KEY ISSUES
- These Guidelines now apply to Arctic and Antarctic waters whether ice-covered or not.
- Polar code will have a mandatory Part B and recommendations in Part D.
- Construction requirements ( Hull and machinery) will be in both the polar code and International Association of Classification Societies (IACS) rules.
- Ice navigator competence requirements must be clearly defined in STCW Convention, requirements to have an ice navigator aboard will be in the polar code.
- Need for a model ice navigation course and to establish acceptance criteria for simulations as part of training fulfillment.
- Need for theoretical training, including the incorporation of contemporary local knowledge, together with practical experience in ice.
- Lack of Arctic Marine infrastructure needs to be considered for independent operations.
- Endorsement of certificates to include bridge and engineering personnel, desirable for ship to be familiar with ship conditions when operating in remote and ice-covered waters.

I.C. Uniformity of Arctic Shipping Governance

ROADMAP AND ACTIONS
- FRAME to conduct a survey of existing national or regional regulations, standards and protocols with the aim of harmonizing safety and pollution prevention measures in keeping with UNCLOS.
- Required surveys and inventories from the AMSA research agenda include: 1. Comparative study of how Arctic states address liability and compensation, especially for bunker fuel spills and other liquid substances incidents.
- Survey of existing and potential systems for weather and other Arctic services, such as navigational aids, sharing, SAR and ice information services, provided by the Arctic states.
- Survey of local practices and emergency response capabilities from Arctic shipping and a comparison of Arctic state approaches to oil spill responses and response agreements.
- Feasibility of national and regional cooperation in addressing Arctic marine operations might be enhanced using other international approaches and experiences.
- Draft language for a potential international agreement or design (PISA) in keeping with UNCLOS on safety and pollution prevention measures in regions of the central Arctic Ocean beyond the coastal state jurisdiction for consideration by IMO.

KEY ISSUES
- Key elements of Arctic state regulations for possible integration in the harmonization of measures.
- Climate reporting scheme, guidelines for cruise ship operations, tanker guidelines for tanker and tankers, equivalent model for construction of Arctic-class ships.
- Arctic shipping/ice-water pollution prevention regulations, or transfer guidelines.
- Russia Guidelines for operation on the Northern Sea Route, Arctic port regulations.
- United States Maritime Administration Protects Arctic, cruise ship discharge regulations in Alaska.
- Greenlandic marine protection of the Arctic, coastal state jurisdiction for consideration by IMO.
- WMO/CMAR Analysis study.
- Industry and NGO surveys and standards.
Funding Issues

Key issues not addressed in AMSA are the broad financial and funding concerns linked to each of the AMSA recommendations. The Fairbanks workshop experts identified several significant areas that require near-term funding and also reviewed issues related to the need for liability and compensation mechanisms in the Arctic.

Indigenous Marine Use Surveys — A key requirement in most regions of the Arctic, and one of the AMSA recommendations, is the need for surveys of indigenous marine use. Upr-to-date baseline data on regional and local patterns of indigenous use of Arctic waters is necessary to assess the impacts from increasing Arctic marine operations. Significant discussions were held on this topic in Fairbanks due to the complexities and sensitivities of conducting such surveys. There was general agreement that the surveys could not be conducted in one unified circumpolar effort (although the baseline data could be merged later to construct a unified picture). Public appropriations from national and regional governments are key, since these surveys relate to subsistence living, marine safety, environmental protection and multiple use management of Arctic marine waterways. In 2003, surveys were completed in the responsibility of governments, national and regional. However, private sources of funding are needed, such as from NGOs and nonprofit foundations, could also make contributions to the local, community level for detailed studies and surveys. Grants or surveys from industry sources (e.g., natural resource development) could also be used to support surveys in preparation of new marine transportation systems and navigation in local waterways.

Marine Infrastructure Elements — The lack of adequate marine infrastructure in most of the Arctic (e.g., for the Norwegian coast and northwest Russia) to support current and future levels of Arctic marine activity is a key finding of AMSA. Large public and private investments will be necessary to provide an adequate safety net for marine operations and environmental protection. Public and private funding for satellite communications and environmental monitoring are urgently required to fill existing Arctic gaps in coverage. Enhancing environmental response capacity may require public-investment or funding of equipment to be cached in remote Arctic locations. A mandatory ship-tracking and monitoring system will require public appropriations and the potential for pooling funding among the Arctic states. Public funding of enhanced Arctic weather and sea ice information may also be needed for recovery schemes. Hydrographic surveys and charting are urgent requirements and these activities need significant national investments. Cost recovery through industry user fees may be necessary, for example, in remote Arctic regions of seasonal marine traffic. The World Bank and other international financial institutions should be considered for Arctic port facilities and overall marine infrastructure. Coordinated investments for such elements as ports and aids to navigation should be discussed by the Arctic states.

Liability and Compensation Challenges — Robust, effective oil spill liability trust funds are required in the Arctic (funds can come from public-private partnerships and could be based on regional or bilateral agreements. Two national models are Canada’s Ship-source Oil Pollution Fund and the U.S. Oil Pollution Act of 1990. A conference on liability-compensation issues for Arctic marine incidents should be organized by the Arctic states and industry interests.

• Indigenous Marine Use Surveys
• Marine Infrastructure Elements
• Liability and Compensation Challenges
Summary ~ Key Policy Issues Ahead

During the course of the workshop discussions revealed a number of high priority issues as critical outcomes of AMSA. The Co-editors of this report have developed a list of key policy issues from the discussions in Fairbanks that require attention in the near-term to enhance Arctic marine safety and marine environmental protection. Throughout the workshop the highest priority issue consistently noted was the urgent need for a mandatory Polar Code developed by the International Maritime Organization. Implementation of mandatory rules for polar ship construction, design, equipment, operations and ice navigator competency was considcd by the workshop participants as the crucial first step for protecting Arctic people and the environment in an era of increased marine operations in the Arctic Ocean.

The following lists are provided as summaries of Arctic policy issues derived from the expert discussions of the AMSA Workshop:

I. Highest Priority Arctic Policy Issues Related to AMSA:
   • A mandatory Polar Code developed by the IMO.
   • Full tracking and monitoring of Arctic commercial ships (mandatory AIS).
   • An Arctic SAR agreement – an ongoing Arctic Council SAR Task Force is to produce a binding agreement by spring 2011.
   • Surveys of indigenous marine use so that multiple use strategies in Arctic waterways can be developed.
   • A circumpolar response capacity agreement – an agreement among the Arctic states (and possibly non-Arctic states) for pooling resources and enhancing regional capacity.
   • Implementation of an Arctic Observing Network among the 8 Arctic states and non-Arctic states – a network to support scientific research and marine operations.

II. High Priority Arctic Policy Issues Related to AMSA:
   • A critical Arctic marine infrastructure requirement – increased hydrography and surveying of Arctic waters for enhanced navigation charts.
   • Oil spill research on prevention best practices and responses to oil released in Arctic ice-covered waters.
   • Enhanced research, including mitigation measures, on the impacts on marine mammals, and other migratory fauna, of increased Arctic marine operations.
   • Identification of specific ballast water invasive species issues and prevention strategies related to Arctic marine operations.
   • A comprehensive study to identify potential Arctic marine areas, including the central Arctic Ocean, for possible designation as IMO Particularly Sensitive Sea Areas (PSSAs).
   • Marine industry development of harmonized best practices for all cruise ships operating in Arctic waters, including operational strategies for mutual rescue.
   • Studies on the application of ecosystem-based management to Arctic coastal regions.
   • A comparative study of Arctic state liability and compensation strategies for marine incidents with a view to developing future uniform measures.
   • Fully developed IMO ice navigator competency requirements included in the STCW mandatory requirement for onboard navigator as part of the Polar Code.
   • Enhanced marine communications systems in the Arctic, including full coverage satellite communications in the central Arctic Ocean.

Highest Priority

• Mandatory Polar Code
• Full Tracking and Monitoring of Commercial Ships (Mandatory AIS)
• Arctic Search and Rescue (SAR) Agreement
• Indigenous Marine Use Surveys
• Circumpolar Response Capacity Agreement
• Arctic Observing Network Implementation
Thank you

[ www.snap.alaska.edu ]