MINISTRY OF TRADE AND INDUSTRY (KTM)

GROWTH Project GRD2-2000-30112 "ARCOP"

ARCOP
Concluding workshop

WP 6: WORKSHOP ACTIVITY

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ARCOP
Concluding workshop

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PARTNERS:

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Royal Wagenborg	NL
Hamburg University of Applied Sciences	D
Tecnomare SpA	I
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Central Marine Research and Design Institute	RU
Arctic and Antarctic Research Institute	RU
Hamburgische Schiffbau-Versuchsanstalt GmbH	D
Det Norske Veritas	NO
The Foundation of Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF)	NO
Neste Oil	FIN
Helsinki University of Technology	FIN
Nansen Environmental and Remote Sensing Centre	NO
Finnish Institute of Marine Research	FIN
Technical Research Centre of Finland	FIN
Stiftung Alfred-Wegener-Intitut fur Polar und Meeresforschung	D
The Fridtjof Nansen Institute	NO
Lloyds Register	UK
University of Lapland	FIN
The Norwegian College of Fishery Science	NO
Ministry of Trade and Industry	FIN

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DELIVERABLE SUMMARY SHEET

Short Description
The workshop 9 report consists of the presentation abstracts and slides, a record of the discussions as well as the conclusions and recommendations.

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Name	Company	Approval	Date
Kimmo Juurmaa	Aker Finnyards		28.02.2006

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Revision	Date	Company	Initials	Revised pages	Short description of changes

DISCLAIMER

PREFACE

Arctic Operational Platform ARCOP is a research and development project co-funded by the Directorate General Energy and Transport of the European Commission under the 5th Framework Programme for Research and Technological Development. The project coordinator is Aker Finnyards.

The project aims to develop efficient and environmentally safe oil shipping by the Northern Sea Route. The three-year (2003-2005) project has been participated by 21 organisations from the EU, Russia and Norway. The work has been divided into 6 parts:

- Development of collection methods for ice information and ice forecasts in view of choosing transport routes (WP1)
- Assessment of the rules and regulations on transport by sea and of insurance and payment systems (WP2)
- Development of an integrated transport system for Arctic oil and gas transport (WP3).
- Development of the environmental impact assessment method and the environmental hazard management system (WP4)
- Trial in practice of the solutions developed and recommendations given during an actual transport assignment (WP5)
- Organisation of expert meetings between industry, authorities and representatives of technology to direct the project, to assess the results and to give recommendations (WP6)

Every year, during the three years of activity, the project has organised three workshops in which the results have been presented to representatives of industries, authorities and scientifical organisations. The participants of the workshops have given guidelines for the project and also evaluated the achievements.

The workshops have been arranged by the Ministry of Trade and Industry of Finland. During 2005, 150 participants, representing 58 organisations from all over the world, attended them. In 2004, the meetings were participated by 131 persons from 57 organisations, and in 2003 the figures were 120/34, respectively.

In the course of time, the workshops have formed a popular forum for the experts to meet and discuss the topical issues of Arctic transportation. The ninth and last workshop, “The Concluding Workshop of ARCOP”, was held in Helsinki, in November 2005. The meeting focused to discuss the future challenges of NSR and other Arctic transportation in the light of the ARCOP results. The future of the NSR icebreaking services, future needs of environmental protection and the planned future work were among the main topics. The meeting gathered 60 experts representing 39 organisations.

This workshop report consists of the presentation abstracts and slides, a record of the discussions during the event as well as the conclusions and recommendations. The conclusions and recommendations have been compiled by the project coordinator and the workshop organisers based on the presentations and the discussions heard during the workshop.

We wish to thank the chairmen, speakers and panellists for their valuable input to the successful and interesting ninth ARCOP workshop.

In Helsinki, 28.02.2006

Liisa Laiho
Piia Nordström
Kimmo Juurmaa

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EXECUTIVE SUMMARY

ARCOP has during the past three years 2003-2005 studied oil and gas transports in the Northern Sea Route in terms of developing their economy and environmental safety. The timing of the project has been excellent, as the production of oil in Russia has increased steeply during the past three years. This has meant greater demand for oil exports both in the Baltic Sea and in the western parts of the Northern Sea Route.

Investments to develop the transports have started. Rising oil prices and advances made in production and transport technologies have also enabled profitable oil production in Arctic areas. At the same time, the development of the Russian oil pipeline network has not kept up with transport needs. The main results and future plans of the ARCOP project were presented at the ninth and concluding workshop of ARCOP, arranged in Helsinki in November 2005.

During the three years, the nine meetings of experts arranged by the Finnish Ministry of Trade and Industry had gathered over 400 representatives of industry, the authorities and the scientific community, from altogether 89 organisations, to tackle the challenges of Arctic transportation.

Estimates of the increase of transports

According to transport plans presented by the Russian oil industry at ARCOP workshops 2004-2005, oil transports in the Northern Sea Route will reach about 100 million tons per year by 2015. The Russian Ministry of Transport has given a more moderate estimate predicting that the route's total cargo volume will rise to some 40 million tons during the same period. Rising oil prices and the development of production and transport technologies also enable profitable oil production in Arctic regions.

The port of Murmansk has made provision for the increase in transports by introducing an extensive investment programme. Estimate indicate that cargo turnover in the port of Murmansk will rise to 60–70 million tons by the year 2015. The volume of oil that would come from other ports in Arctic Russia and by rail from the direction of St. Petersburg for loading in Murmansk would be about 30 million tons.

The growth that is seen in the transports, originates from growth in production in new oil areas. Oil production in Nenets Autonomous Area will rise from the present 11.6 million tons to some 19 million tons by 2008. Many of the most promising oil and gas deposits in the European part of Russia are located in the underdeveloped and remote areas of Nenets where, owing to natural circumstances alone, development of infrastructure and service networks is a challenging task.

Technological advances help ensure more economical transports

The technical and economical studies conducted for ARCOP show that marine transport of oil is a competitive alternative to transport by pipeline. In changing market situations, the flexibility of marine transports was found to be an important advantage.

Optimisation of the transport system can bring cost savings of up to 50%. Among vessel types, the most economical alternative is the ice-breaking, double-acting tanker that can manage independently in ice conditions.

A study conducted by the Russian Ministry of Transport concluded that despite the programme to modernise nuclear icebreakers and efforts to step up the building of new vessels, the availability of icebreaker assistance in the Northern Sea Route will diminish in the coming years. Even if the building of new icebreakers were to start now, the situation would be difficult in the years 2013–2015, when some of the currently operating icebreakers will have been removed from service and the new vessels to replace them have not yet been completed.

More investments in environmental safety

By investing in vessels, oil companies and shipping companies contribute to improving the environmental safety of transports. The modern terminals under construction are also a long positive leap forward in terms of the environment. Despite technical advances, however, equipment and vessels are still controlled by people.

The representatives of maritime training centres stressed the link between environmental safety and the skills adopted by the crews of oil transport vessels. When transport needs increase, there is the risk that crews having very little or no experience of navigation in ice conditions end up working in northern transport routes. Another drawback is the lack of international recommendations concerning the level of training for crew members.

In the sector of environmental protection, ARCOP identified many needs for further research. ARCOP's environmental specialists recommended that the techniques for combating oil spills in Arctic conditions, and especially the effects of ice cover on the spreading of oil, should be studied in more detail.

Up-to-date information on the properties of the oil grades transported is needed since the properties of the various oil grades in the region differ from each other. This is of vital importance for combating oil spills.

In order to monitor variables describing the state of the environment, data should be collected for a database. The representatives of international oil companies assured that the development of environmentally safe modes of operation is daily routine in the oil production industry and there is preparedness for additional investments to safeguard the state of the environment.

After ARCOP

The results of ARCOP will initially be utilised in the workings of the Arctic Marine Shipping Assessment (AMSA) of the Arctic Council, which will analyse the present state and development of Arctic marine transports for the years 2020–2050. It will also assess the impact of climate change on transports as well as the effects of transports on the Arctic environment. The project is led by Canada, the USA and Finland, and the work will be finished in 2008.

PROGRAM, 16th November 2005 Concluding Workshop of ARCOP	
Chairman: Project coordinator Kimmo Juurmaa, Aker Finnyards	
Opening address	Erik Ulfstedt Ministry of Foreign Affairs, Finland
Summary of ARCOP project -Technical solutions, economics, safety and policy issues	Kimmo Juurmaa Aker Finnyards
Experience in icebreaker maintenance and ship traffic management in the seas of the northern Arctic	Nikolay Babich Murmansk Shipping Company
Environmental protection processes in oil and gas projects	Gennady Matishov Russian Academy of Sciences
Oil Transportation plans and needs in Murmansk Area	Alexander Selin Murmansk Regional Government
Panel discussion	
PROGRAM, 17th November 2005 Concluding Workshop of ARCOP	
Chairman: Project coordinator Kimmo Juurmaa, Aker Finnyards	
Future trends in the development of seaborne cargo transportation in the Arctic region of Russia and its icebreaker support for the period up to 2020	Nikolay Monko Federal Agency of Maritime & River Transport, RF Ministry of Transport
Shipping through the Northern Sea Route: navigational and hydrographic support	Victor Medvedev Hydrographic Department, RF Ministry of Transport
Development of transport streams through Baltic and Barents seas - Future freight flows - Impacts of infrastructure projects - Environmental considerations	Mikhail N. Grigoriev Gecon Ltd.
Nenets AO – a growing oil province - plans and needs to develop oil reserves and transportation on-going projects and views for their future - impact of the developing oil industry on other means of livelihood	Vladimir M. Shibeko Directorate for Natural Resources Complex Use, NAO Administration
Other ongoing work and plans for the future - Arctic Marine Shipping Assessment (AMSA) - Program of the Russian chairmanship of the Arctic Council	Lawson Brigham US Arctic Commission
Concluding Panel Session: The challenge remains	Speakers, Sergey Aysinov, Admiral Makarov State Maritime Academy

1. OPENING ADDRESS

Erik Ulfstedt, Ministry of Foreign Affairs, Finland

Ladies and gentlemen,

It's a great pleasure for me to have the honour to open this final workshop of the ARCOP.

This meeting reminds me of times some 15 years ago, when we exported ships including nuclear driven icebreakers and they were paid for with oil export from Soviet Union. That trade took place through barter trade agreement.

History seems to repeat it self. Russia is again our biggest trading partner. We do export ships again and we import oil from Russia. The only difference is, that it is now all paid for in cash.

Finland took the initiative for a Northern Dimension policy for the EU. ARCOP has been implementing the Northern Dimension policy of the EU and Finland. Transport systems play an important role in the energy strategy and therefore ARCOP is also part of the energy dialogue between EU and Russia.

As far as I have understood, we can be pleased with the final results of ARCOP: the marine shipping of oil and gas is a competitive alternative. There are no major legal obstacles or conflicts. The open and equal competition should be secured with the Russia joining the WTO. The required technology is further developing and so is the understanding of environmental protection and the methods to protect the environment.

ARCOP is not solving all the problems, but gives a solid base for the future work. During these two days we will hear presentations, which will enlarge the scope even beyond ARCOP.

It is important to understand, that the Arctic is more than natural resources and their exploitation, it is the home for a great number of people and unique species of flora and fauna. It is as well important to understand, that the Arctic is an integrated enormous area covering the northern part of our globe. Within the Arctic Council the approach and scope of our work is therefore circumpolar.

The recently finalized Arctic Council Climate Impact Assessment forecasts major changes in the arctic climate, which will affect the lives and economic activities in the whole Arctic. Based on these research conclusions the Arctic Council has decided to start an Assessment on the Arctic Marine Shipping (AMSA). The lead countries for the assessment are Canada, Finland and USA, but both Russia and Norway have expressed their desire to actively participate in the work.

The information, experience and knowledge, which have been created during the ARCOP project, should in our opinion give a good basis for the AMSA work.

The importance of AMSA work is emphasized by the fact that the Barents Euro-Arctic Council has decided to discontinue its working group on the Northern Sea Route and instead concentrate the available resources in the circumpolar work within the Arctic Marine Shipping Assessment. Considering the importance and close connection between the energy interdependence and shipping strategies in the Northern Dimension, it would be more than desirable, that the European Commission would give a strong input in the AMSA work.

Finally I would like to express my congratulations to all the parties who have participated in the ARCOP work. The results of this work will have a positive effect on future sustainable arctic shipping, but it has also identified remaining challenges.

I wish you all a successful workshop.

2. SUMMARY OF ARCOP PROJECT - TECHNICAL SOLUTIONS, ECONOMICS, SAFETY AND POLICY ISSUES

Kimmo Juurmaa, Aker Finnyards

Abstract

General

ARCOP project has come close to the end. Most of the work has been completed. In total 48 reports have been published. There are 2 under review and 10 more to be delivered by the end of this month. All ARCOP project have been or will be published on the ARCOP web-site www.arcop.fi

During the project 8 workshops have been arranged and this will be the final workshop. The workshops have gathered 346 specialists representing 82 different organisations from 12 different countries. This final workshop has 60 pre-registered participants.
The web-site has been in active use for close to three years and the there has been some 250.000 successful requests from the site. The web-site will remain in operation for two years after the project has ended.

WP1 Ice information system

The work within this work package was made in clustered cooperation with another EU-funded research project IRIS. IRIS produced methods to derive more precise ice ridge information from satellite images and developed a routing tool for vessels sailing through ice fields. The work was done for the Baltic conditions and utilized the infrastructure available there. Within ARCOP the work was concentrating on developing recommendations on how to create a similar system for the Northern Sea Route conditions taking into to account the existing Russian systems in the area. The final report has not yet been delivered, but the results published so far indicate, that a saving of 20 % in sailing time can be achieved also in this area with the enhanced ice information system.

WP2 Legal and administrative issues

This work package covered a large number of topics varying from international law to rules and fees applicable in the Russian Arctic. Within international law the regime in force in the Russian Arctic is in line with UNCLOS Article 234 and thus the situation regarding commercial shipping is more or less clear. It was also considered that the UNCLOS Article 76 dealing with the extended exclusive economic zones does not really affect the commercial shipping since the sailing in the central Arctic Ocean means in any case passing through areas covered by the Article 234.

There are a number local issues related to the dispute zones and possible PSSA areas. From the point of view of commercial shipping the dispute zones are not a problem. But the potential PSSA areas may cause need for longer voyages and affect the economics of the transportation. However it seems that within the oil industry these additional cost have considered acceptable if they are properly justified by environmental reasoning.

Within the WTO and GATS there are a number of issues that are not clear today. But since the whole GATS regime covering shipping is still open, this cannot be a specific problem for the Arctic. There is one issue, which is interesting for the Arctic shipping community and this is the question of icebreaker services. In some countries this considered as a service that should be open for competition within WTO. In Russia as well as in Sweden this is considered to be part of the infrastructure that the coastal state

provides. Probably the solution to this question will be seen only when the large-scale transportation is in place and we can see if the coastal states are able provide the required service.

The question of ice rules caused a lot of discussion during the ARCOP workshops. And it seems that system of rules is not consistent. When dealing the hull strength The IMO recommendations refer to Polar Classes. But these Polar Classes in fact do not exist since IACS has not published their Unified Requirements. And as far is the propulsion power is concerned the Unified Requirements do not say anything about that. Among the national authorities like in Finland and Russia there are and obviously will be requirement for minimum power. This puts the ship owners and ship designers in a difficult situation since there is no generally approved basis for the requirements. So a lot of work needs still to be done within this sector.

The issue of fees seems also to be a difficult one. Generally it is considered that the current level of fees, for instance 16 dollars per ton of oil cargo, is far too high. The problem is that the fees are set based on the current cargo flow, which is less than 2 million tons per year. If the cargo flow will increase 40 million tons or more per year the fees should decrease to a level of 1 dollar per ton. This would be in line with fees collected in Finland. The other issue is that the system to define the fee level in Artic Russia is not transparent as it is in Finland. We actually do not know how the money collected as fees is used. It was also criticized that the fee systems do not encourage the use of higher technology. A simple calculation shows that a more expensive vessel, which needs less icebreaker assistance, is not beneficial for the ship owner since he in any case is forced to pay for the service he does not need. Hopefully this issue is also reconsidered in the future.

WP4 Environmental Issues

Within this work package we at first looked at the risk levels of the Arctic marine transportation. With the scenarios that were created it seems that the risk levels are quite low when compared to the experience from other sea areas. It must however be admitted that there is not existing experience from the large-scale transportation in the Arctic conditions. The experience on ice damages is mainly based on Baltic conditions. This is an issue that needs to be studied more thoroughly in the future.

The second issue studied was the oil drift after the accident. The several scenarios produced showed that depending on the accident location either high capacity or quick response time is important. This means that the response strategy must take both these into account. What was satisfactory was that the different simulation methods gave consistent results and thus at least the experts are confident that the methods are reliable.

The third issue was the actual oil spill counter measures. Knowing that the use of in-situ burning and the use of dispersants are efficient, but their use may be limited to other reasons, we concentrated on bioremediation and mechanical oil recovery. In bioremediation the problem still exists that the type of bacteria available today are not efficient in temperatures below freezing. This means that the development of more specific PAH-degrading cold adapted bacteria needs to be continued. Within the mechanical oil spill recovery several options were studied. It seems that none of them is proven in large-scale oil spill. There are efficient methods like the LAMOR Arctic Skimmer, but they have been designed for limited size of oil spills and need further development.

WP3 Integrated transportation system

This work package was the actual core of the ARCOP project. Here we looked at the different elements that are needed from tankers and icebreakers to loading system, traffic management and crew training. And of course we looked at the economics of the transportation.

The scenario for which the development work was done was selected to be realistic, but not yet commercially in operation. The task was to transport 330.000 barrels per day oil production from Varanday in North West Russia to Rotterdam in Europe. As tankers we used two different operational modes; independent and assisted. As icebreakers we had three alternative designs each capable to assist the tankers up to 120.000 tdw. The route alternatives used were either direct transportation to Rotterdam or shuttle service to Murmansk and transhipment there to open water tankers to Rotterdam. The result was that assuming a fee level of 1.2 Euro per ton, we can achieve a cost level of 12 Euros per ton. This can be considered feasible if we compare it with the pipeline costs for similar routes that are approx. 20 euros per ton. What is important to notice is that the difference between the best and worst alternative is some 100 %. This means that with the optimisation you can achieve a saving of more than 100 million Euros per year. Over the lifetime of the project this is over 2,5 billion Euros.

The work with the VTMIS system showed that there are a number of information services that can be combined in the system in the Arctic. In future especially the ice information should be part of the VTMIS system.

The lack of crew training was an issue that came quite strongly out of the work that was done within ARCOP. Although many international codes including IMO recognise the issue, there is no international standard or not even service available. The need for trained crews for ice operations is increasing. The need for crewmembers to be trained in the coming few years is more than 3000. The question is also strongly related to the issue of safety.

WP5 Validations

The original idea within ARCOP was to arrange a large-scale validation voyage with a large size tanker up to the Russian Arctic. Unfortunately no commercial cargo was available for a large tanker by the time the voyage was planned. What was done instead was that the Russian participants in the project analysed some of the ongoing activities in areas that can be considered relevant. The current cargo operations at the Varandey terminal show that the downtime estimates that were used in the ARCOP economic analyses were quite close to those that are experienced today. Also the time that is needed to perform the customs and other administrative formalities were on realistic level. The analyses related to the operation of icebreakers with large tankers was done from the experience in the Baltic. This analyses shows that at least in Baltic conditions one icebreaker is often enough to assist one large tanker through the ice. Thus the assumption that was used in the ARCOP calculations may be slightly pessimistic.

WP6 Workshops

The workshop activity during the ARCOP project was maybe the most successful part of the whole project. The workshops were an efficient tool to bring together the different interest groups from industry, science and authorities. And although ARCOP was a EU-project, the workshops brought a circumpolar dimension into the work.

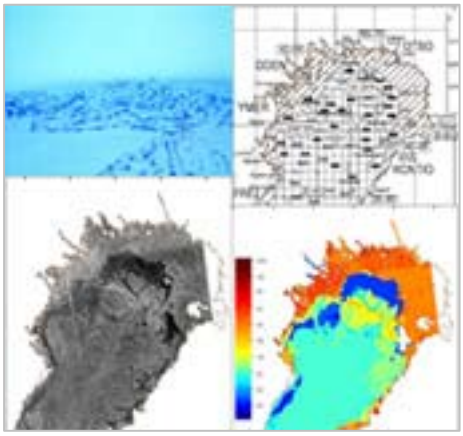
Presentation

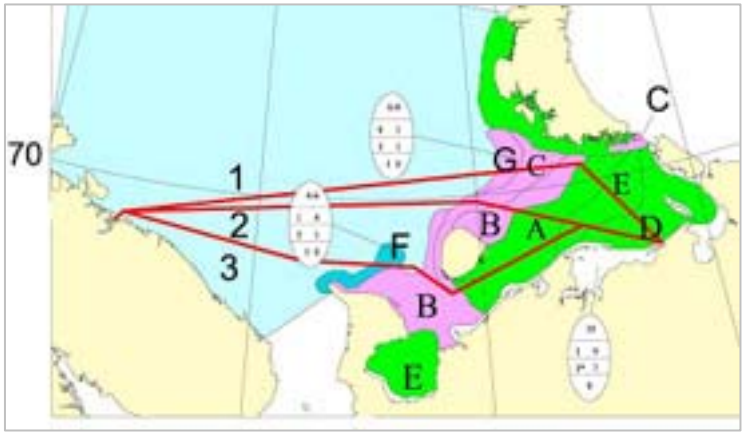
DELIVERABLES BY 15.11.2005

- 46 reports published
- 2 reports under review
- 8 more reports to be produced
- All reports have been or will be published on the web-site
- 8 Workshops arranged with 346 participants representing 82 different organisations from 12 different countries
- 1 Workshop ongoing with more than 60 participants
- Web-site in active use with more than 250.000 succesfull requests

WP 1 ICE INFORMATION (IRIS)

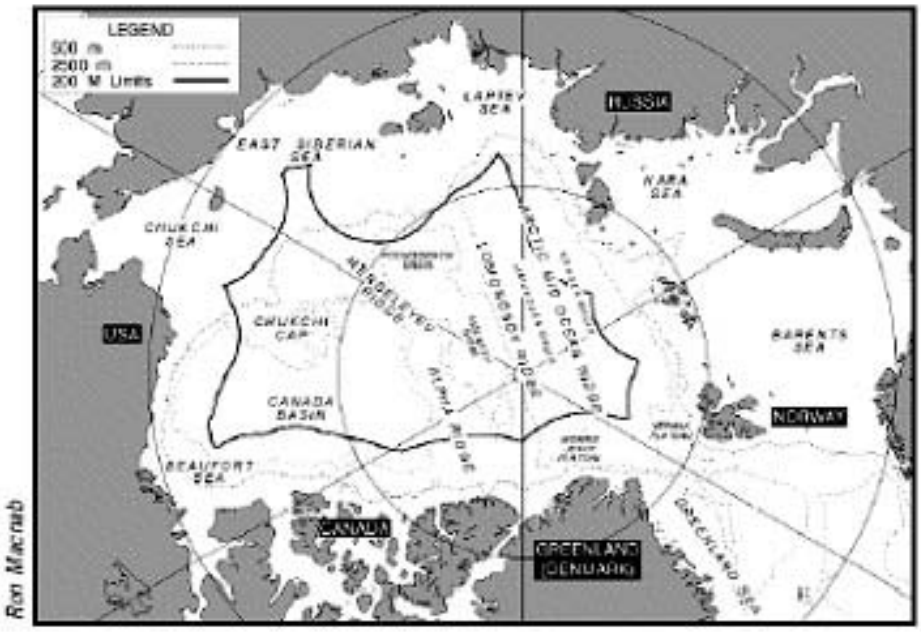
- Describe the ridged ice fields in form of equivalent thicknesses
- Develop method and a tool to compare the selected routes onboard
- Validate the results
- Based on IRIS experience 20 % reduction in sailing time can be expected
- Recommendations on how to combine the Baltic system technology with the existing NSR infrastructure will be given





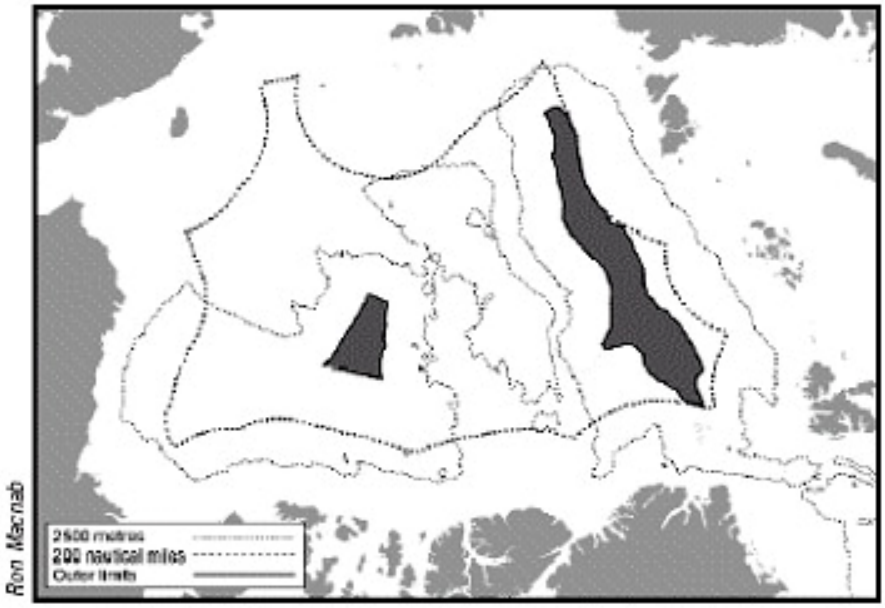
WP 2 LEGAL ISSUES

UNCLOS Article 234



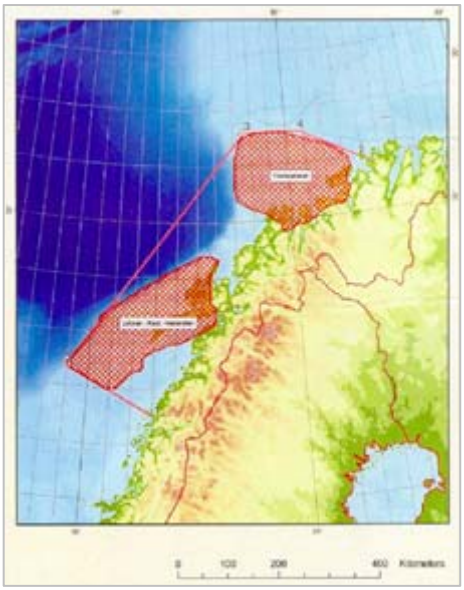
Map showing the coastal Arctic states, their joint Exclusive Economic Zones (EEZs), and the natural prolongations of their land territories.

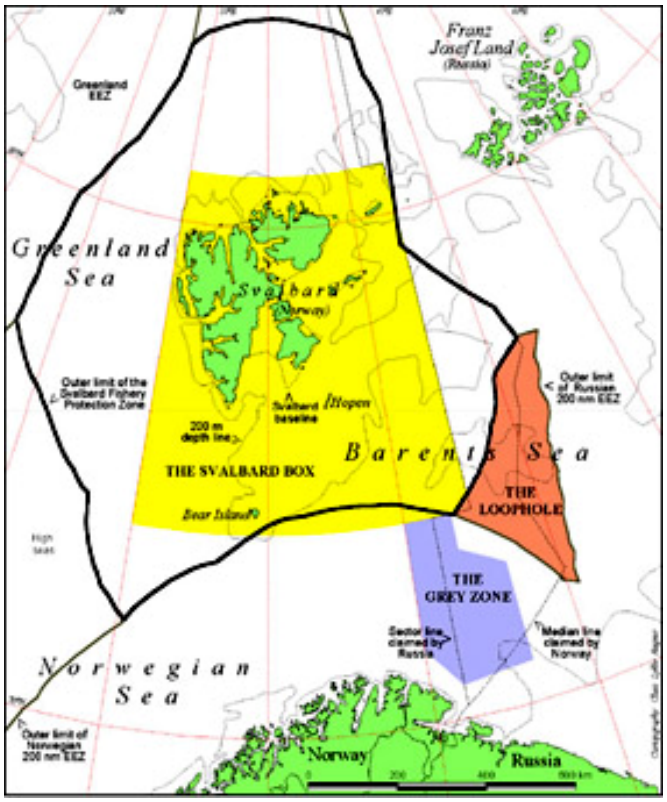
UNCLOS Article 76



A hypothetical map of the Arctic Ocean showing the combined continental shelves of the five Arctic coastal states after resolution of the extensions of their EEZs under Article 76 of the UN Convention of the Law of the Sea. Only two small 'donut holes' remain that would be considered international waters. This plausible future has key implications for Arctic shipping. (EEZs), and the natural prolongations of their land territories.

PSSA'S AND OTHER DISPUTE ZONES





- A number of issues related WTO / GATS, but GATS regime governing shipping will take some years
- Free competition in icebreaker services is of interest
- EU legistlation tends to go beyond IMO
- EU is not a state and cannot be member of IMO
- EU member states need to follow both IMO and EU regulations
- Trading with EU member states brings the EU requirements to the shipping

WP 2 ICE RULES

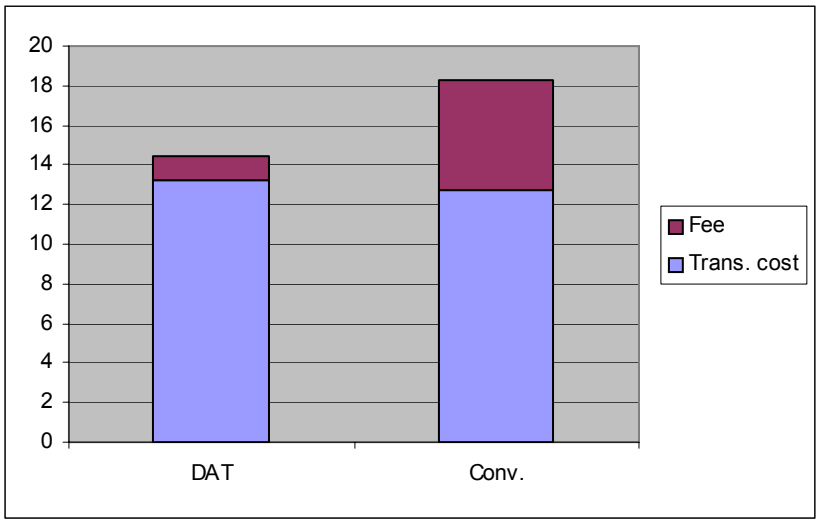
- IMO Guidelines for Ships Operating in the Arctic Ice-Covered Waters form the basis, but...
- The PC requirements referred to do not exist
- IACS Unified Requirements do not contain any requirements regarding the engine power
- National authorities and different classification societes have different requirements for minimum performance
- Some fees and some safety requirements are based on these (FMA, NSRA, HELCOM)

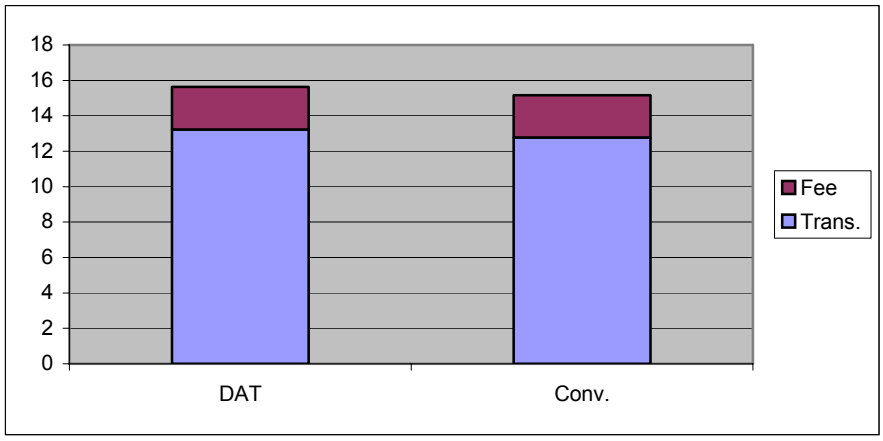
WP 2 RECOMMENDATIONS FOR ICE RULES

- Agree and publish the UR's for Hull and Machinery as basis for the safety
- Keep the performance requirements as they are and where they are
- Start the process to develop Unified Requirements for the performance
- Start development of requirements for new technology
- Make sure that the development work is transparent and inclusive

WP 2 FEES

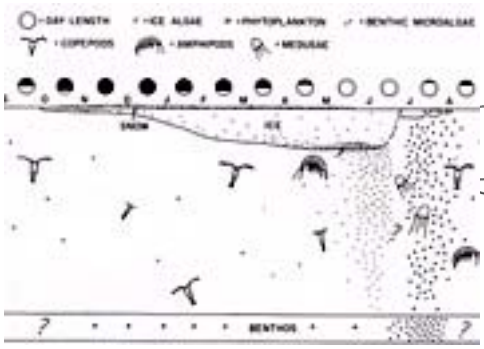
- Fees to cover fairway maintenence and icebreaker service
- Fee system has impact on the technology development
- !6 USD/ton for oil is considered too high
- The basis for the fees should be transparent
- In Finland 30 million Euros for icebreakers and 30 million Euros for fairways
- 1 Euro/ton for 9 icebreakers

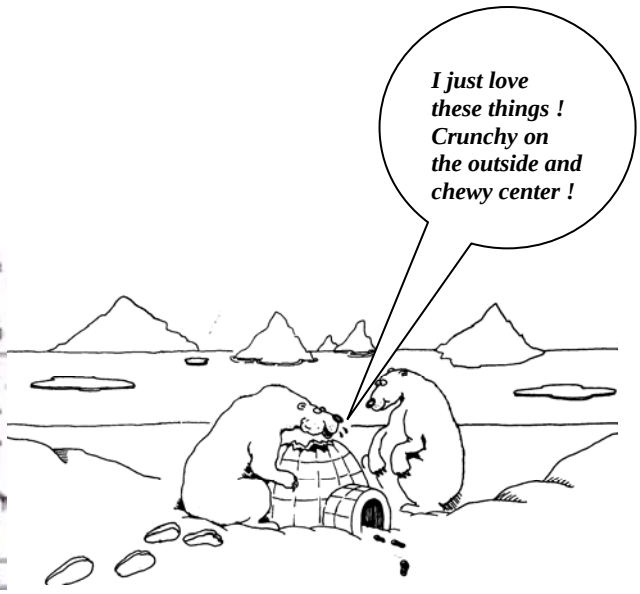




WP 4 ENVIRONMENTAL ISSUES

Sea ice associated food webs in the Arctic = sea ice is the beginning (and the end?) of pelagic food webs in the Arctic





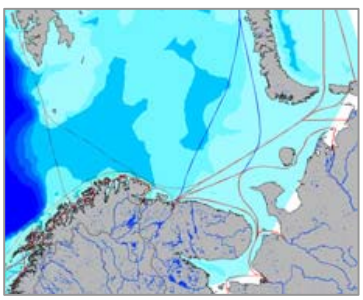
WP 4 ENVIRONMENTAL RISK ASSESSMENT (ERA)

- Environmental Impact Assessment: Indicate possible consequences and impacts
- Environmental Risk Assessment: Integrate probability & consequences

  Probability of an Event (P) * Consequences of the Event (C)
- Event
  - Ship transportation of oil products, serious oil spills
- Probability
  - Accidental frequencies & oil spill modelling
- Consequences
  - Resources at risk
- Their sensitivity / vulnerability to oil
  - Risk calculation

WP 4 ERA: ACCIDENTAL EVENTS

Carrying capacity of crude oil tanker	Number of round trips per year		
	Year 2003	Year 2012	Year 2020
30kT	190	-	-
120kT	60	52	108
300kT	-	66	86



YEAR 2003 – FREQUENCIES AND RETURN PERIODS FOR SERIOUS OIL SPILLS

Zone	1	2	3	4	5	Total (All zones)
Length (km)	280	110	140	900	1000	2430
Accident frequency (per km per year)	2.28E-6	2.28E-6	2.28E-6	2.28E-6	4.41E-7	1.52E-6
Accident frequency (per yr) *)	6.38E-4	2.51E-4	3.20E-4	2.05E-3	4.41E-4	3.7E-3
Return period (years)	1600	4000	3100	490	2303	270

YEAR 2020 – FREQUENCIES AND RETURN PERIODS FOR SERIOUS OIL SPILLS

Zone	1	2	3	4	5	Total (All zones)
Length (km)	280	110	140	900	1000	2430
Accident frequency (per km per year)	1.94E-6	1.94E-6	1.26E-6	1.17E-6	3.89E-7	9.71E-7
Accident frequency (per yr) *)	5.43E-4	2.13E-4	1.64E-4	1.05E-3	3.9E-4	2.36E-3
Return period (years)	1800	4700	6100	950	2600	420

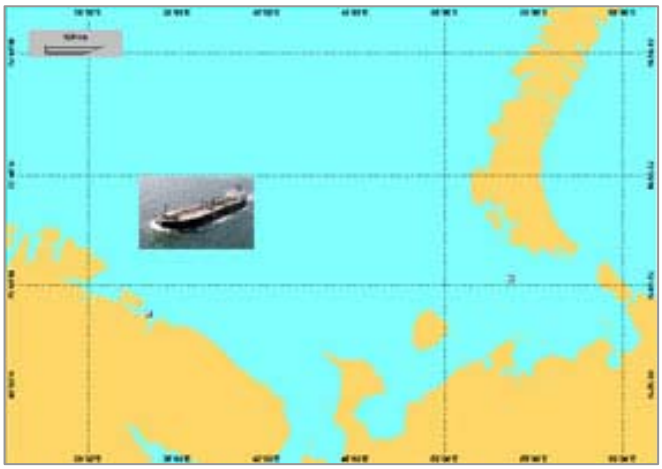
WP 4 ERA: ENVIRONMENTAL CONCERNS

- Low risk index values due to
  - Limited traffic
  - Limited exposure during periods of ice cover
  - Apparently lower resource index values ?
  - Regime with icebreaker assistance

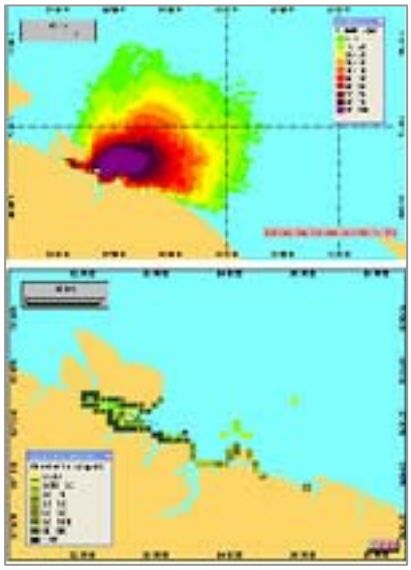
- Main concerns regarding environment
  - Personell / operation
  - Tankers without icebreaker assistance
  - Regularity vs. Safety
  - Speed vs. Ice conditions
  - Economical demands

- Risk reducing measures
  - Ship specific (icebreaking abilities, double acting tankers, ”winterization”)
  - Personell training and experience
  - Oil spill response & contingency
  - Ice monitoring and forecast

WP 4 OSCAR OIL DRIFT SCENARIOS



- Spill location
  - Entrance to Murmansk Fjord (open water)
  - Between Varanday loading terminal and Kolguyev Island (seasonal ice)
- Type of spill
  - Grounding or collision
- Amounts and duration
  - 10 000 m3 in 10 hour
- Oil type
  - Oil type (Troll crude) chosen on the basis of similarity with crude assay data for the Prirazlomnoye crude oil
- Season
  - Spring (March, April, May)
  - Autumn (August, September, October)



WP 4 SIMULATION STRATEGY

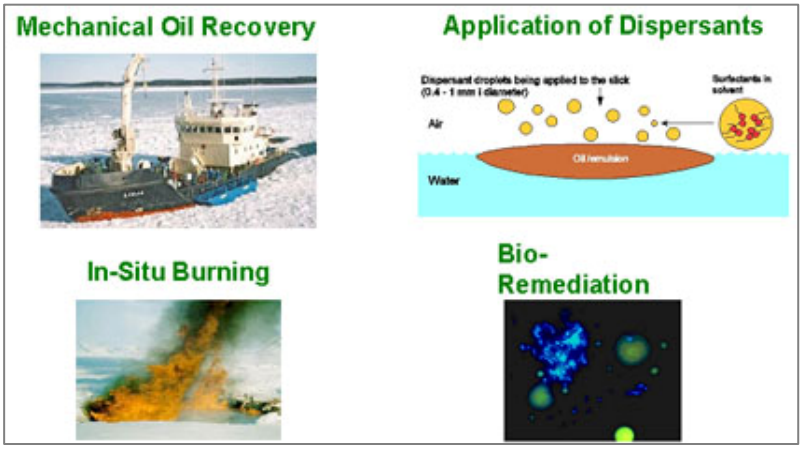
- Statistical simulations
  - Simulations based on 23 years of historical wind and ice coverage data, combined with climatologic current fields for the region of concern.
  - Statistics obtained by running a number of oil spill scenarios starting in the prescribed season within the years with available data.

  - Simulations made with no oil spill response and with various levels of oil spill combat measures
- Single scenario runs
  - Made for the scenarios with maximum stranded oil.
  - Used to evaluate the benefits of additional oil spill response units

WP 4 OIL DRIFT CONCLUSIONS

- Cases studied
  - Oil tanker groundings or collisions on the Varanday – Murmansk ship route
  - Short term release (10 hours) of large amounts of oil (10 000 m3)
  - Simulations were made with no response and various levels of response efforts.
- The results differed for the two locations, depending of drift time to shore:
  - Marginal gain in terms of reduced amounts of stranded oil for the near shore location ("Murmansk")
  - Significant gain for the offshore location ("Varanday")
- Short response time may be more important than high recovery capacity for near shore spills

WP 4 OIL SPILL COUNTERMEASURES



WP 4 BIOREMIDATION TESTS

- The experiment of effects of oil, Inipol and fish meal on bacteria (bioremediation: Dieckmann & Gerdes) and protist communities (=biota: Ikävalko) was made in Van Mijenfjorden, Spittsbergen during 2-4/2004 (63 days)
- Statjord oil, inipol (commercial product incl. nutrients N+P, with urea as nitrogen source) and fish meal (nutrients) were added onto ice.

WP 4 BIOREMIDATION

- It appears that biodegradation of oil hydrocarbons comes to a halt at temperatures below freezing.

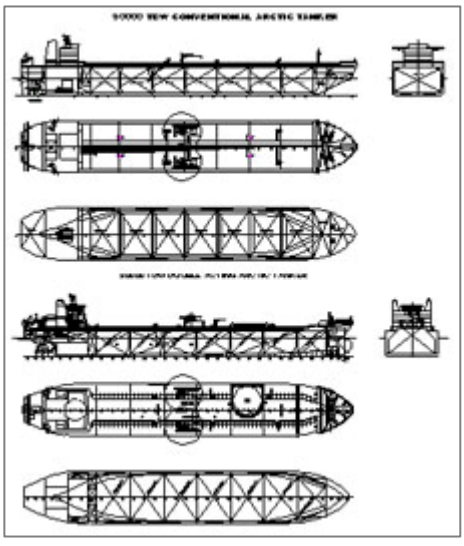
- However, when temperatures rise above 0°C and melt water pools begin to develop bioremediation could be applied as a sensitive alternative oil spill response method.
- Future bioprospection and the culturing of more specific PAH-degrading cold-adapted bacteria should improve the prospects of oil remediation in sea ice.

WP 4 MECHANICAL OIL RECOVERY

- Several options were studied
- It appears that no proven system for large scale oil spills exists
- The most promising alternative especially for use at terminal areas is the Arctic Skimmer from Lamor

WP 3.1 TRANSPORTATION SCENARIO

- Route Varandey-Rotterdam
- Volume 330.000 barrels per day (15 million tons per year)
- Offshore Loading
- Onshore storage to balance the variations



WP 3.2 TANKERS

- Size 60.000 to 120.000 tdw
- Assisted conventional
- Independently operated DAT
- Costs in the range of 65 to 85 million Euros
- 100.000 tdw chartered openwater tankers for summer

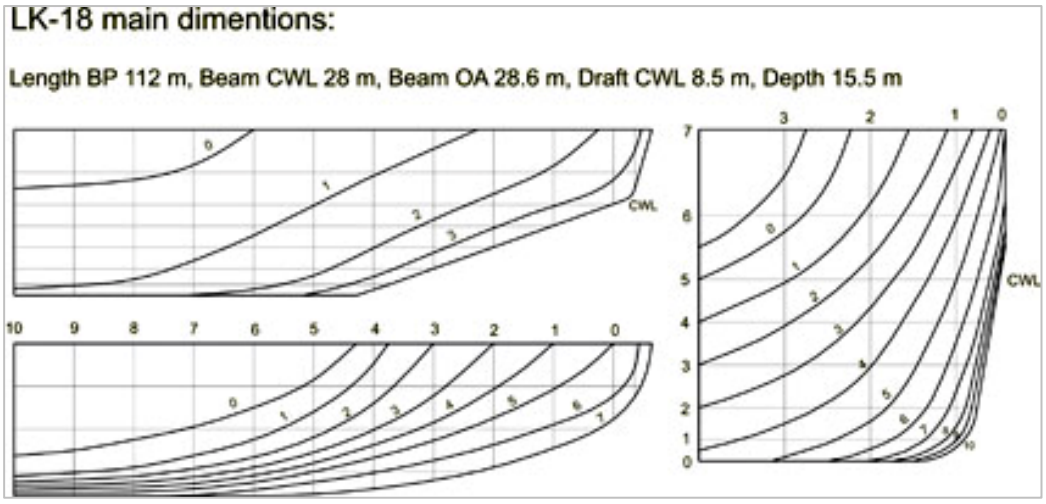
WP 3.2 OPERATIONAL MODES

Conventional tankers following in the lead which wider than the tanker

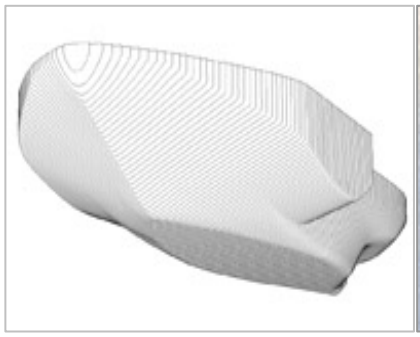
Independent operation without assistance of any icebreaker

WP 3.3 ICEBREAKERS

- Type LK-18
- 18 MW shaft power
- Two icebreakers to assist one tanker
- All together 6 icebreakers are needed



WP 3.3 ALTERNATIVE ICEBREAKER DESIGNS

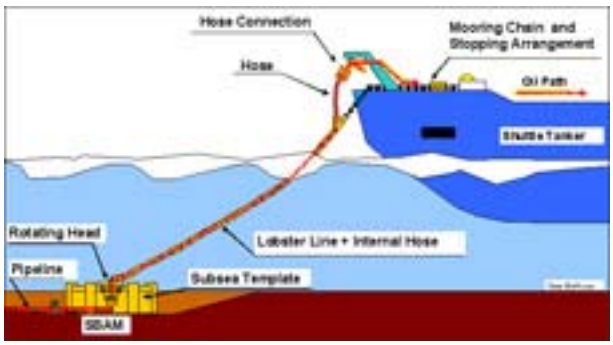


Wide body Taimyr

Oblique icebreaker

WP 3.4 LOADING SYSTEM

- Tecnomare SBAM
- Costs include subsea pipeline
- Maintanence costs including mobilisation costs
- Downtime estimates without ice management



WP 3.5 ECONOMIC TOOL

- For transit time calculations AARC simulation tools have been utilised
- Dedicated fleet simulation tool was developed within ARCOP workpackage 3.5
- Excel worksheet utilising data from:
- WP 3.1 Transportation scenario
- WP 3.2 Tanker designs
- WP 3.3 Icebreaker designs
- WP 3.4 Loading terminal
- Information from following WP's was also used:
- WP 2.3 Immigration and customs prcedures
- WP 2.4 Risk management and insurance coverage
- WP 2.5 Fee Policy
- WP 5 Demonstrations

WP 3.5 OPERATIONAL ASSUMPTIONS

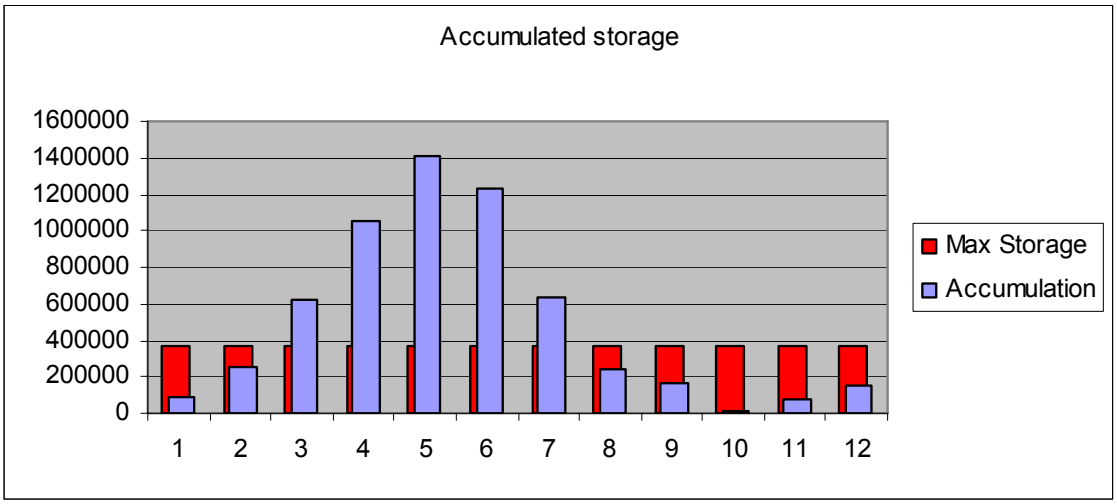
- The variation of transportation performance is balanced by storage and by chartering open water tankers during summer months
- Downtime for each tanker is 1 month in every second year

- Delays for terminal approach, mooring etc. considered as 15 hours per roundtrip
- Cost for building the dedicated vessels are based on European cost level
- Fixed fee per ton for transhipment in Murmansk
- Fixed fee for transport between Murmansk and Rotterdam for large open water vessels
- Chartered vessels during summer time are Aframax size, ice class 1A when needed

WP 5.5 ASSUMPTIONS FOR ACTUAL COSTS

- The fairway infrastructure cost is 120 million Euro per year (equal to icebreaker cost)
- The infrastructure cost is evenly distributed over all the cargoes, which means 1.2 Euro per ton
- The icebreaker costs are based on actual usage of icebreakers

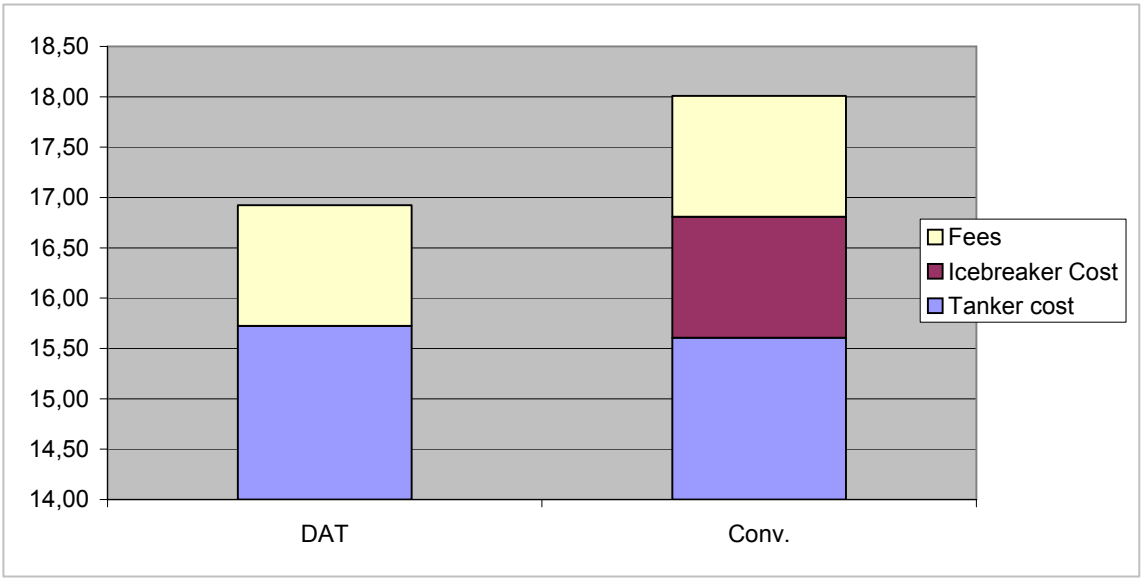
WP 3.2 EXAMPLE OF RESULTS FOR DAT



- Basic fleet is 8 vessels for direct transportation
- Aframax size open water vessels:
- 5 in June
- 4 in July
- 3 in August
- 2 in September
- 1 in October
- Max storage 1.4 million m3

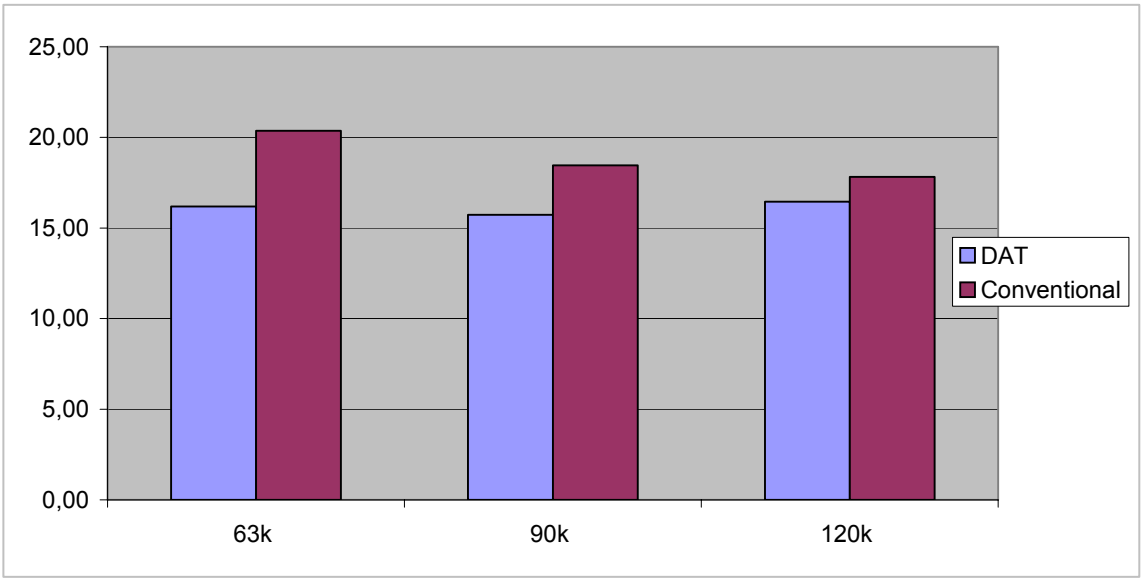
WP 3.5 INDEPENDENT OR ICEBREAKER ASSISTED WITH TRANSHIPMENT AT MURMANSK

- 4 LK-18 icebreakers are needed
- The independent operation is still more feasible



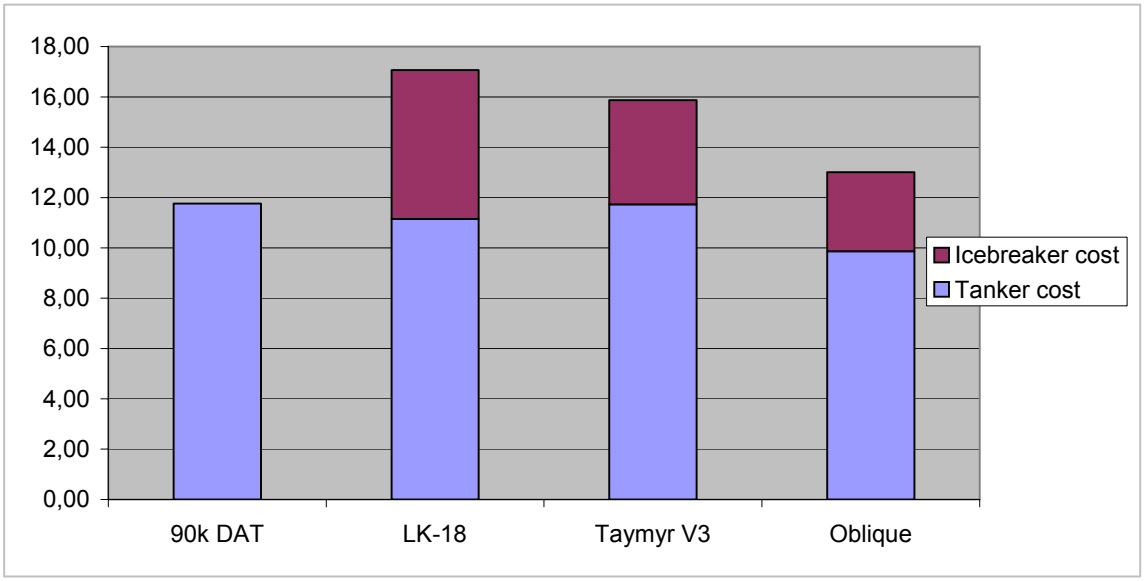
WP 3.5 WHAT SIZE WITH TRANSIPMENT TO ROTTERDAM?

- With bigger vessels the storage cost will increase
- For shorter distances the optimisation of all components becomes important



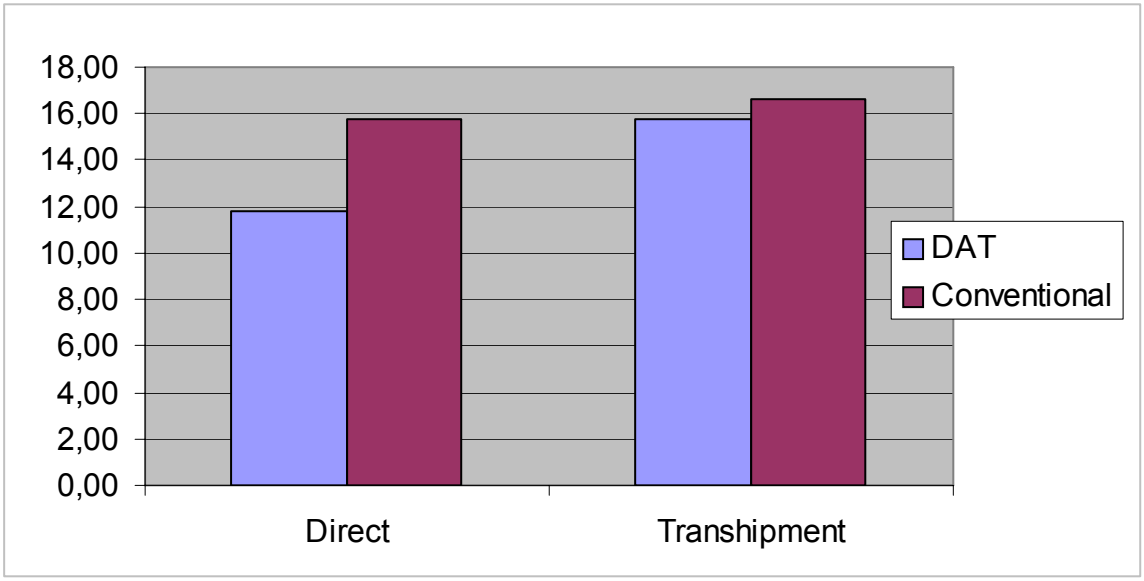
WP 3.5 WHAT TYPE OF ICEBREAKER WHEN DIRECTLY?

- Development in icbreaker technology creates cost savings
- Independent operation is hard to beat



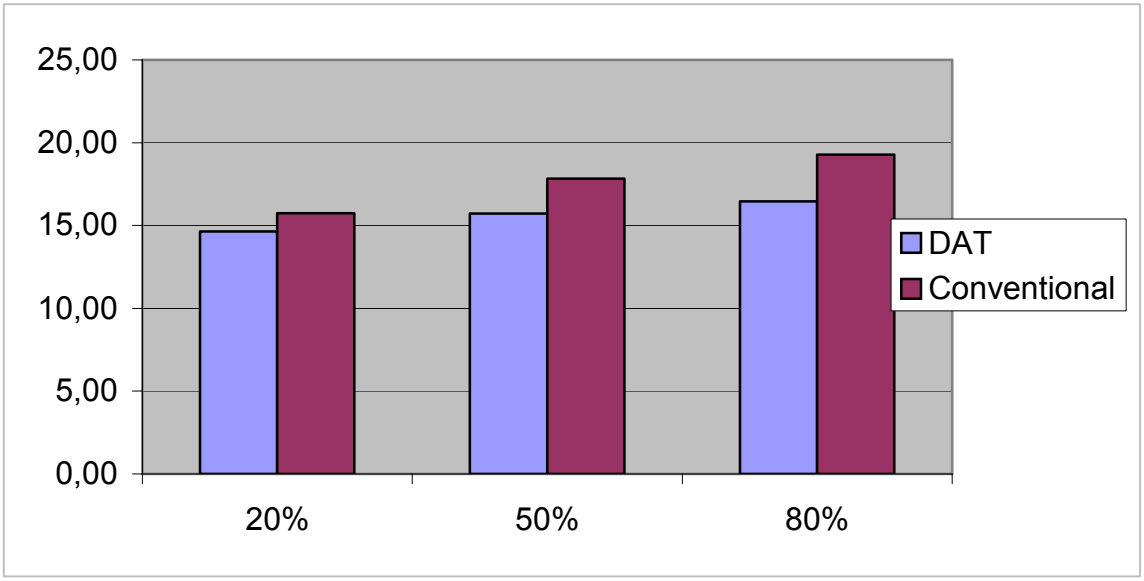
WP 3.5 SO, WHAT IS THE BEST ROUTE?

- Direct transportation to Europe
- For other destinations with longer open water leg the transipment may be more cost effective



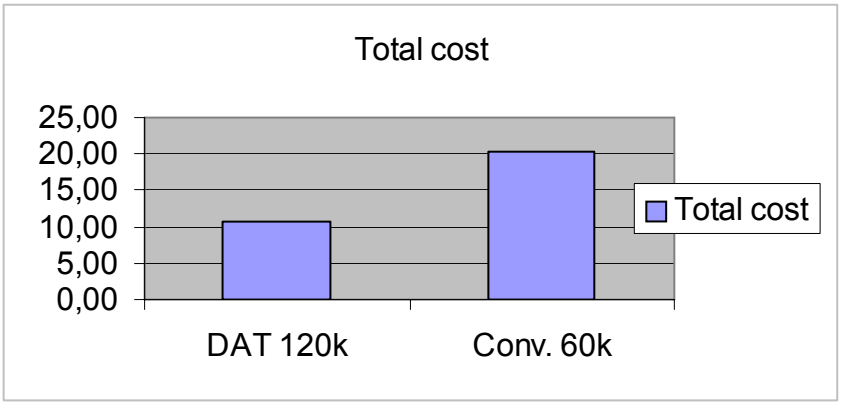
WP 3.5 HOW DOES THE WINTER EFFECT THE TRANSHIPMENT ALTERNATIVE?

The cost difference between mild and severe winter if more than 20 %



WP 3.5 CONCLUSIONS

- The development of the fleet is a complecated problem of optimisation
- The marine transportation is a competitive alternative for oil transportation from the Pechora Sea
- Direct transportation to Europe can be more cost effective than the use of transhipment
- Independent transportation is today the most cost effective alternative
- Icebreaker technology should be developed further to make the use of icebreakers competitive
- The cost saving with optimised design can be upto 50 %
- This is over 150 million USD per year
- In the lifetime cost this is 3 billion USD



WP 3.6 VTMIS

- Recognized the specialities of the NSR conditions:
  - Traffic density low
  - Difficult weather and ice conditions
  - Large area
- Recommended special design:
  - Use of AIS
  - Combine with ice information services
  - Combine with ice pilotage
  - Combine with icebreaker services

WP 3.7 TRAINING

- Both IMO and national authorities require certificated ice navigation training
- There is no internationally accepted uniform certification
- The interest towards training is increasing
- Private companies and terminals have their tailor made courses
- Estimates for near future indicate business volume of 15 million USD (3000 crew members each 5000 USD course)

WP 5 VALIDATIONS

- IRIS validations from the Baltic
- Two reports from CNIIMF analysing some of the current activities
- Downtime during winter operations upto 70%-80%
- Formalities typically 8 - 12 hours
- Large tankers in the Baltic 2005 mainly with signle icebreaker assistance

WP 6 WORKSHOPS

- Efficient tool for outreach
- Brought together different interest groups
- Brought in the circumpolar dimension
- Helped to focus the project on the essentials

We hopefully understand now a little more about the marine transportation of oil and gas in the Russian Arctic than before the ARCOP

Discussion

The US Arctic Commission representative commented, that though the US has not yet ratified the UN Convention of the Law of the Sea (UNCLOS), it is hoped to do so in the future. The issue has lately been discussed in the Senate, but no resolution was found.

He commented also, that it is unclear that when the countries that have signed the UNCLOS, where all of the coastal Arctic states may extend their baselines out beyond 200 miles, use their ability to have special regulations in their new sovereign sea base areas. So while it is agreed that in principal that does not bring new problems to Arctic shipping, it does allow the coastal states to have very special regulations, from which we do not know what they will be in the future.

The US Arctic Commission representative also expressed a wish that the IMO guidelines would become mandatory in the future and that the unified requirements, currently prepared within International Association of Classification Societies IACS, would be accepted by all coastal states.

Conclusions

The presentation described the essential achievements and results of ARCOP project. The economical calculations were based on the results of the workpackages. The results of the calculations were within the range of what was expected, but still brought new information on the impacts of the different factors and sensitivity of an Arctic transportation system to those.

It was noted that ARCOP works covered practically all topics that was originally planned. It was a pity that the validation voyage could not be realised but the Russian analysis of the current activities gave valuable information on the come of the critical issues. There are still many questions that require additional work in the future.

3. EXPERIENCE IN ICEBREAKER MAINTENANCE AND SHIP TRAFFIC MANAGEMENT IN THE SEAS OF THE NORTHERN ARCTIC

Nikolay Babich, Murmansk Shipping Company

Abstract

The first worldwide and most powerful icebreaker 'Ermak' (10000h/p) was put into operation in Russia in 1899. Already in 1921 Russia had 10 icebreakers in its disposal, with a total power about 51200 h/p. Up to that time Icebreakers' navigation, as well as navigation of other vessels in the Russian Arctic was carried out exclusively for expedition and investigation purpose. Regular commercial navigation with icebreaker support in the tense navigation summer period launched in 1921. Capacity extension of the currently in force Icebreaker Fleet and establishment of the nuclear-powered icebreakers 'Arktika' type (75000h/p) and 'Taimyr' type (48000 h/p) contributed to launch the whole-year navigation in the western Arctic region (the Barents and Kara Seas). Up to that time practically all the sea routes suitable for the ice pilotage were developed, with high-latitude and near the pole regions included.

Reached shipment capacity in the Northern Sea Route in 80-90 period amounted to 4 up to 6,7 million tones per year under the total power of the Icebreaker Fleet about 500000 h\p and with about 200 –300 cargo vessels provided. Since year 1998 the shipment capacity in the Arctic decreased up to 1,5 – 2,0 millions tones with about 50 – 60 vessels provided. At the same time the currently operating Icebreaker Fleet potential, consisting of JSC 'Murmansk Shipping Company' (440 thousands h\p) was capable to provide the carrying capacity of The Northern sea Route regarding transit communications up to 3 millions tones (summer navigation) and not less than 10 millions tones in the western part of the Northern Sea Route (whole-year navigation).

Since 2002 the shipping capacity decline in the Northern Sea Route came to its end and it is expected that in 2005 such a capacity will exceed 2 millions tones. The stable development of the Icebreaker Fleet is realized under the condition that the annual shipment extension in the Northern Sea Route equals 3-3,5 million tones. The level as such is expected up to 2008-2010 years. Due to the fact of consistent existing nuclear-powered icebreakers deactivating\putting out of operation it is already planned to build perspective nuclear-powered icebreakers, ice-breaker - 60 nuclear-powered type. The nuclear-powered icebreaker '50 Victory Anniversary' will be built and put into operations in 2007.

Accumulated 40 years experience of linear powerful icebreakers operations, including whole-year navigations, contributed to draw up certain navigation route methods, means of pilotage and ice enforcement techniques that provide the most effective and safe ice pilotage. Based on this experience and knowledge regarding ice conditions principals there are certain rules in regard operating speed in ice navigation, of optimal quantitative convoy members and of carrying capacity of the Northern Sea Route regions, depending on ice conditions are worked out.

The present database allows planning marine operations and controlling the Fleet movements in Arctic in accordance with the graph and the timetable. Depending on the scope and directions presented for the forthcoming cargo transportation, the graph can be taken in account of practically any period, up to one-year limit.

The central Northern Sea Route administrative board was founded in 1932; in 1971 its commission was delegated to the Northern Sea Route administration under the Ministry of Transport. The following years normative and legislative basis was set up regarding marine operations realization in Arctic. In the present-day conditions the main documents are the following: 'Regulations for navigation on the seaways of the Northern Sea Route', 'Guide to navigating through the Northern Sea Route'; as well as an extensive list of others normative documents, regarding such aspects as maintenance of navigation and ecological safety concerning every navigating vessel, notwithstanding its membership, characteristics and flag.

With a view of navigation and ecological safety maintenance only high-powered ice-class vessels are permitted for the arctic navigation – ULA, UL, L1 of the Register of Shipping of the RF or corresponding to the abovementioned ice-class vessel Register of other countries. Notwithstanding this fact, the main instrument providing the safe ice navigation is considered to be the Icebreaker Fleet. Analyzing the icebreaker accident rate for the recent 30 years presented that since linear icebreakers operations entrance 'Arktika' and 'Taimyr' type the number of accidents regarding screw, rudder and hull damages has decreased from 30-15 percents up to 3-1 percent. Every icebreaker is a survival vessel, possessing the diving party, equipment for the underwater welding, repairs and screw (propeller) blade substitution and hull damage elimination. The icebreakers are equipped with medical block, special medical equipment and provided with specialists enabling to render medical care, dental and surgical included.

JSC 'Murmansk Shipping Company' was founded in 1939. In 1953 entirely icebreaker and transport fleet of the northwest of Russia were concentrated within Murmansk Shipping Company limits. Since 1960 main functions of planning, carrying out and marine operations management in the western Northern Sea Route region turned to Murmansk Shipping Company. At the present icebreakers and other vessels in Murmansk Shipping Company possession provide marine operations in the Northern Sea Route, in the Dudinka-Igarky course, provide Fleet Operations in the freezing water areas in the White Sea, Barents (Pechora) Sea, as well as oil-transhipment terminal in Varandey region.

Presentation

Nuclear fleet of Russia
(1959-2003)

First-ever nuclear ice breaker ”Lenin”
03.12.1959
Capacity - 32 MW;
Displacement - 19240 T

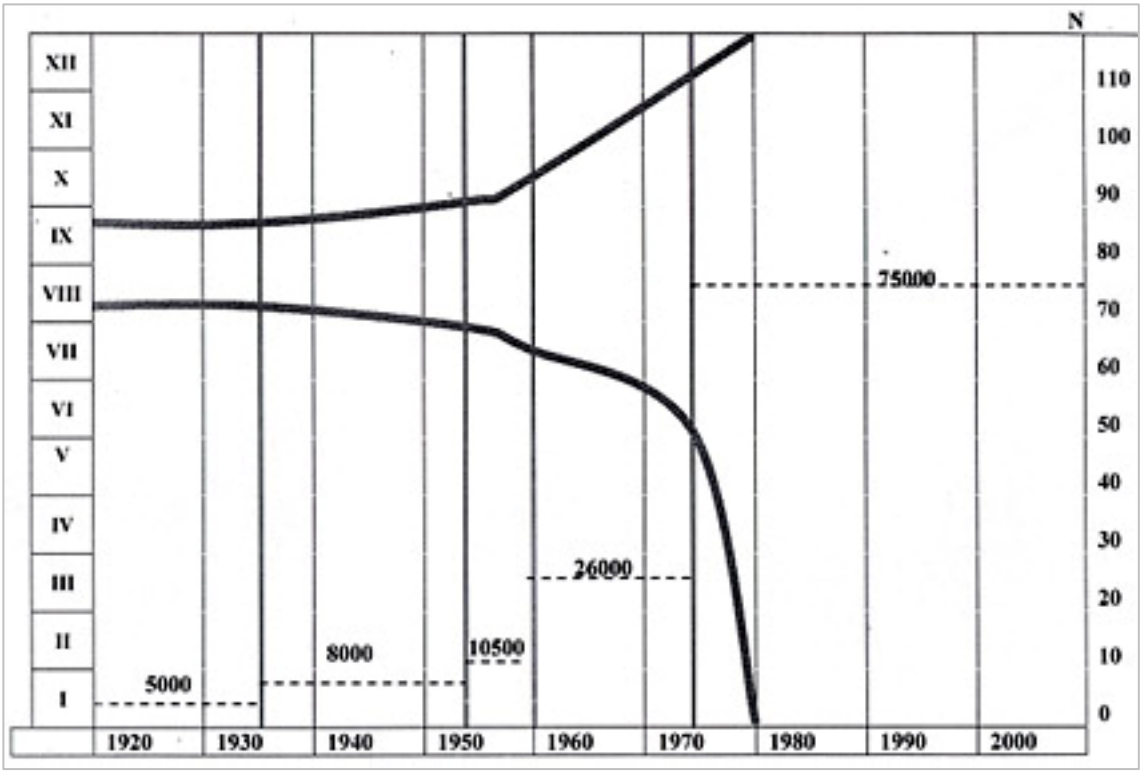
Nuclear ice-breakers class of ship ”Arctica”
Capacity - 54 MW;
Displacement - 23000 T;

n\i ”Arctica” - 25.04.1975
n\i ”Sibir” - 28.12.1978
n\i ”Rossiya” - 21.12.1985
n\i ”Soviet Soyuz” - 29.12.1989
n\i ”Yamal” - 28.10.1992

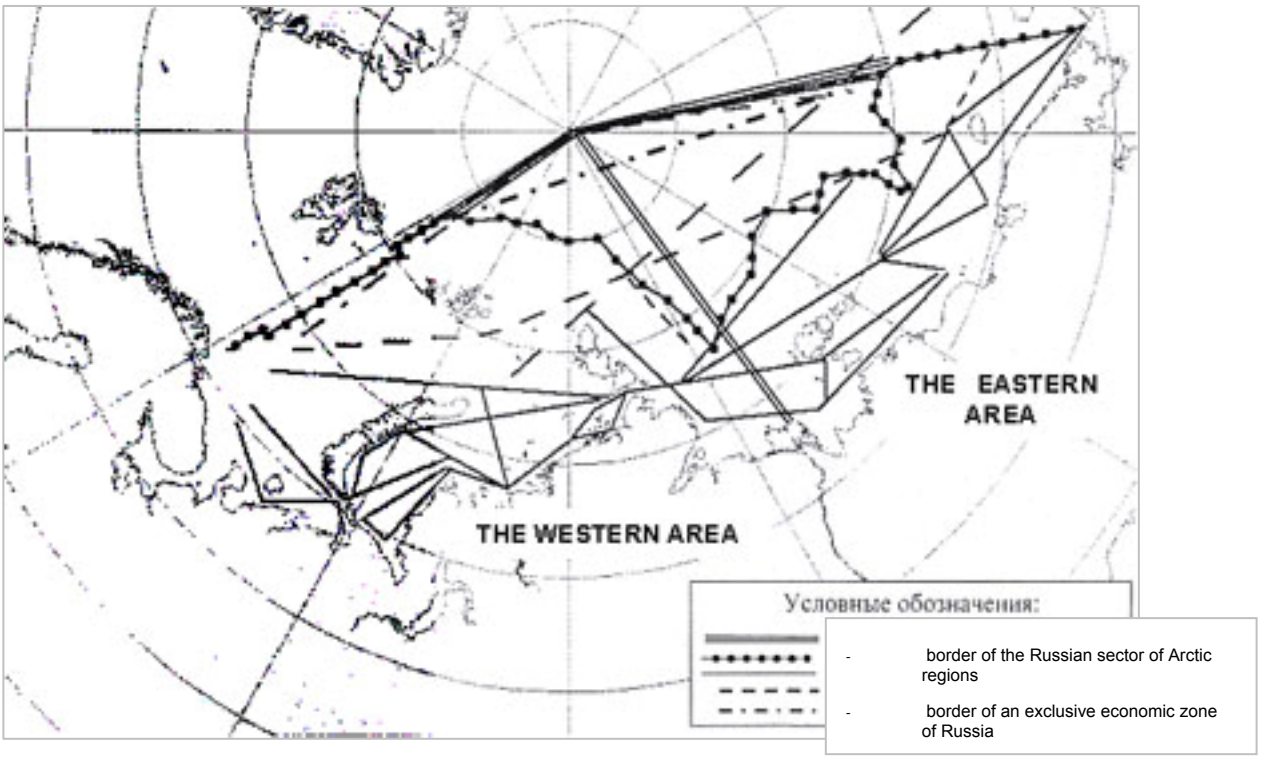
Nuclear ice breakers class of ship ”Taimyr”
Capacity - 35 MW;
Displacement - 21000 T;

n\i ”Taimyr” - 30.06.1989
n\i ”Vaygach” - 25.07.1990

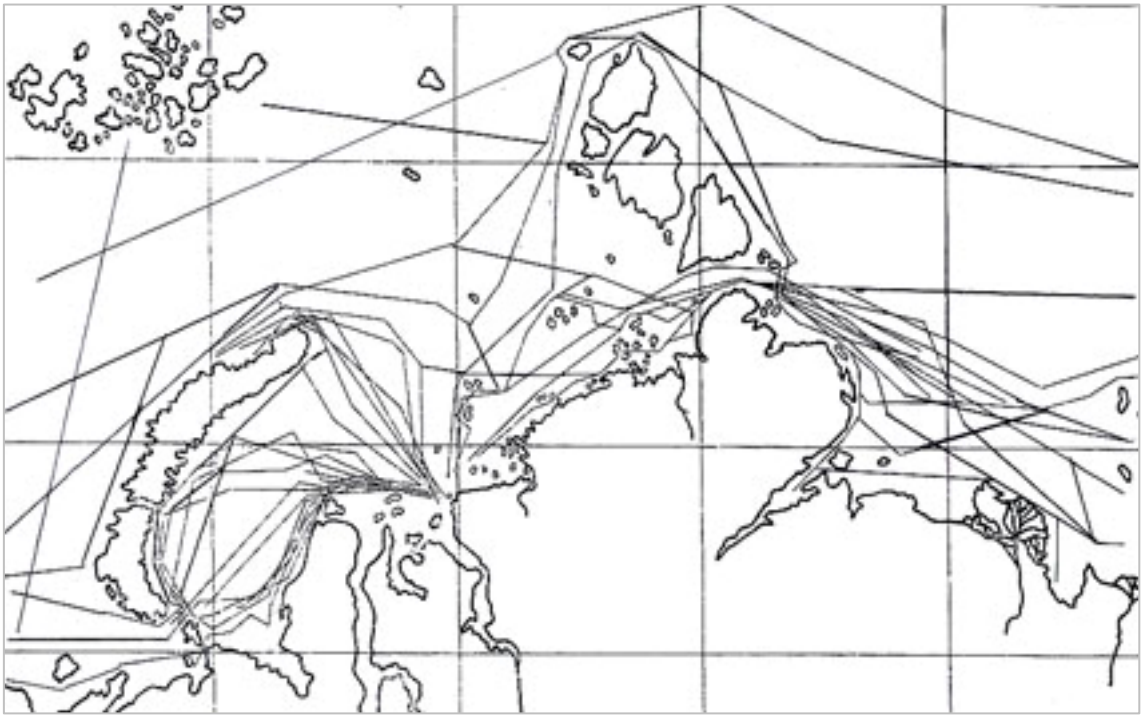
Nuclear lighter-aboard ship ”Sevmorput”
30.12.1988
Capacity - 32,5 MW;
Displacement - 61000 T;
Dead-weight - 33900 T.



Increase in duration of navigation in the western area of the Russian Arctic regions for the period 1920-2004 depending on growth of capacity of providing ice breakers

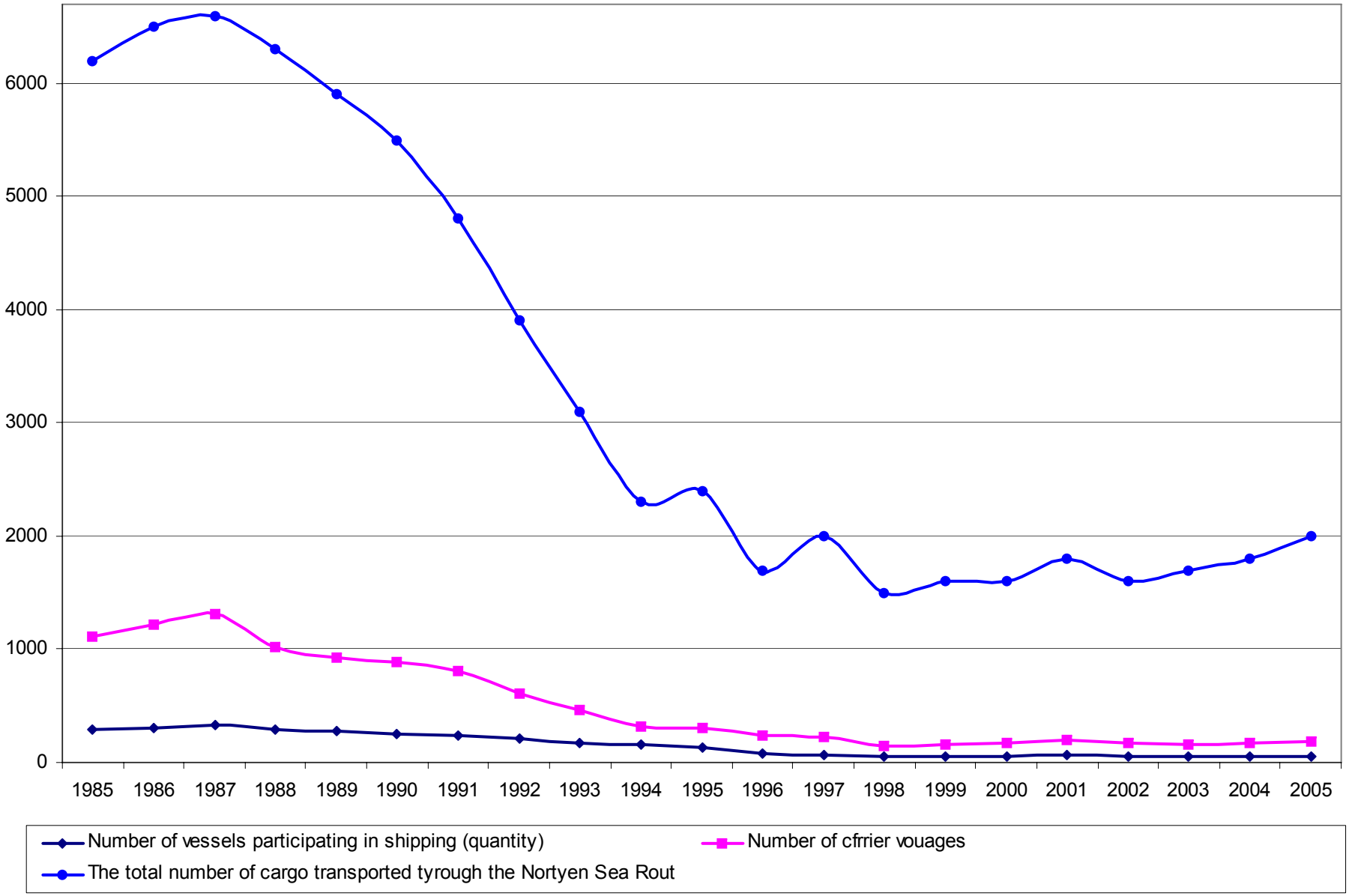


Border of an economic zone of Russia and line of Northern sea route



The circuit of traditional ways of navigation and variants of high-altitude lines in the western area of the Northern sea route

Icebreaker's name	Construction date	Gross weight, Mwt	Shipyard's country	Operator
Nuclear-powered icebreakers				
Arktika	1974	49,0	USSR	MSCO
Sibir	1978	49,0	USSR	MSCO
Russia	1985	49,0	USSR	MSCO
Sovetskiy Soyuz	1989	49,0	USSR	MSCO
Yamal	1992	49,0	USSR	MSCO
Taimyr	1989	32,5	USSR Finland	MSCO
Vaigach	1990	32,5	USSR Finland	MSCO
Diesel-electric icebreakers				
Ermak Kapitan Sorokin	1974 1976	26,5	Finland	SPA (St. Petersburg)
Admiral Makarov	1975	26,5	Finland	FESCO
Krasin	1976	26,5	Finland	FESCO
Kapitan Nikolaev	1978	16,2	Finland	MSCO
Kapitan Dranitsyn	1980	16,2	Finland	MSCO
Kapitan Hlebnikov	1981	16,2	Finland	FESCO


6000
5000
4000
3000
2000
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1985
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1987
1988
1989
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1999
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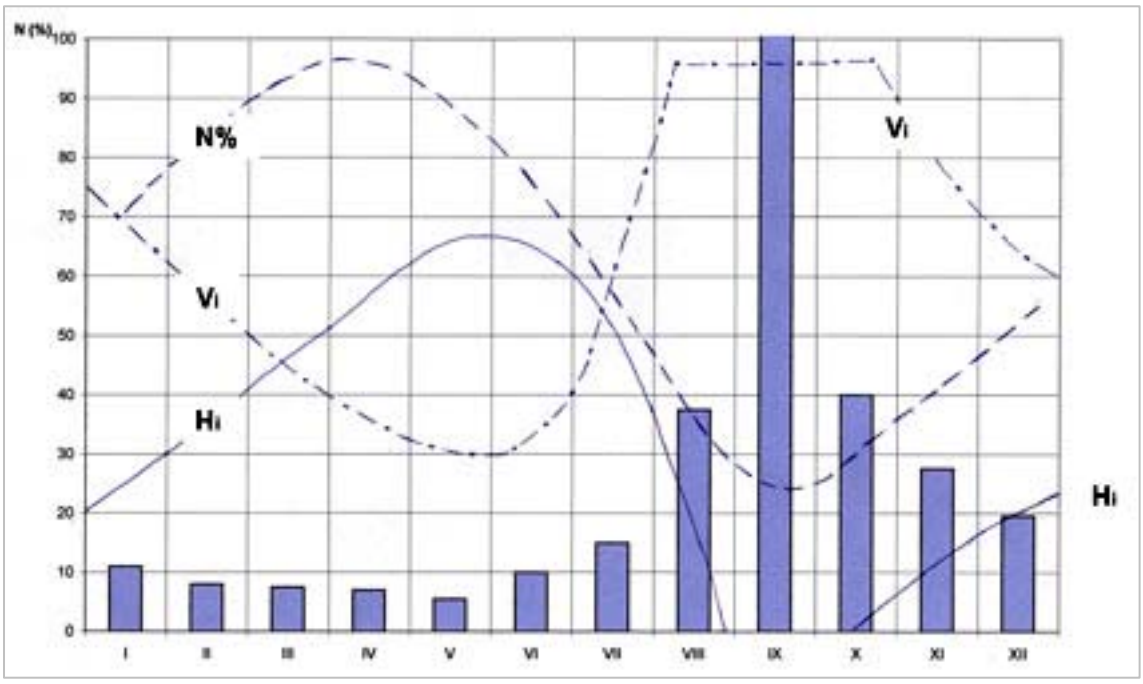
2001
2002
2003
2004
2005
Number of vessels participating in shipping (quantity)
Number of cfrrier vouages
The total number of cargo transported tyrough the Nortyen Sea Rout



Dynamics of transportations on NSR the western area of Arctic regions depending on thickness of ice (Hi), speed of passing of the ships(Vi), used capacity of ice breakers (N%)

№ 4151B

ADMINISTRATION OF THE NORTHERN SEA ROUTE
STATE HYDROGRAPHIC DEPARTMENT OF THE
MINISTRY OF TRANSPORT OF RUSSIAN FEDERATION

GUIDE TO NAVIGATING THROUGH THE NORTHERN SEA ROUTE

1998

CONTENTS

GENERAL OVERVIEW

NAVIGATION DIRECTIONS

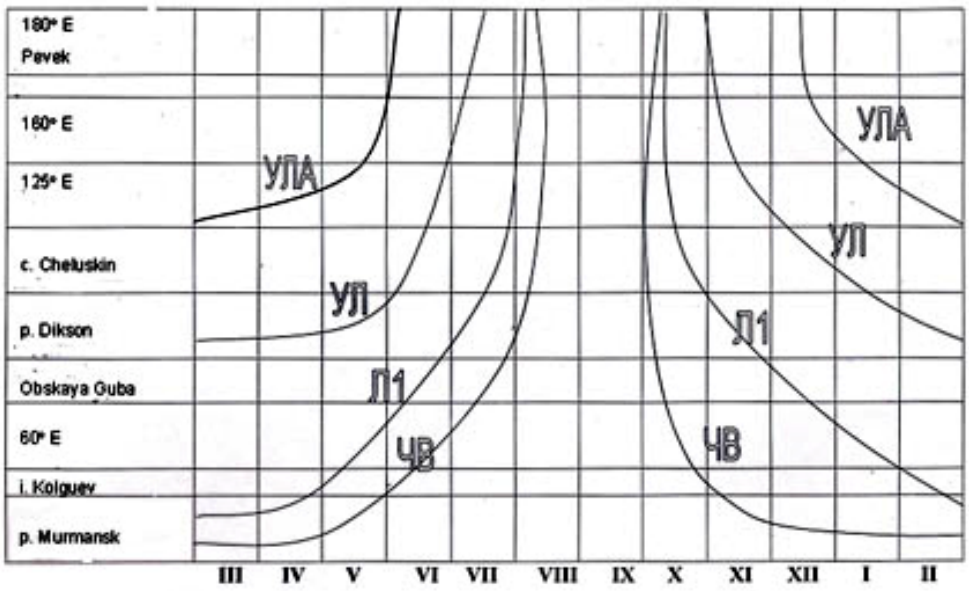
REFERENCE SECTION

ПРАВИЛА ПЛАВАНИЯ
ПО ТРАССАМ
СЕВЕРНОГО МОРСКОГО ПУТИ

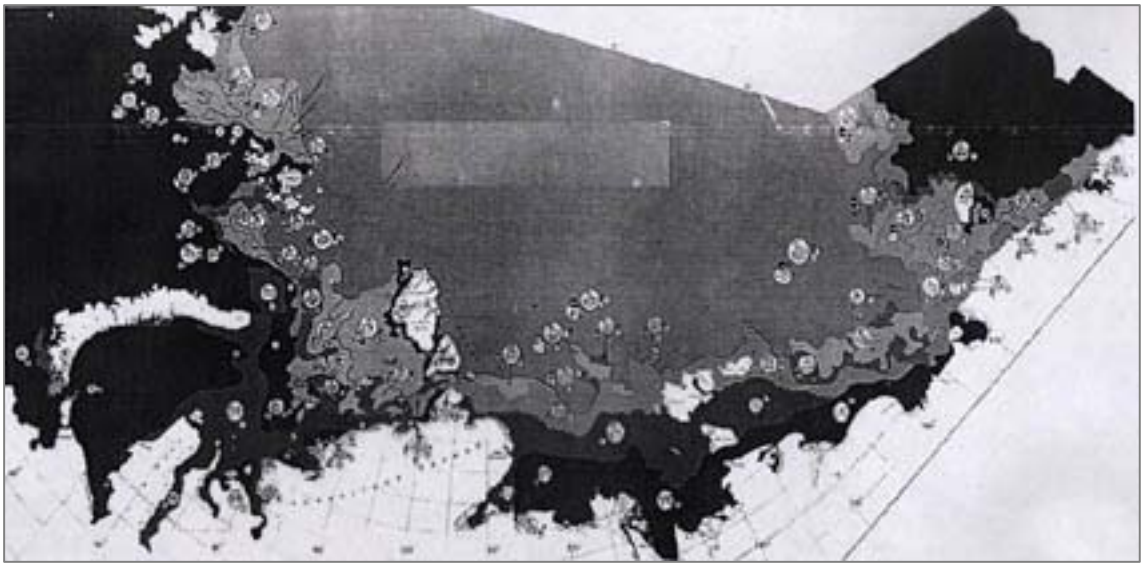
REGULATIONS FOR NAVIGATION
ON THE SEAWAYS
OF THE NORTHERN SEA ROUTE

Издание Главного управления навигации и океанографии
Министерства обороны Союза ССР
Published by the Head Department of Navigation and Oceanography
USSR Ministry of Defence
1991
1—20903

CONTENTS



Duration of the period of work on lines NSR by ships of ice classes УЛА, УЛ, Л1; possible terms of navigation in conditions of open water




MSCO
ICEBREAKING ASSISTANCE IN THE ARCTIC SEAS OF RUSSIA
IS THE ONLY GUARANTEE FOR THE SAFE AND REGULAR OPERATIONS
■ Planning of ice operations.
■ On-terminal ice management.
■ Icebreaking pilotage.
■ Technical management of icebreaking fleet.
■ Own professional training program for working in Arctic region.
■ Technical operation of nuclear power shipboard plants.
MURMANSK SHIPPING COMPANY
THE ARCTIC ROUTES

Discussion

Mr Babich was asked about the different transportation segments of the NSR and Ob Bay traffic (see chart in the presentation). Mr Babich explained that the situation in Ob Bay is currently open, and the navigational services will depend on how the Yamal and Ob Bay traffic will develop. Currently the Ob Bay is entered from the east.

The NSR rules regarding escorting were discussed. The MSCO representative did not comment on the escorting of the double-acting tankers that will in principle be able to navigate independently in ice. He stressed that the Russian Maritime Register of Shipping is the authority responsible for dealing with the regulations regarding new transport concepts.

He also explained that the new NSRA rules extend westward to Kara Gate, but in practice it is possible to extend the rules to include also the areas that are covered by ice more than 6 months every year.

Conclusions

Russia has long experience in transporting cargo on the NSR. Still, the experience is limited to relatively small size vessels and low cargo volumes. Follow-up of operations with large vessels, high cargo volumes and technologies is needed. The practices should be developed according to need. This should apply to activities in all ice-covered waters.

4. ENVIRONMENTAL PROTECTION PROCESSES IN OIL AND GAS PROJECTS

Gennady Matishov, Russian Academy of Sciences

Abstract

The Barents Sea oil and gas production, transportation and exploration operations have revived during the past 10 years. Some of the numerous activities are potentially harmful to the wildlife and ecology of this sensitive area.

The main worries are the oil spills and marine accidents. So far the Barents Sea has experienced only local impacts, but a large-scale spill would be catastrophic. Several assessments in the field of oil spill preparedness are underway.

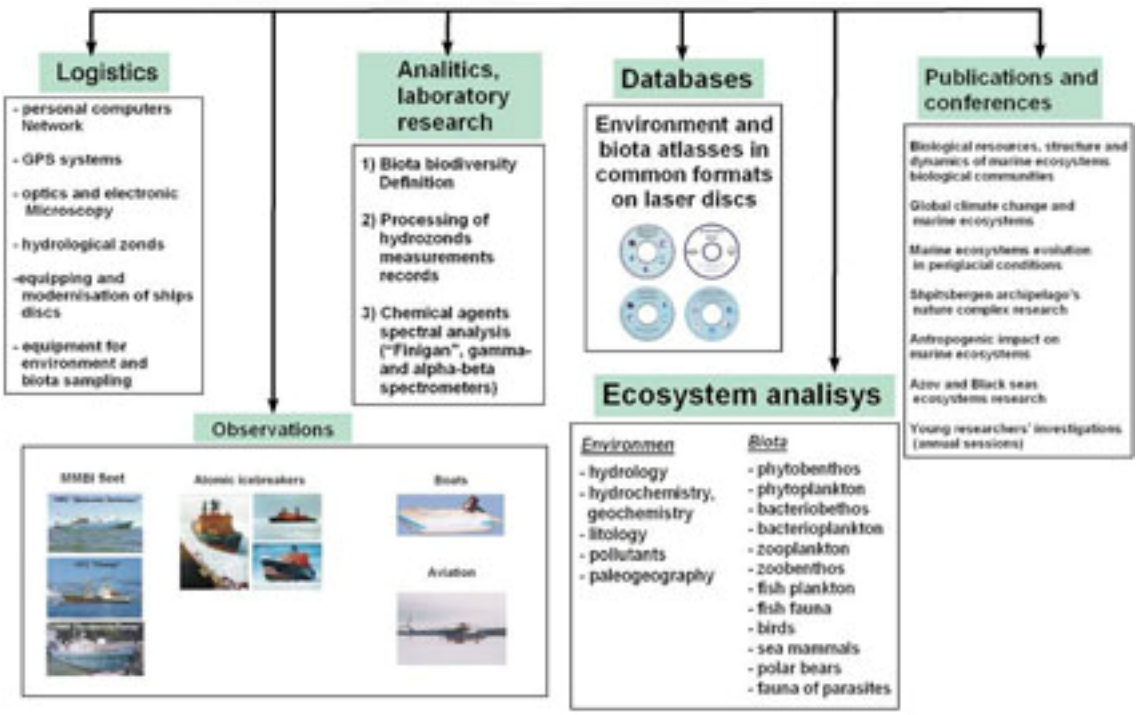
Transportation activities impact the sea area in other ways too. Ballast waters carry alien species of fish, shellfish or microorganisms. Species that do not belong to the Barents Sea, are introduced and in worst case, might overcome the local species and alter the ecology.

Also the exploration operations harm the nature. Several methods used to map the sea bottom and the layers below it, are quite violent and destroy habitats and populations.

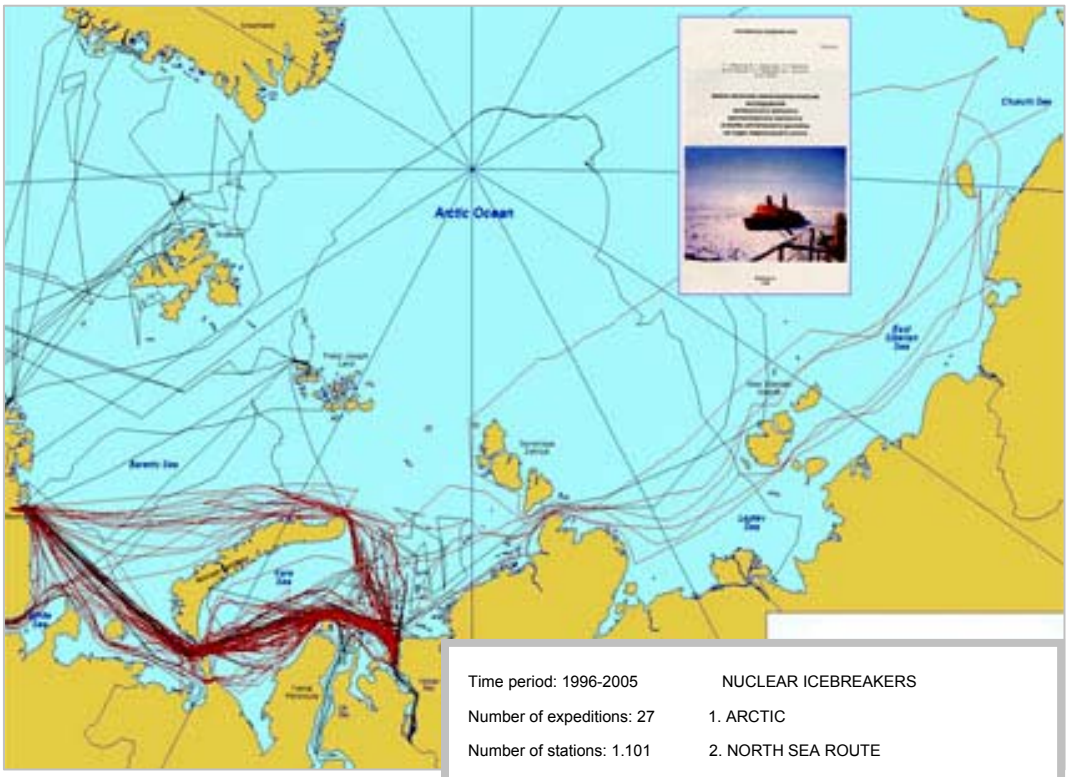
While the industry grows, the environmental issues should be taken care of. The data collection and monitoring of the potential changes is a necessity, to observe the impacts and inhibit destruction of wildlife.

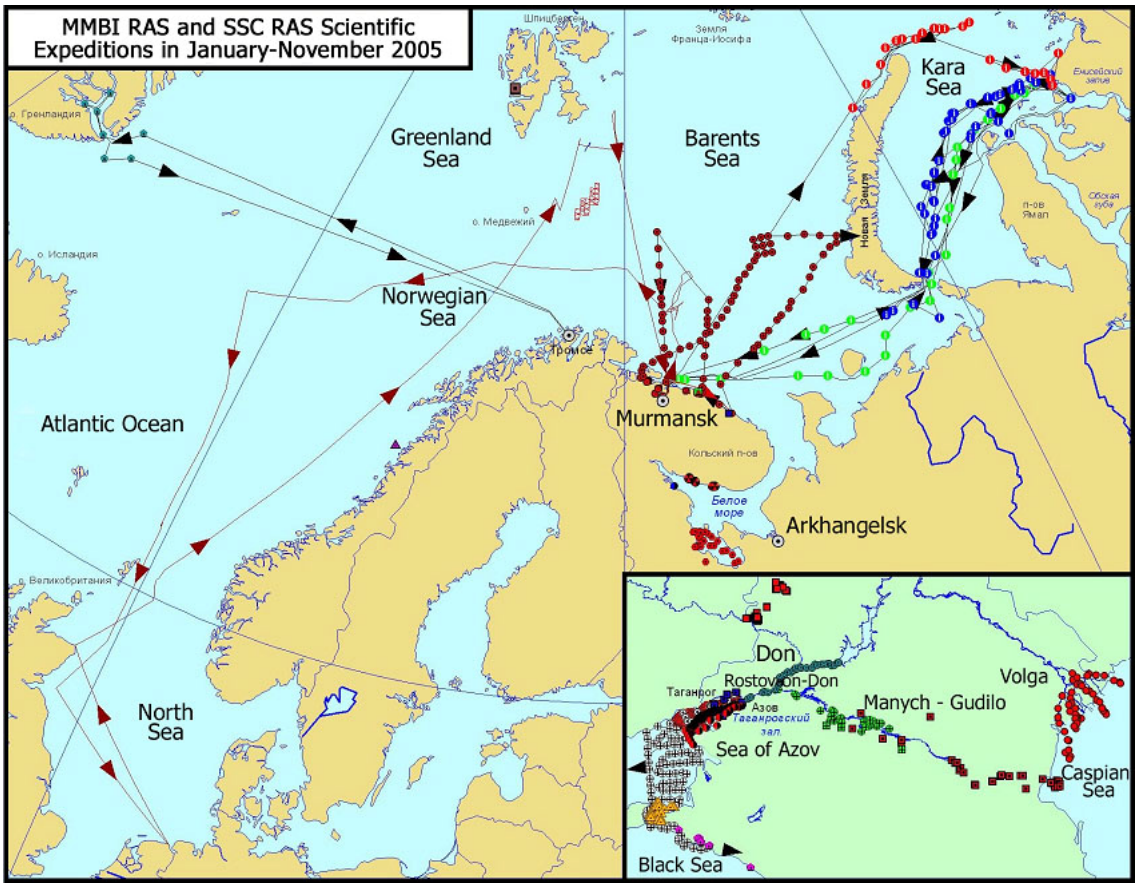
Presentation

MARINE ECOSYSTEM RESEARCH COMPLEX AND LOGISTICS IN MMBI



ALL-SEASON ECOSYSTEM MONITORING FROM BOARD OF ATOMIC ICE-BREAKERS IN DIFFICULT TO ACCESS ARCTIC REGIONS



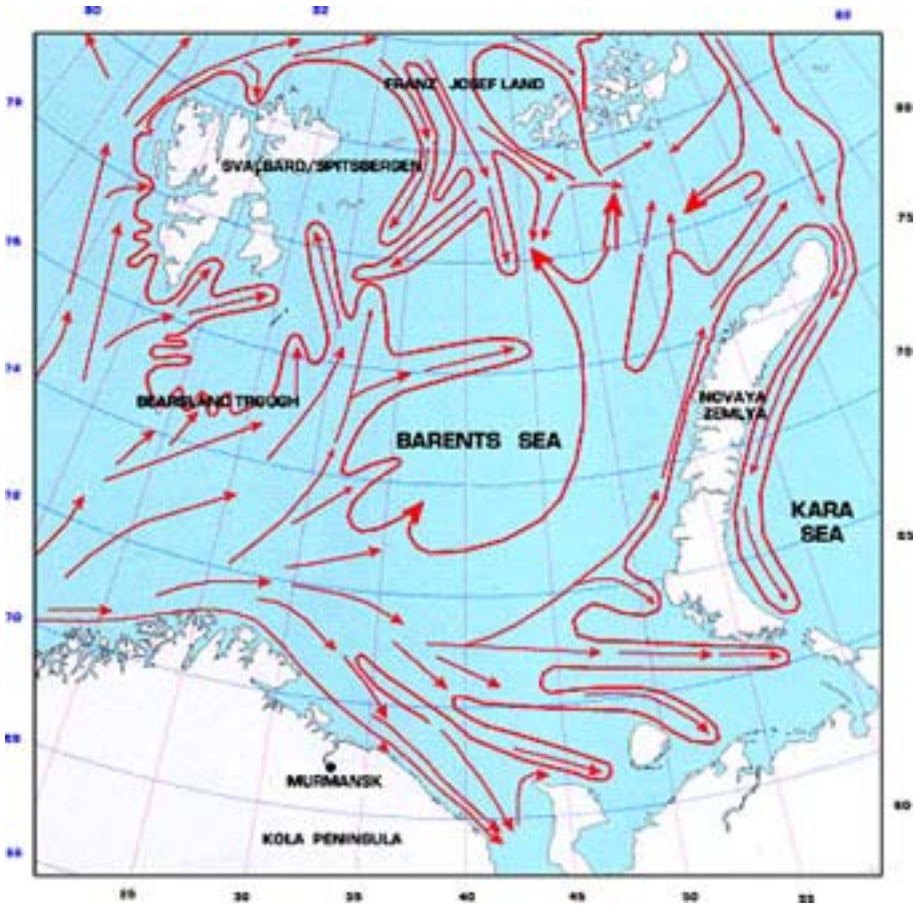


“CLIMATIC ATLAS OF ARCTIC SEAS 2004: PART 1. DATABASE ON BARENTS, KARA, LAPTEV AND WHITE SEAS – OCEANOLOGY AND MARINE BIOLOGY»

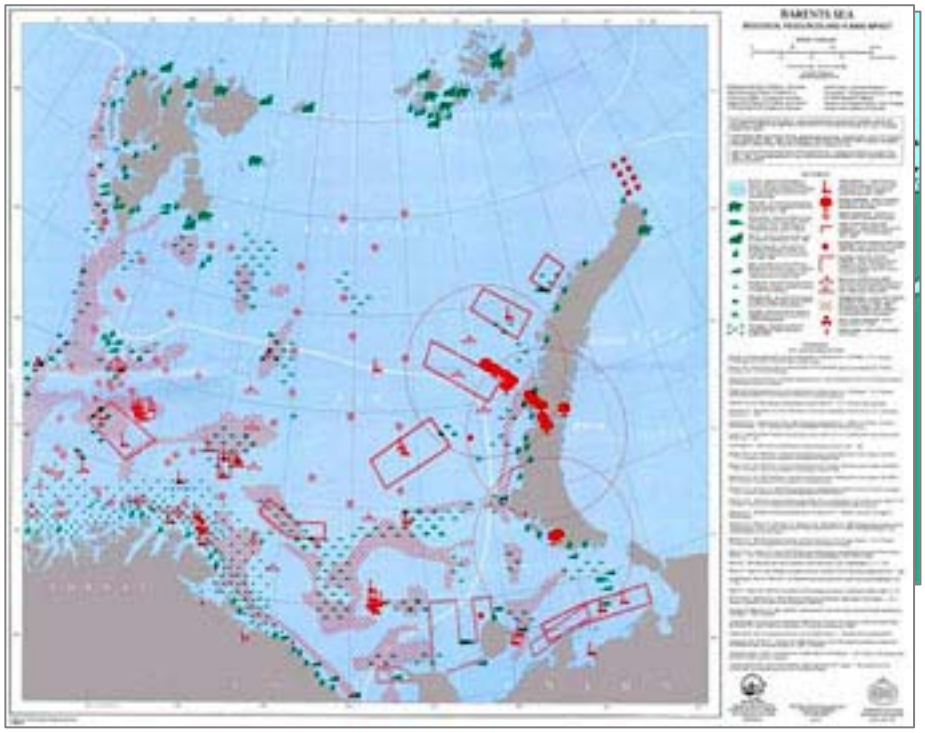
Totals the 10 years work of the institute in the field of applied marine informatics and, at the same time, is the base for further development of Integrated hydrobiological research in oceans and seas.

Meteorological, oceanographical and hydrobiological primary data on arctic seas are presented on DVD including 478 thousands of oceanographical stations in 1810-2001 period.

ATLANTIC WATER ADVECTION INTO THE BARENTS SEA



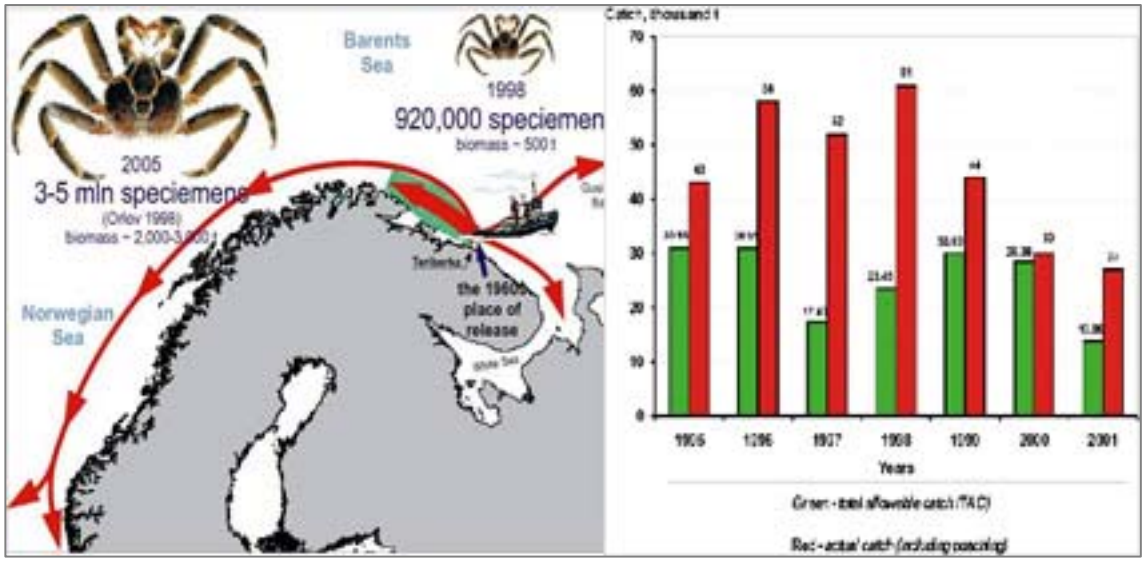
SCHEME OF BENTHOS STATIONS, CARRIED OUT BY MMBI IN 1994 – 2004



BARENTS SEA, BIOLOGICAL RESOURCES AND ANTROPOGENIC IMPACT MAP

(Barents Sea Biological Resources and Human Impact. Map Scale: 1:3 000 000/ Matishov G., Weslawski S. MMBI, Institute Oceanology Polish Academy of Sciences, Norwegian Polar Inst. Oslo, 1991)

NON-INDIGENOUS SPECIES; INVASION OF KING CRAB IN THE KOLA BAY MOUTH REGION

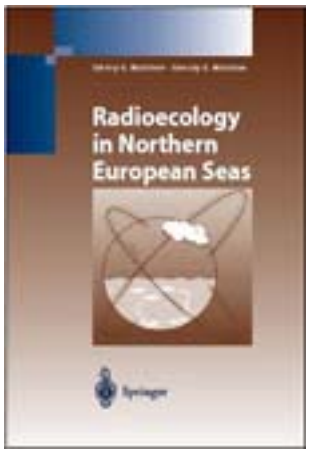


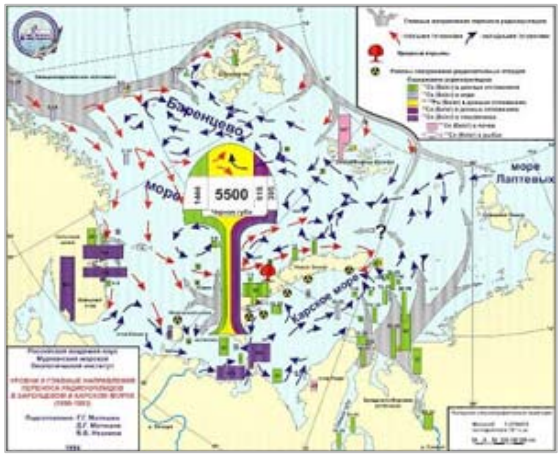
Red king crab in the Barents Sea (according to the data of Polar Research Institute of Marine Fisheries and Oceanography, All-Russian Research Institute of Fisheries and Oceanography)

Dynamics of TAC and actual catches of red king crab on the West Kamchatka shelf in 1995-2001 (Red king crab-2002), thousand tons (according to the data of Pacific Research Institute of Fisheries and Oceanography, Dulepova, E.P. 2002)

(underwater video filming of I. Kronberg, underwater research group of SV "Kartesh")

LEVELS AND MAIN DIRECTIONS OF RADIONUCLIDE TRANSFER IN BARENTS AND KARA SEAS

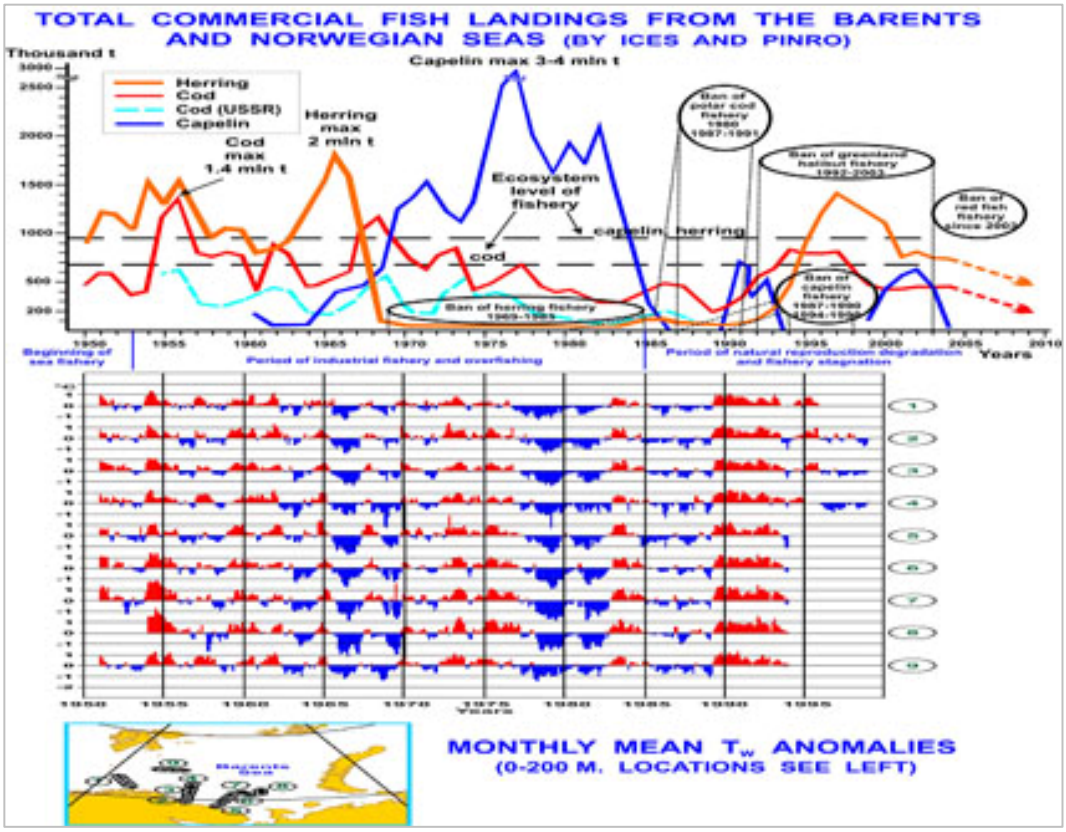


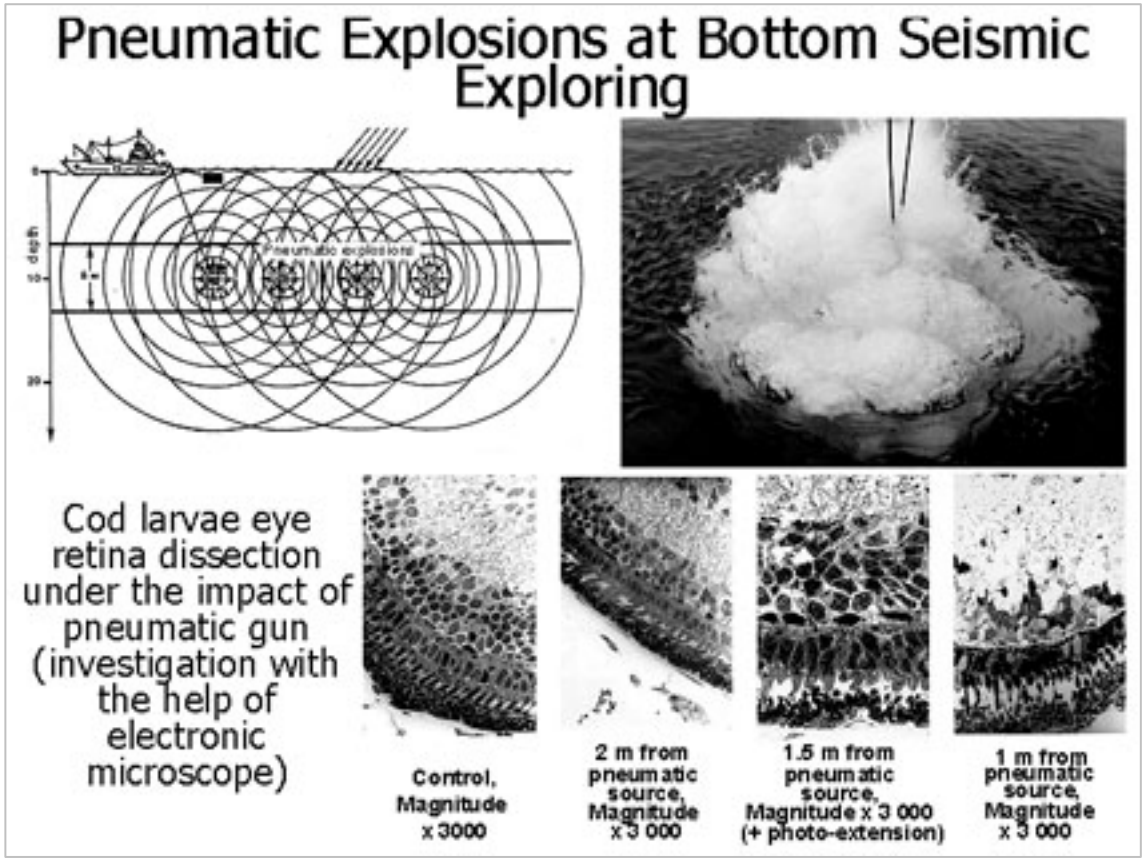


(Levels and main directions of radionuclide transfer in Barents and Kara Seas.

Scale 1:4 704 075/ Edit. Matishov G. G., Matishov D. G.,

Nazimov V. V. , Rovaniemi (Finland), 1994.)





TANKER ACCIDENTS ARE INEVITABLE. OIL SPILLS COMBATING MEASURES' DEVELOPMENT ARE REQUIRED

MMBI activities on the oil spills impact assessment

MMBI MONITORING IN THE ACCIDENT AREA OF C/V «STEPAN RAZIN», TRANSPORTING APATITE CONCENTRATE

Kola Bay 11.11.2004

GOVERNMENTAL LICENSES GRANTED TO MMBI TO CARRY OUT ECOLOGICAL RESEARCH


ЛИЦЕНЗИЯ

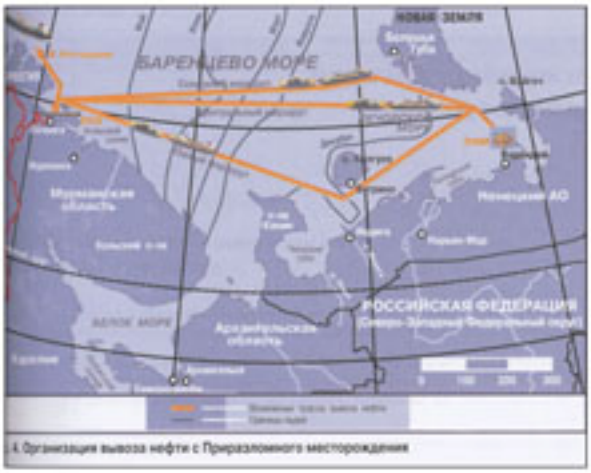

ЛИЦЕНЗИЯ

Environmental impact assessment of the Stockman gas condensate deposit in the Barents Sea

PRIRAZLOMNOE OIL DEPOSIT

An ice-resistant oil platform is planned to be set up and put on production in 2005-2006.

By 2010 oil production may be increased up to 7.5 mil tonnes a year



4. Организация вывоза нефти с Приразломного месторождения

Transport scheme:
– platform –
– shuttle tanker –
– storage tanker in the Kola Bay –
– transport tanker.

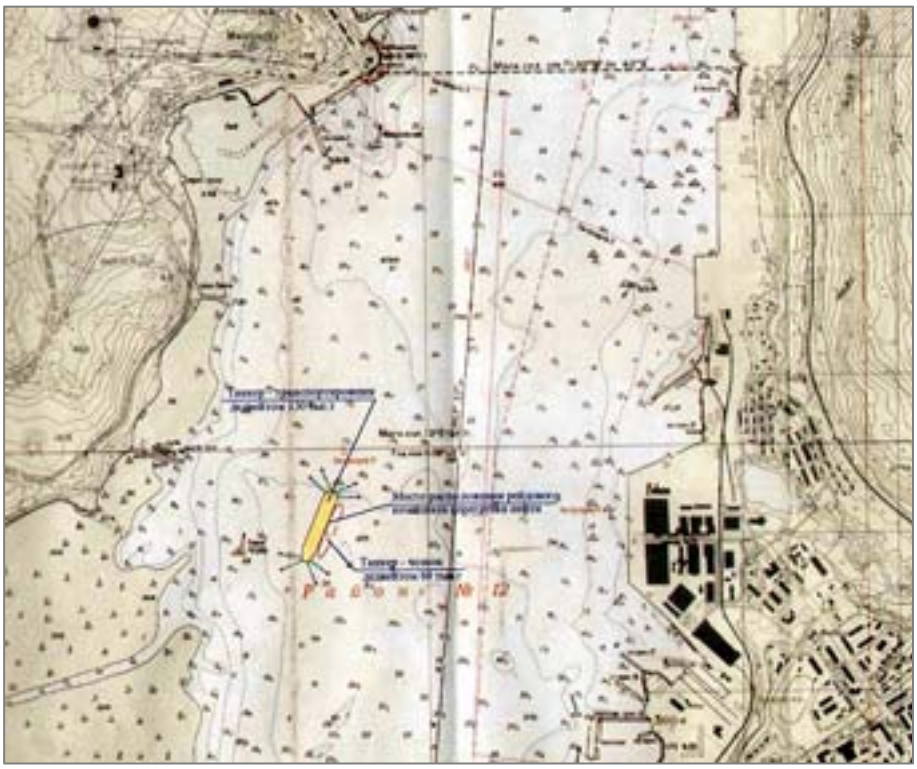
DRAFT PROJECT ON THE ENVIRONMENTAL IMPACT ASSESSMENT

“Oil transfer terminal in the area of Belokamenka in the Kola Bay water area” 2003

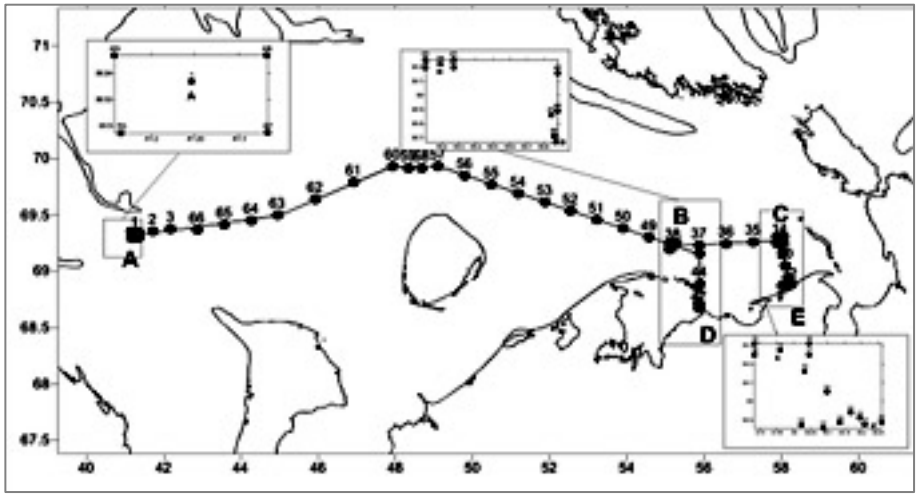

РОССИЙСКАЯ АКАДЕМИЯ НАУК

РАБОЧИЙ ПРОЕКТ

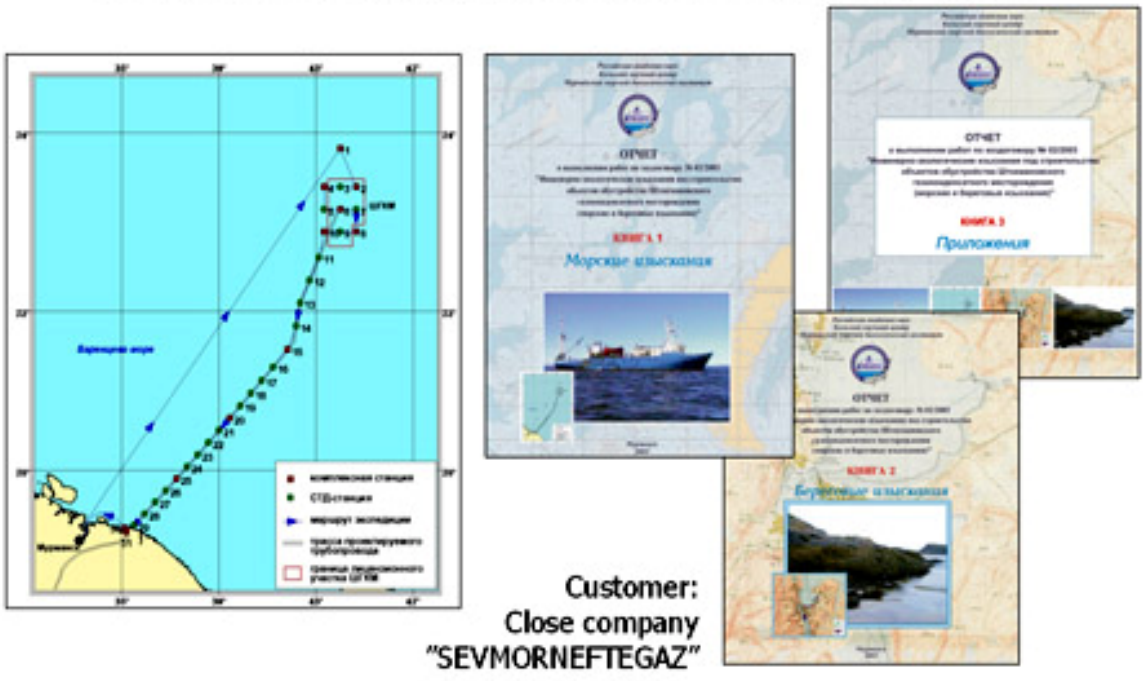
“Oil transfer terminal to the south of Cape Mishukov”
Environmental impact assessment 2003



Technical Report on the project: “Engineering and ecologic investigations in the Pechora and Barents Seas in the areas of planned routes for sub-sea pipeline and construction site of an oil transfer terminal” 2001



“Engineering and ecologic investigations for the construction of facilities of the Stockman gas condensate deposit (land and marine investigations)” 2003



Customer:
Close company
"SEVMORNEFTEGAZ"

Complex ecological monitoring for the experimental trying out of the roadstead oil transfer in the Pechora Sea

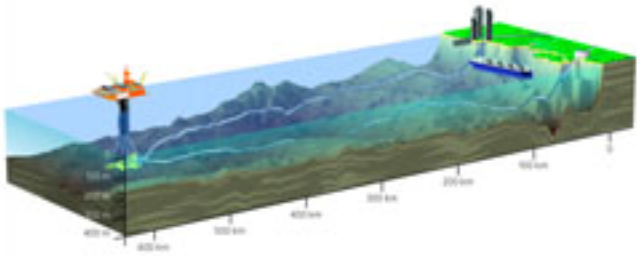
(within the framework of the "Prichal-Varandey" ("Wharf-Varandey") project 2000-2004

Customer:
Murmansk Shipping Company

NORWEGIAN OIL AND GAS COMPLEX «SNOW-WHITE» IN THE BARENTS SEA

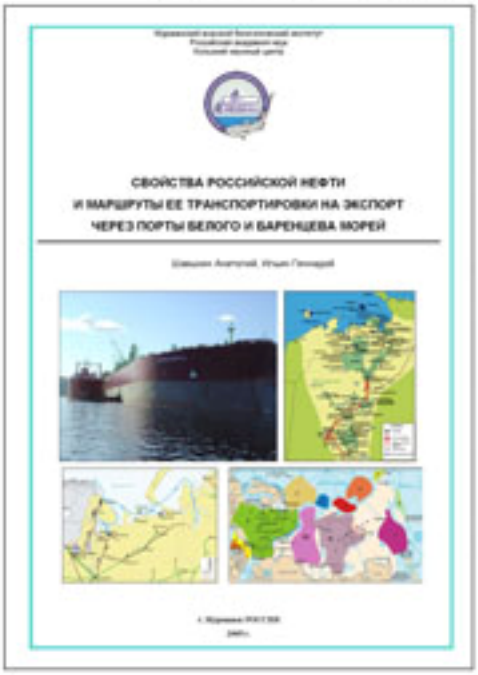
CONCEPTION

Development of the system of production environmental monitoring of the Stockman project 2003

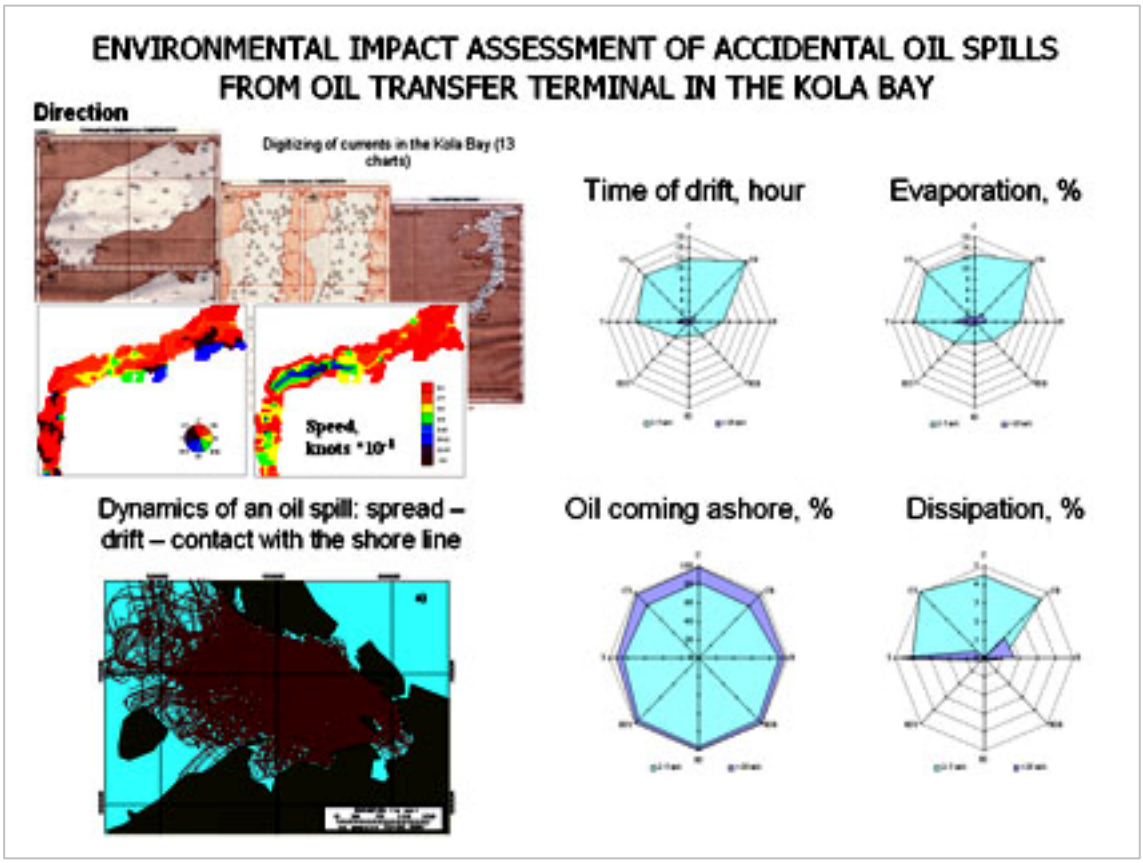


Customer: "Orgekogaz"

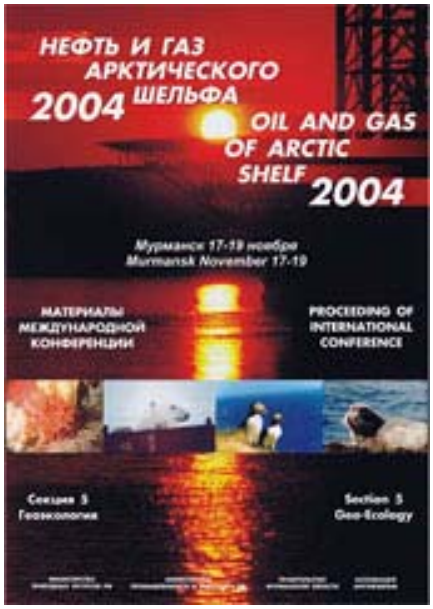
THE PROPERTIES OF THE RUSSIAN OIL AND ITS TRANSPORT ROUTES TO THE EXPORT THROUGH THE PORTS OF THE BARENTS AND WHITE SEAS



Customer: SINTEF



INTERNATIONAL CONFERENCE “OIL AND GAS OF THE ARCTIC SHELF-2004”
Murmansk 17-19 November 2004



- 25 organizations and institutions participated in the meeting
- 38 reports were presented and discussed

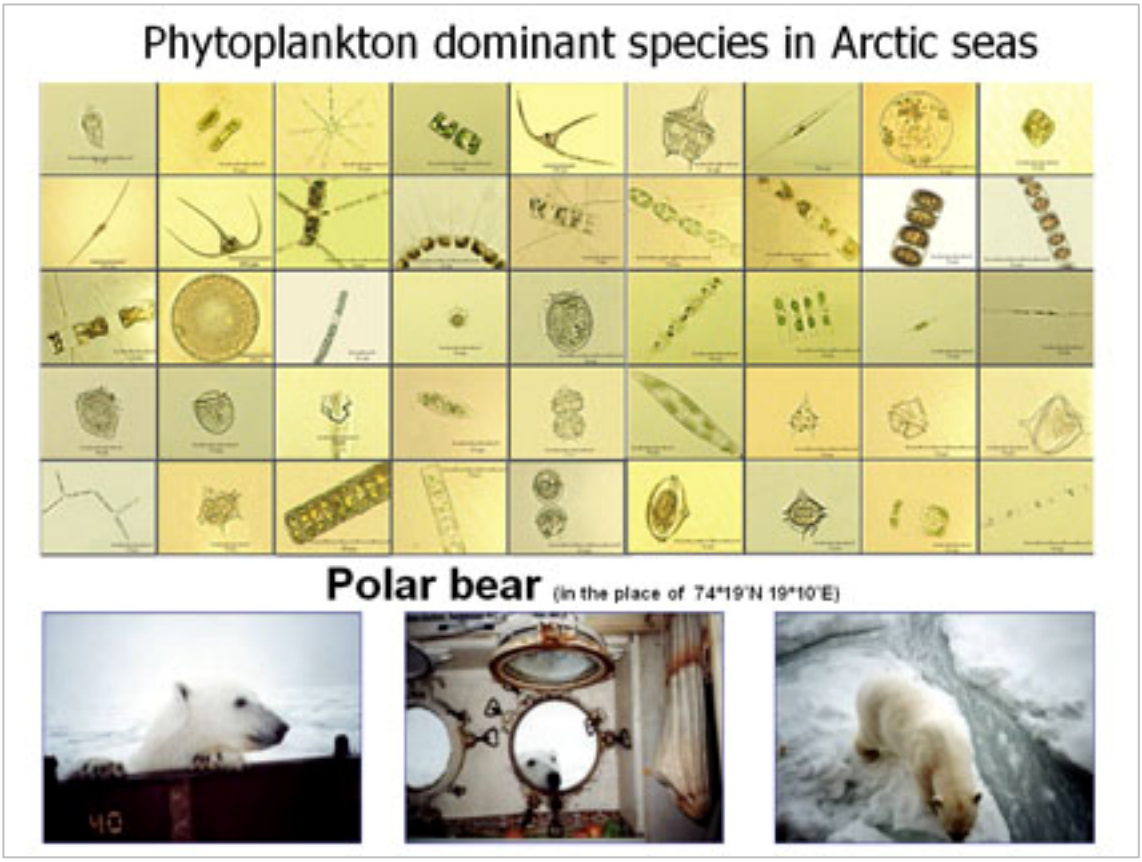
Subject-matter of the reports made at the section:

- Monitoring of the ecosystem status of arctic seas in relation to the development of the shelf, different aspects of the Environmental Impact Assessment and engineering and ecological investigations;
- Equipment for the treatment and clean-up of oil spills;
- Remote monitoring methods (air-plane laboratory, satellite);
- databases;
- GIS-technologies;
- Impacts of oil production on different components of the Barents Sea ecosystem (benthos, birds, macrophytes, etc.).

MMBI PROJECTS IN 2005

Conception of the production and environmental monitoring within the framework of the Environmental Impact Assessment “Substantiation of marine transport of liquefied gas from the Stockman deposit to the USA” (marine part). Customer: Close company “Scientific and production firm “DIEM”

Environmental Impact Assessment for the project “Substantiation of investments into the marine transport of liquefied gas from the Stockman deposit to the USA”. Customer: JSK “GIPROSPETSGAZ”



Discussion

The climate change indicator species were discussed. Mr Matishov explained that climate change can be observed by studying changes in key species, indicators. For instance some molluscs are sensitive to changes in the environment, and thus good indicators.

He emphasized, that before starting any industrial operations, monitoring system for observing the state of the nature should be established first.

The Barents Sea fish reserves were discussed. Mr Matishov described the situation to be critical and dangerous. He forecasted that all fishing would be banned in the Barents Sea by 2010-2012.

Currently the natural reproduction has already been totally ruined and artificial reproduction is needed. He said, that decisions regarding strict fishing restrictions will be very difficult but it will be right from the ecological point-of-view.

Another breaking problem at the Russian side of the Barents Sea is the Red King crab, whose spreading from a population of 100.000-200.000 in 1994 to 15.000.000-20.000.000 today is now a threat to all other bottom dwellers and the whole ecosystem.

The environmental monitoring processes of Shtokmann and Prirazlomnoye offshore projects were discussed. Mr Matishov said that since both these areas and also Varandey terminal area are new areas for oil transportation activity, the consequences of major spills couldn't be estimated in advance. There are very little or no experience from the behaviour of the transported materials in cold waters.

He emphasized the importance of thorough monitoring. At Shtokmann the scientists are currently observing chemical pollution and plankton content and changes in them as well as changes in flora and fauna.

Representatives of the oil industry reminded that according to Russian legislation oil companies need to prepare a feasibility study before any development and the study needs to be updated regularly. In addition to feasibility studies, measurements on environmental variables are required. In case of a catastrophe the requirements are very strict, more environmental studies and observations for a long period of time.

Representatives of the University of Lapland reminded, that in a holistic approach, social impacts are a part of the ecosystem. When an oil project is launched, social impact data is also collected.

The extent, to which positive impacts matter, is depending on the policies. Whether people benefit from the developing industry or not, depends on the laws and regulations. The relationships of people and industries go beyond the legislation, for they are not as efficient as the governmental offices would believe them to be.

The recommendation of University of Lapland is that the knowledge of the local people should be utilized in oil industry projects, and better flow of information from local people to governmental offices should be secured.

Project coordinator commented that ARCOP social impact study was not completely successful, for such a social impact study cannot be made on a hypothetical basis, like ARCOP scenario. Due to the fact, ARCOP scientists couldn't come up with any concrete recommendations.

Conclusions

There's a lot of historical data especially from the Barents Sea region. There is a need for continuous monitoring in a changing situation. Large vessels, growing transportation volumes and the climate change among others put demands on the monitoring of the possible environmental changes. The legislation and rules should be developed where necessary to achieve this and to minimize the impacts of the growing activities.

5. OIL TRANSPORTATION PLANS AND NEEDS IN MURMANSK AREA

Alexander Selin, Murmansk Regional Government

Abstract

The economy of the Murmansk Oblast is based on its rich mineral raw material resources and the biological resources of the Barents Sea, also on a non-freezing bay and a direct access to the oceans. These natural and geographical features have predetermined the development of this region and its role in Russia.

The extensive industry of the Kola Peninsula has been built up during decades. It produces 100 % of apatite concentrate and significant amounts of nickel, copper, iron ore concentrate and rare metals. The energetic capacities of the region are among the best in Russia. Our fishing industry provides nearly every sixth ton of all fish food products processed in Russia.

During the difficult times at the end of the last century we succeeded in retaining the acquired potential and providing the necessary conditions for further development.

I would like to point out that during those years we were given plenty of support and real help by many countries - first of all our neighbours.

The present stable situation in the socio-economic sector gives us a chance to strengthen positive tendencies and to tackle, on a practical level, new major tasks related to the economic growth.

One of them is the development of the Murmansk transport juncture.

Competitiveness of the Murmansk transport juncture

As it is known, the unique geographical location of the Kola Peninsula together with a non-freezing bay and a direct access to the Atlantic have been prerequisites that have defined the destiny of Murmansk Oblast as a large traffic juncture in Russia and northern Europe.

It is not by happenchance that the Murmansk region is reputed the northern gates of Russia, a principal Arctic base area and a starting point for transit by the Northern Sea Route.

With the new geopolitical and economic realities, the significance of the Murmansk transport juncture is increasing. Its role will be crucial not only for the economy of our polar region, but also an important element for Russia's economy as a whole. Indicative of this is the fact that quite recently, on October 11th, Prime Minister of Russia, Mr M. Fradkov chaired in Murmansk a working meeting on such issues as problems of the traffic sector, development of transport system in the Arctic, and also the role of the Murmansk region in utilizing the resources of the Arctic and opening new routes of goods traffic and new markets.

Development of the Murmansk transport juncture

A great deal has been done during the last few years to make the Murmansk transport juncture more efficient and more competitive. Reconstruction of the Port of Murmansk and dredging of the Kola Bay has made it possible to accommodate larger than 200,000 dwt ships. I would like to remind you that no other port in the European part of Russia has got this possibility. New facilities have been built, among these for transhipping oil. Loading of oil on tankers on anchorage on the Kola Bay started three years ago, where the level of 10 million tons will be reached this year.

Volume of cargo processing

At the moment there are already facilities for transhipping up to 20 million tons of oil each year. Consequently there are prerequisites for developing the Murmansk transport juncture not only in the traditional way, but it can gradually become also a significant oil transhipping port in Russia.

Cargo turnover according to the general scheme

According to the general scheme of development of the Murmansk transport juncture, its annual shipping capacity is estimated to become, even based on a pessimistic scenario, more than 45 million tons by the year 2010 and over 56 million tons by the year 2015 (this does not take into consideration the possibility of constructing the Murmansk pipeline system).

Development of port facilities on the eastern and western banks of the Kola Bay

The aim is to modernise and to increase the capacity of the port on the eastern shore and to build new terminals on the west bank of the Kola Bay.

1. Facilities for transhipment of coal, capacity up to 15 million tons, comprising two piers with total length of over 600 m and capable of accommodating 150,000 dwt ships.
2. Facilities for transhipment of general freight and containers, capacity up to 3 million tons, comprising five piers with the length of 1230 metres and capable of handing ships up to 65,000 dwt.
3. Three terminals for transhipment of oil and oil products, capacity 31.5 million tons with deep-water piers capable of accommodating super tankers. After transferring the facilities for shipment of coal from the eastern to the western bank, the vacant area will be used for constructing a modern container terminal.

A Master Plan of the area, which according to the intentions of Russia's Ministry of Transport will be confirmed in the near future, will form a basis for taking further practical measures in developing the Murmansk transport juncture. The Plan will contribute to the implementation of the Arctic regions' development strategy, also support a balanced development of transport sector in Russia, giving due consideration to the country's long-term interests as well as the interests of the region and its citizens.

We also believe that the Murmansk transport juncture will become one of the bases in Russia for the development of export in traffic services and for the implementation of the country's policy in goods transit.

Oil and gas sectors - promising directions of development

Already in the near future the Murmansk Oblast can become a key area in the exploitation of hydrocarbon resources of the Arctic offshore. According to prognoses, active production of hydrocarbons on the offshore of the northern seas will begin in 2008-2010. At the moment, the possible future amounts of oil transportations along the northern routes can be mere approximations. According to various estimations, the amounts will vary from 20 to 50 million tons a year.

Distribution of oil and gas resources on the seas

In future, Russia's needs for hydrocarbon raw materials will be secured, to a great extend, by utilising the fields located on its peripheral sea areas, and the importance of the "maritime" element will continuously increase as the resources on the continent diminish.

Total hydrocarbon resources of Russia's Arctic offshore

The most promising region for oil and gas is the western Arctic offshore, comprising an area of more than 2.6 million square kilometres under the waters of the Barents, Pechora and Kara Seas. It contains 75 % of Russia's offshore hydrocarbon reserves and can be seen as a region for a long-term strategic development of the oil and gas sector. According to specialists' prognoses, the oil and gas deposits that have already been found on these seas - amongst them the unique

Shtokmann, Leningrad and Rusanovskoye fields - could in this century become main sources of hydrocarbons for Russia and European countries.

Arctic offshore - new oil and gas province

The prospected resources of oil in the deposits that have been already found, and prognosticated resources in promising structures allow us to conclude that a new oil production region will emerge here in the near future. The closeness of industrially developed areas of the European North of Russia with its potential buyers of oil and gas, and a possibility of transportation to the Western Europe and America through the non-freezing port of Murmansk are prerequisites for developing the production of hydrocarbons in this region.

Hydrocarbon deposits

The main merit in all discoveries belongs to the geological prospecting enterprises of the Murmansk region, which have been specially established for developing the Arctic offshore - the state enterprises and joint-stock companies "Arktikmorneftegazrazvedka ", "Sevmorneftegeofizika", "the Arctic maritime engineering and geological expedition AMIGE" and "MAGE".

Shtokmann field

Development of the fields on the Barents, Pechora and Kara Seas will allow us to solve fuel and energy problems of the Murmansk region, increase its economic potential, bring significant revenue to the regional and local budgets and, finally, raise the quality of life for our citizens.

Perspectives of developing the gas sector

On September 8th, 2005, at a session of a cross-departmental commission on planning the location of production in the Murmansk region, a Declaration on intentions was approved on investments in objects of the Shtokmann gas condensate field, including the appliance of gas liquefaction technology and a multifactorial analysis for selecting the site of a liquefaction plant. The declaration was presented by a joint-stock company Giprospetsgas on behalf of Gazprom. The raw-material base for the project will be the Shtokman gas condensate field with estimated resources of 3.2 trillion cubic metres of gas. The capital investments required for the project will be 12 billion US dollars, including $ 4.4 billion in the Murmansk region. The towns of Vidyayevo and Teriberka were selected as the most preferable locations for accommodating the plant for producing liquefied natural gas.

Implementation of the project will result in new jobs and new orders for the companies of the region, also modernization of the local enterprises. It will also bring significant tax revenue of about 180 million US dollars a year to the regional and local budgets.

The Murmansk Oblast is a key region in practically all variants of exploiting the hydrocarbon deposits of the Arctic offshore, which is not just by happenchance. The favourable geographical location and advanced infrastructure make this region attractive for establishing enterprises in connection with the development of the fields.

Ensuring of ecological safety

The development of the Shtokman gas condensate field, together with the inflow of “big oil” from the Arctic offshore and an increase in the volumes of transhipped oil will impel us to take measures for ensuring ecological safety when producing and transporting oil and gas; also to do our utmost to minimize the impact on the volatile northern nature.

Already a great deal is being done. A regional plan on combating oil spills has been drawn up and confirmed for the Western sector of the Arctic (the Barents and the White Sea which belong to the operational zone of the Murmansk Basin Emergency and Salvage Department), as well as a plan on liquidating pollution of the Murmansk coastal areas in case of oil spills.

Each operator engaged in oil transhipments will draw up their own plans on combating oil spills, which will be coordinated with the above-mentioned regional plans. Operators provide for ecological and biological monitoring of environment in places of transhipment of oil and oil products, and they also ensure necessary readiness for liquidating spills. Technical equipment of the Murmansk Emergency and Salvage Department will be improved to increase its readiness and capability to combat oil product spills of various levels in the region.

For this reason it is extremely essential to create a functioning system for exchange of information between countries and for predicting the occurrence and progress of emergency situations, also to design adequate technical means and methods which can be used to liquidate the consequences of pollution of the Norwegian and Barents Seas.

A special programme is being prepared within the framework of a regional target programme "Protection and hygiene of environment and ecological safety in Murmansk area during 2006-2008". The goal of the programme is to secure ecological safety in the Kola Bay and on the adjoining Russian and Norwegian offshore areas during the process of production and transportation of oil, liquefied gas and oil products. It includes the following primary tasks:

Task 1.

Founding of a joint Emergency Centre of Russia (Murmansk region) and Norway for forecasting, preventing and combating emergency situations on all sea areas in the Euro-Arctic region. To date, such issues as regulations and legal framework necessary for the establishment of the centre, as well as its financial and material basis have been dealt with. According to the plans, the joint Centre will be founded using the capacities of the existing centres of the Ministries of Transport of the Russian Federation and Norway.

Task 2.

An Ecological Centre

According to plans, an ecological centre will be established as a subdivision of the Murmansk branch of the Kola Geological Information and Laboratory Centre, and it will be subordinated to the Murmansk Oblast Committee of Natural Resources and Environmental Protection.

The main task of the Centre will be to create a system for acquisition and processing of data on natural resources and ecology and to form a united database applying GIS technology. The Centre will guarantee access to data for all authorities and organizations engaged in control and emergency response operations and in liquidation of oil spills. Data will be available also for the Emergency Centre as well as ecological NGOs and citizens of Russia.

Task 3.

Preparing of a combined plan on combating oil spills on the Kola Bay and a regional plan for the Barents Sea, which will join together the oil spill combating plans of separate companies. A united strategy and tactics for emergency response solutions will be drawn up for the Kola Bay and the Northern Sea Route.

Task 4.

Forming of a united system to guarantee safety when delivering, shipping and transporting oil. The Port of Murmansk Marine Administration will carry out this task.

The seafaring safety system includes the following subsystems:

- vessel traffic management;

- radio station for the sea area A1 of the Global Maritime Distress and Safety System (GMDSS);
- automatic identification system (AIS);
- complex of supporting subsystems.

A great deal of attention will be given to anti-terrorist safety of the infrastructure for production, transportation and transhipping of oil and oil products. This problem was discussed recently at a meeting of Russia's Marine Board chaired by Prime Minister Fradkov.

Task 5.

Creating of a local automatic system for monitoring the surface of the Kola Bay.

The task includes the acquisition and installation of transmitters for monitoring drifting oil, also informing in time the control and emergency response authorities.

Task 6.

Construction of an ecological site for utilizing different kinds of waste, including dangerous oil-bearing waste and products from oil spills. A site of this kind is specified in the General Plan of Development of the Murmansk transport juncture.

Task 7.

Design of more suitable sorbents and containers for collecting oil from the sea surface and the shore in the event of oil spills.

According to the plans, tests on sorbents containing vermiculite will continue. These materials have been developed by the ecological laboratory of the Mining Institute of the Kola Science Centre as a basic substance for removing spilled oil.

Task 8.

Organizing a special laboratory for analysing the consistency of oil transported along the Northern Sea Route.

One of the certificated laboratories in Murmansk will be furnished with special equipment, the work being carried out within the framework of cooperation between Murmansk region and Statoil.

We are confident that by a joint effort of all interested countries and organizations we will succeed in guaranteeing the ecological safety of production, transportation and processing of hydrocarbon raw materials of the Arctic offshore.

The Northern Sea Route - national transport mains

As it is known, the Northern Sea Route has a key role in the large-scale economic development of the northern regions of Russia, especially the Arctic. The shortest way between northern, Atlantic and Pacific regions lies through the Arctic Ocean, and in the Government's plans of support for the Arctic, this route is yet again becoming a priority. In the long term, the cargoes will consist mainly of hydrocarbon raw materials coming from the Timan-Pechora basin, the Ob Bay and Yamal. According to Russia's Ministry of Transport, the volume of transportations on the Northern Sea Route will be 13-14 million tons by the year 2015.

The Northern Sea Route

Liberalization of foreign trade and the creation of the Barents Euro-Arctic region in the North of Europe are factors that encourage foreign trade activities in northern territories and contribute to the development of new transport communications and to the modernization of the existing ones.

At an International Euro-Asian Transport Conference (May 1998, Saint Petersburg), the Northern Sea Route was defined as an independent Euro-Asian transport corridor.

However, in order to attract foreign companies to the Northern Sea Route it is necessary to solve a variety of problems: insurance with a possibility to change conditions by consent of the parties; information services; development of Arctic infrastructure, including transportation and icebreaker fleets. For example, shipyards of Finland have acquired significant experience in building icebreakers and ice class transport ships.

Such objectives as exploitation of the hydrocarbon resources of the Arctic offshore, building of Arctic infrastructure and new large-scale oil refining and gas processing capacities, also conversion of the Northern Sea Route into an Arctic sea transportation system and an international transport corridor have a special importance not only for Russia, but also for the European countries, including Finland. To achieve these objectives, coordinated and joint actions are necessary, not only from federal and regional authorities of Russia, but also from official bodies of those countries whose business and scientific organizations are ready to participate actively in the investment process.

Significance of the Arctic offshore development

I would like to emphasize that development of the offshore is going to have a huge impact on the Murmansk region, resulting in the following:

- increase of direct budget income from the exploitation of mineral resources;.
- increase of direct investments into the real sector of economy;
- increase of domestic consumption and export;
- growth of gross national product and gross regional product;
- lesser dependency on imported machinery and high technology;
- social and economic development of the northern territories of the Russian Federation and areas of special geopolitical interest;
- support to employment of the citizens and creation of new working places;
- improvement of the quality of life for the citizens.

Structure of industrial production

New kinds of economic activities will emerge in our region. The structure of industrial production will change, too, as shown on the slide.

On November 10, 2005, Chairman of the Board of Gazprom A. Miller and Governor of Murmansk Oblast Y. Evdokimov signed a five-year agreement on cooperation in oil and gas sector. A working group will be formed for preparation and implementation of the programmes related to the development of the oil and gas fields on the offshore of the Barents Sea, including Shtokman. The agreement covers following activities: projects on building gas pipelines and means for processing and transportation of gas; projects on building infrastructure for delivery, transhipping and storage of cargoes, also infrastructure for sea transportation of gas and products from gas processing; building capacity for using compressed and liquefied natural gas as engine fuel; other activities.

The government of the region will render Gazprom assistance in questions related to survey and construction work on the territory of the region. It will also allocate to Gazprom and its affiliated companies land for building structures required for the development of the Shtokman gas condensate field and for producing liquefied gas.

Presentation

MURMANSK REGION

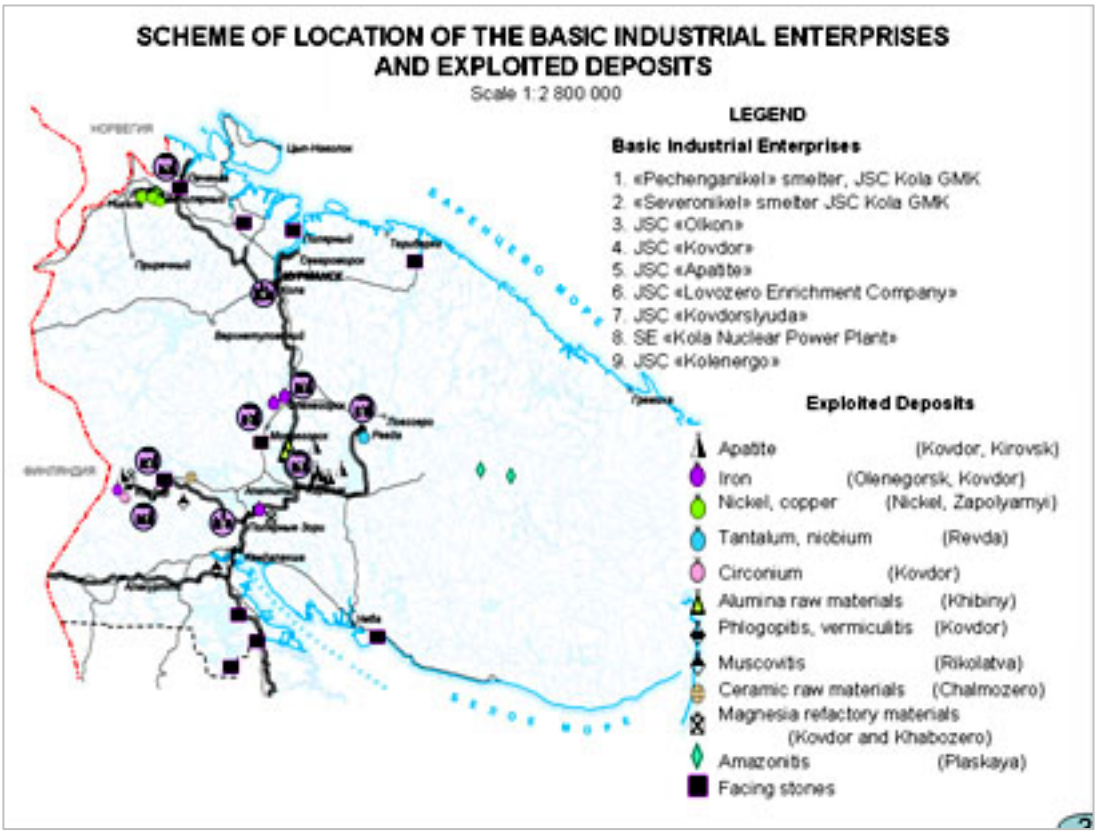
Situated on the Kola peninsula to the north of Polar Circle.

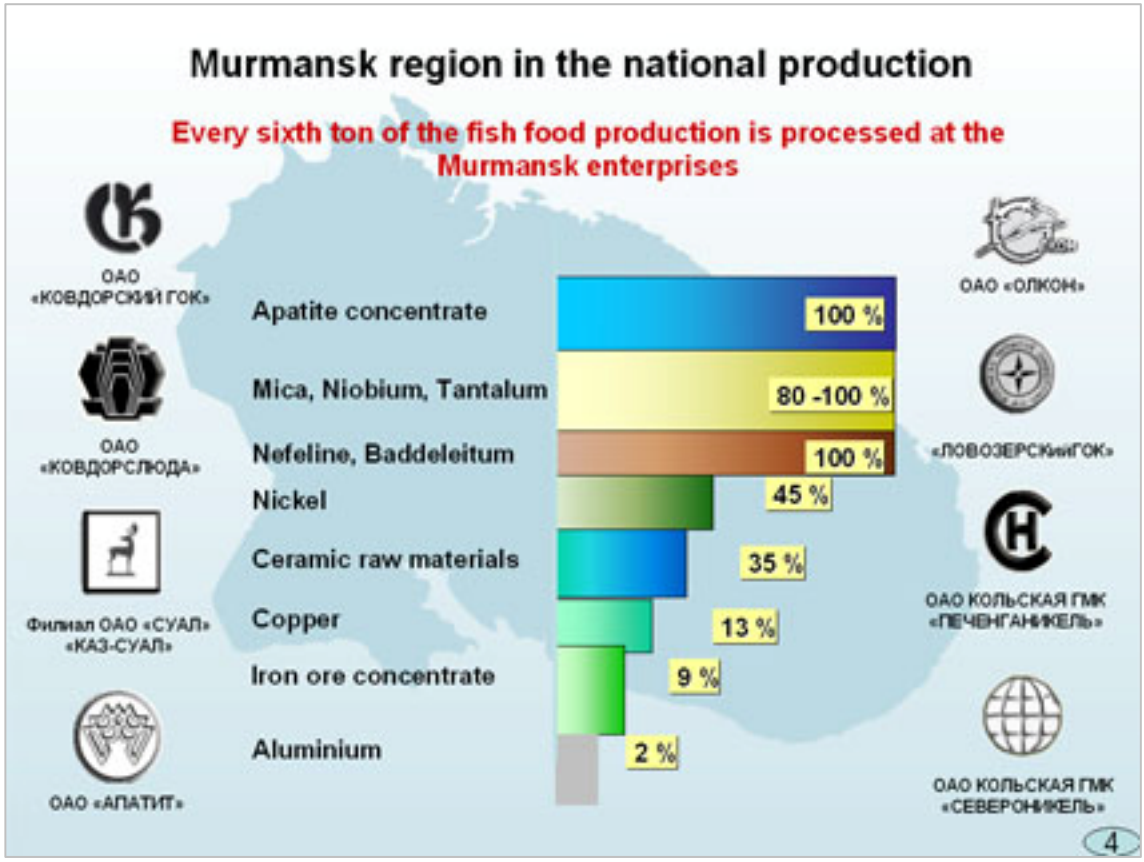
Area - 144.9 thousand sq. km.

Population - 872 thousand people

- Borders on Norway and Finland
- Participant of the Barents Euro-Arctic Co-operation
- Non-freezing Kola bay
- Direct access to the World ocean
- Unique mineral and biological resources

Specific geographical and geopolitical situation





ADVANTAGES OF THE KOLA BAY - COMPETITIVENESS OF THE MURMANSK TRANSPORT KNOT

Factors, creating unique for Russia conditions for constructing ports and forming competitive transport schemes for exporting mass raw material cargoes with use of large vessels with dead-weight up to 300 thousand tons

- Free, not constructed and explored territory;
- Deep water, non-freezing, still area of water;
- Free access to the open sea with relatively low intensity of shipping;
- Nearness of the transport knot to European and American markets;
- Opportunity to use international transport corridors: Northern Sea Route, Transiberean and North-South;
- Reliable communication of the Kola peninsula with industrially developed regions of Russia via railway, automobile and in perspective pipe-line main lines.

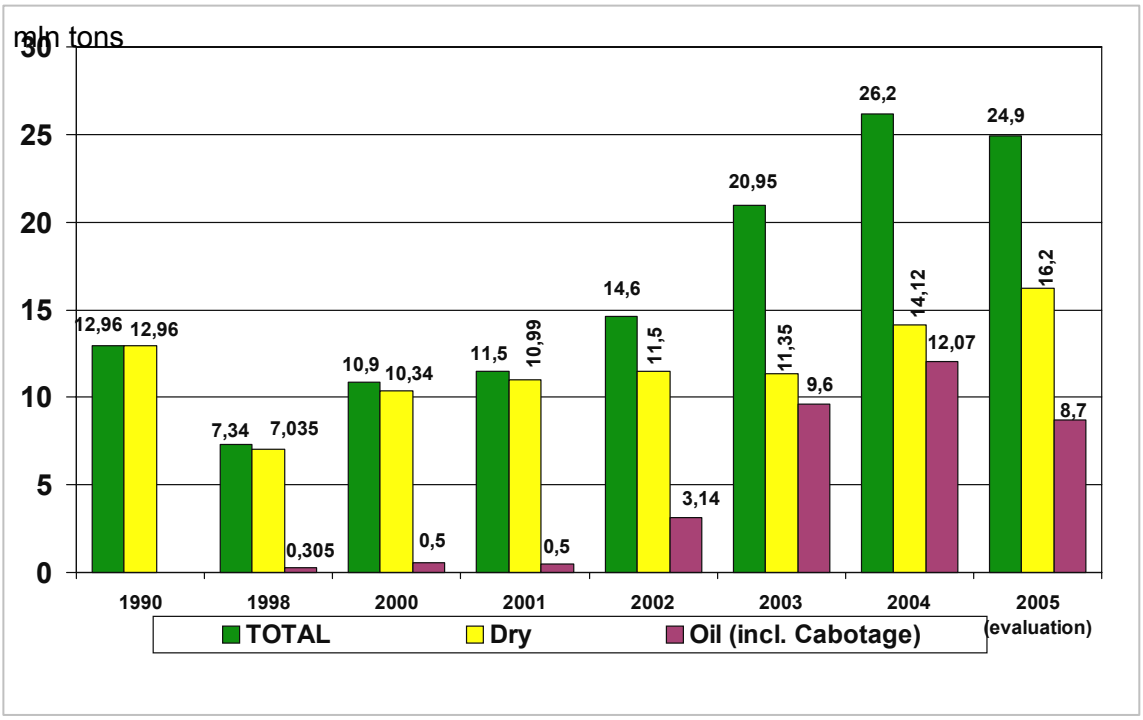
DEVELOPMENT OF THE MURMANSK TRANSPORT KNOT

2000 - implementation of bottom deepening works, which let receive vessels of 150 - 200 thousand tons displacement.

2002 - start of implementation of the scheme for raid loading of oil products to large-scale tankers in the area of water of the Kola bay.

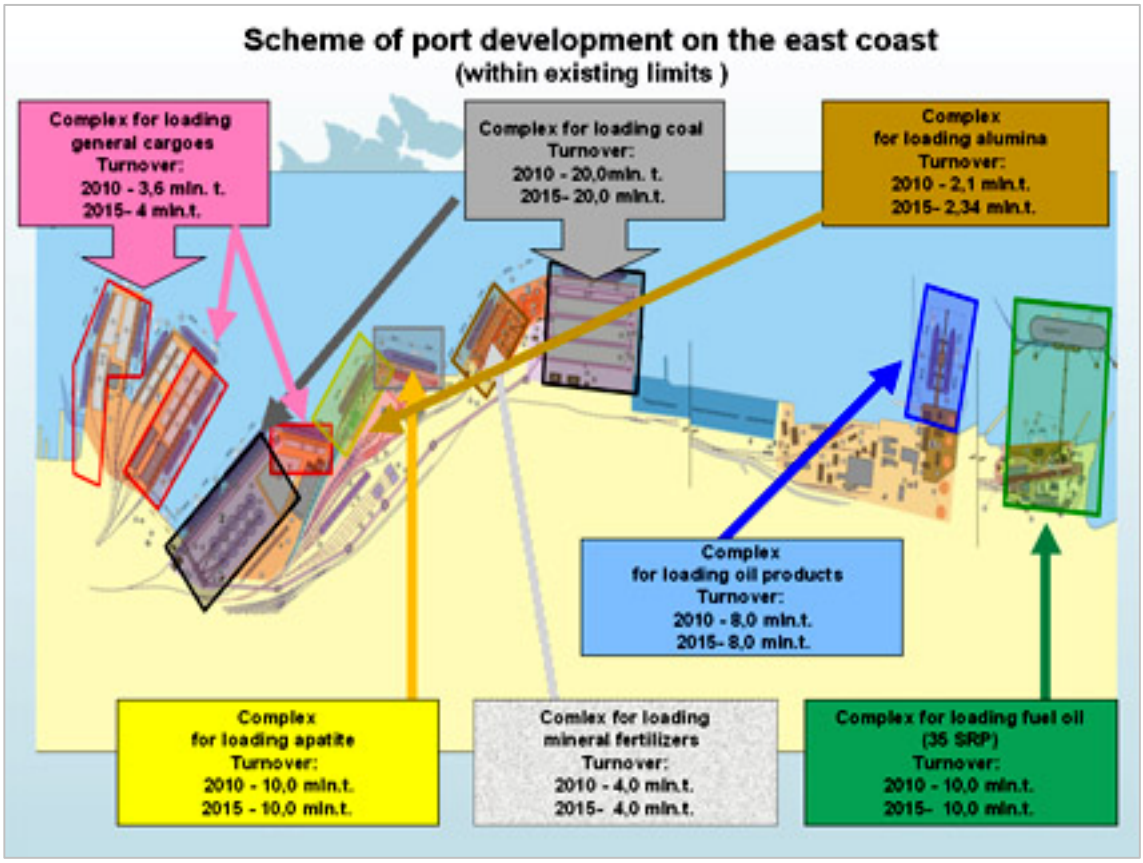
2004 - start of implementation of the scheme for export oil supplies via the biggest in Russia raid loading complex «Belokamenka» - a floating oil reservoir - a tanker of 415 thousand tons displacement.

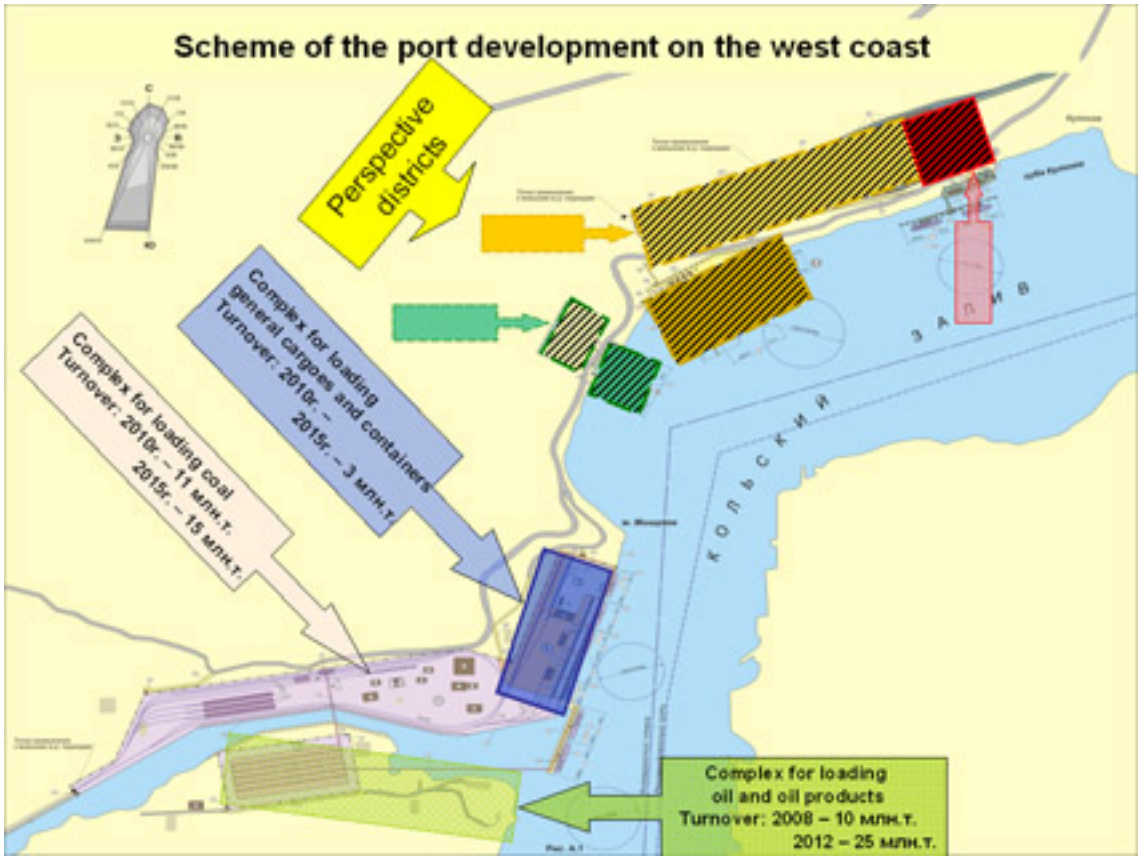
VOLUMES OF CARGO PROCESSING IN THE REGION PORTS, INCLUDING RAID LOADING COMPLEXES



VOLUME AND STRUCTURE OF COMMON CARGO TURNOVER OF THE MURMANSK PORT TRANSPORT KNOT

Cargoes	Cargo turnover according to the general scheme				
	2004	Forecast			
		2010		2015	
		min.	max.	min.	max.
1. Dry cargoes	14,08	23,60	30,80	29,60	38,20
1.1 Load cargoes	13,16	12,30	29,00	26,20	33,20
1.2 General	0,92	1,30	1,80	3,40	5,00
2. Liquid	13,58	24,00	27,00	27,00	34,00
TOTAL	**27,66**	**47,60**	**57,80**	**56,60**	**72,3**



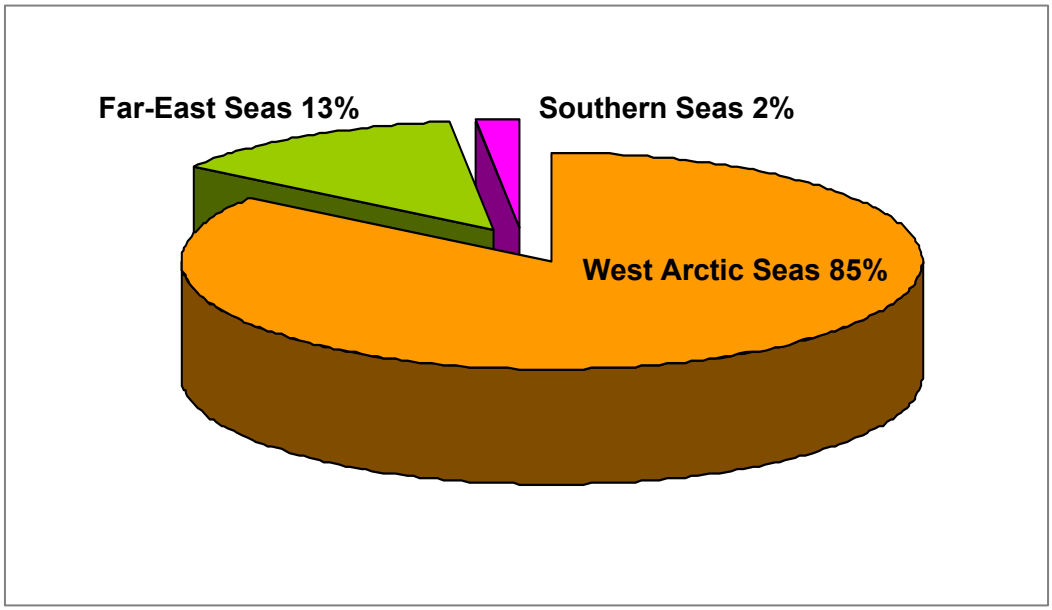


OIL AND GAS SECTOR - PERSPECTIVE DIRECTION OF DEVELOPMENT

Resources of oil and gas of the Western Arctic shelf are estimated by geologists as much as a few billion tons. Among the 15 deposits explored by the Murmansk organisations in the Barents, Pechora and Kara seas there are unique ones, such as Shtokman, Leningrad and Rusanovskoe deposits.

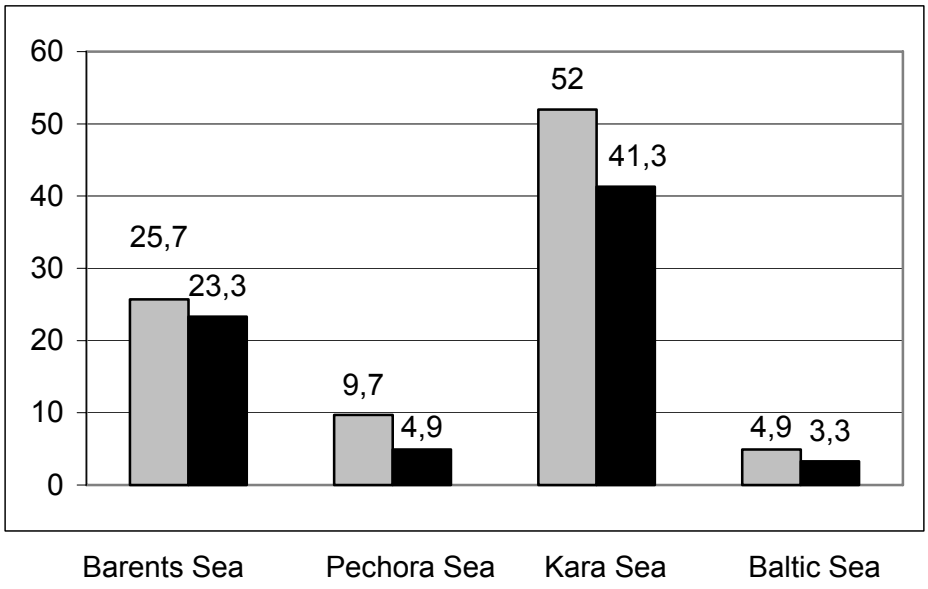
According to the experts minds, they will be the main source of hydro-carbons for Russia and Europe in this century. The new oil and gas region is being formed. Its nearness to the industrial centres, which are great consumers of hydro-carbons, opportunity to transport raw materials via non-freezing Murmansk port define the growing interest in the territory.

DISSEMINATION OF LOCALISED RESOURCES IN THE AREAS OF WATER OF THE SEAS

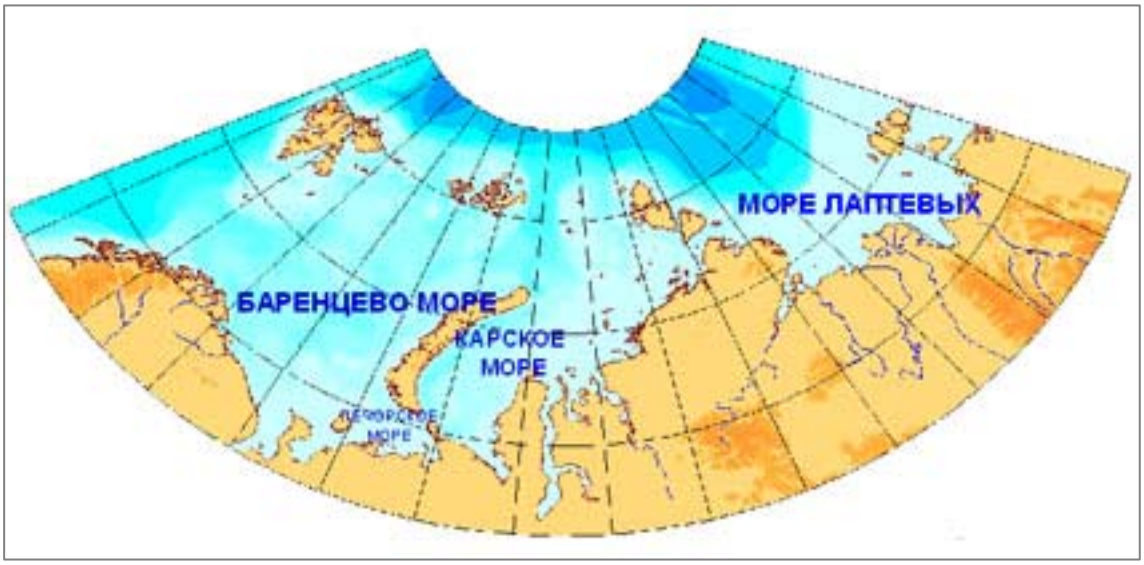


Area of Water	Number of structures	Category	Gas bln. m3	Oil mln.t.	Condense mln.t.	Total mln.t.
West Arctic Seas	166	C_3+$Д_1$+$Д_2$	28152	2628	560	31339
Far East Seas	41	C_3+$Д_1$	1411	3166	75	4651
Southern Seas	74	C_3+$Д_1$	417	187	_	604
TOTAL	281	C_3	7838	1454	150	9441
		$Д_1$+$Д_2$	22142	4526	485	27153
		C_3+$Д_1$+$Д_2$	29979	5980	635	36594

TOTAL HYDRO-CARBON RESOURCES OF THE ARCTIC SEAS SHELF OF RUSSIA



THE ARCTIC SHELF - NEW OIL AND GAS PROVINCE



- For 25 years 400 000 km of seismic profiles were worked. Over 1600 engineering and geological bore-holes were drilled, with total depth of 52 000 m. 54 deep research and exploration bore-holes were drilled with total volume of 150 000 m.
- Growth of industrial stock is *6.7 bln. tons* of ideal fuel, total resources are *70-90 bln. tons*

HYDRO-CARBONS DEPOSITS

Legend

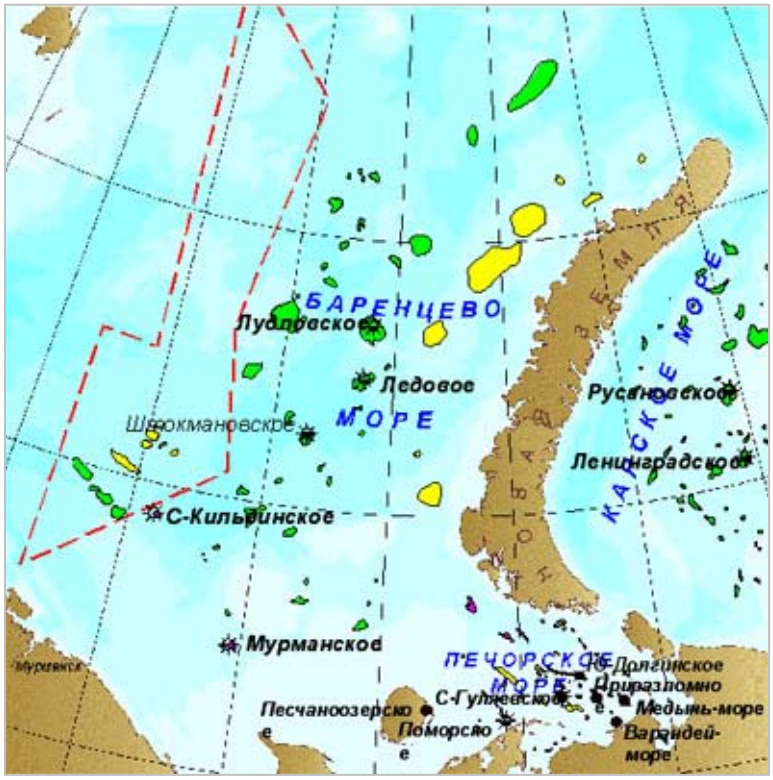
Zone of disputed economical interests

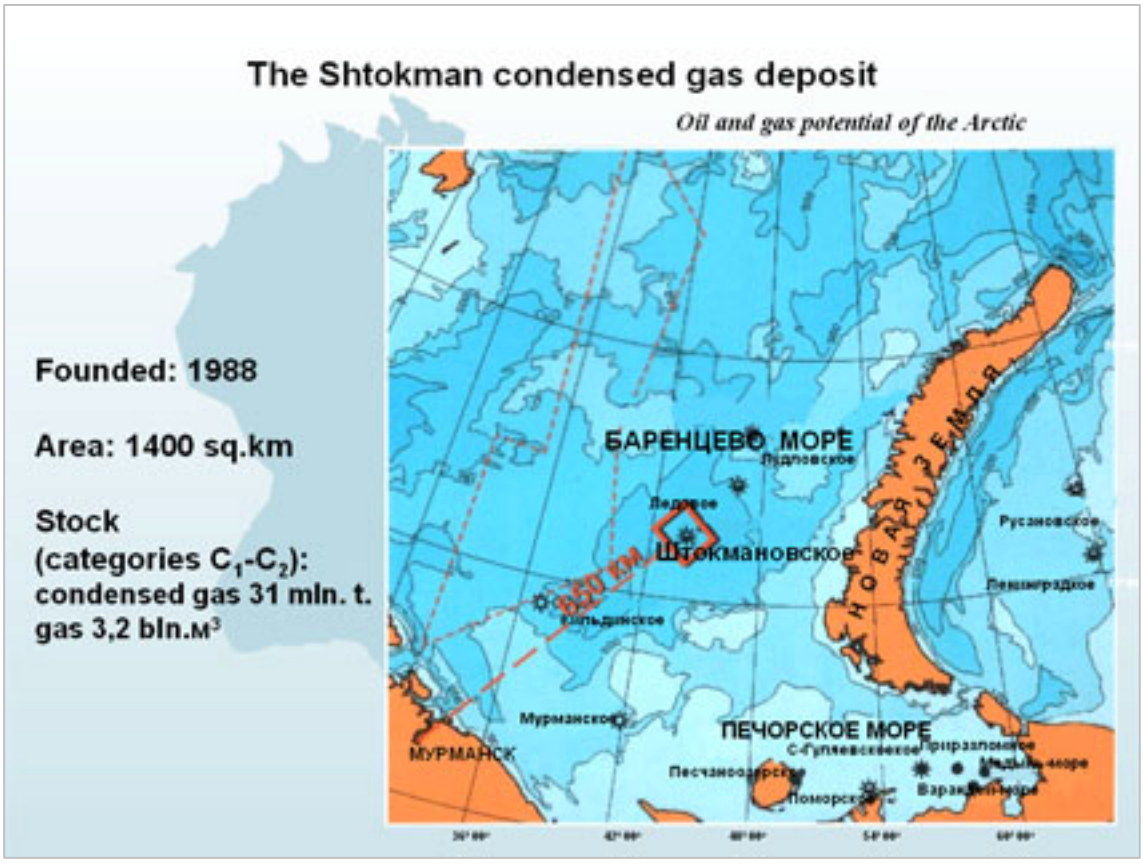
Local raisings

- по ОГ $B(J_3)$
- по ОГ I(P-T)
- по ОГ Ia(C-P)

Deposits

- gas
- condensed gas
- oil
- oil and condensed gas





PERSPECTIVES OF DEVELOPMENT OF THE GAS SECTOR

- *Project on exploration of the Shtokman deposit with application of liquefied gas technology* (Declaration on approving investments on request from JSC «Gazprom» presented by JSC «Giprospetsgas» and considered by the Government of the Murmansk region September 8, 2005) will require capital investment of 12 bln. US dollars, including 4,44 bln. in the Murmansk region.
- *A special economic zone of industrial and production type can be established on the west coast of the Kola bay, oriented at production, repairs and service of drilling and other equipment and platforms for working on the shelf.*

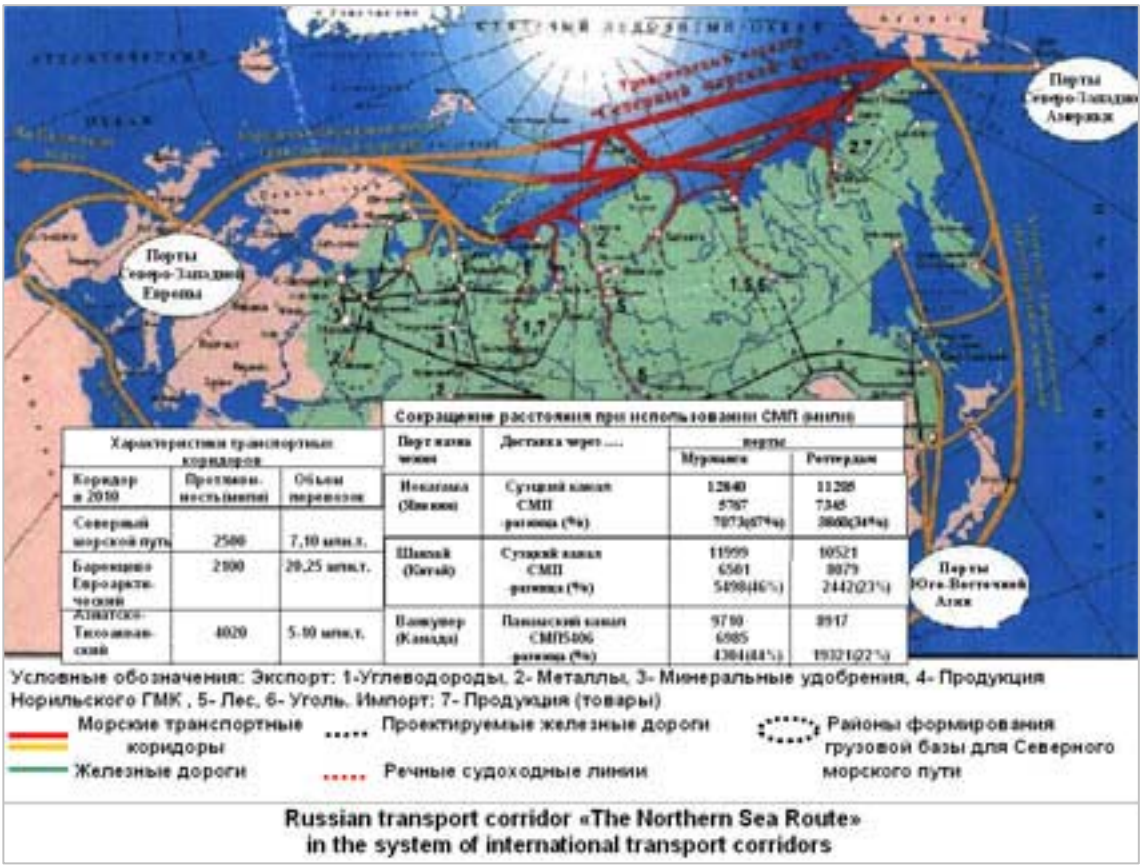
Tasks for ensuring environmental safety while exploring and transporting oi and liquefied gas

Regional Programme
"Protection and Hygiene of Environment and Ensuring"

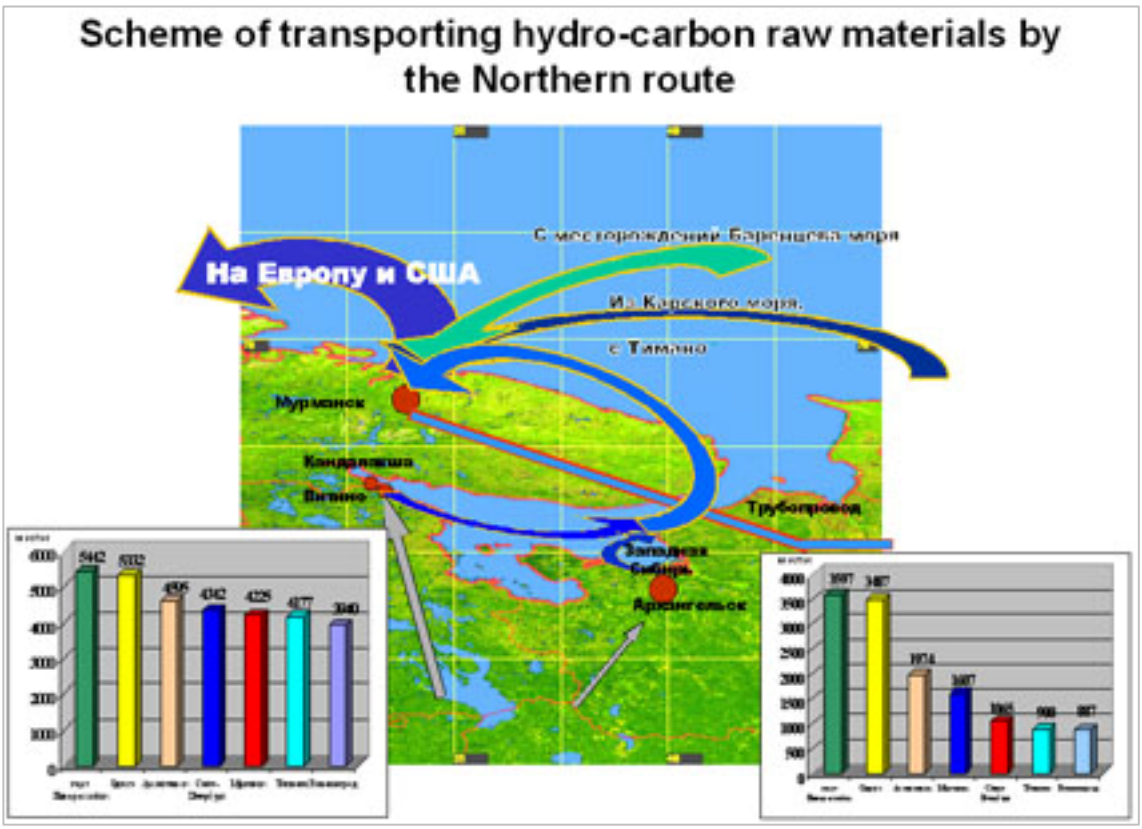
Establishing of common situational centre for forecast, prevention and liquidation of emergencies in the marine area of the Euro-Arctic region	Construction of environmental ground for utilisation of oil containing waste, products of emergency spills
Establishing of common safety system at delivering, dispatching and transporting of oil	*Establishing of local automated system of monitoring the surface of the Kola Bay*
Establishing of environmental centre	*Designing of most suitable sorbents and package for collecting oil*

THE NORTHERN SEA ROUTE –
THE NATIONAL TRANSPORT MAIN LINE

- Murmansk
- the northern gate of Russia
- the starting point of transit on the Northern Sea Route
- the Capital of the nuclear ice-breaker fleet



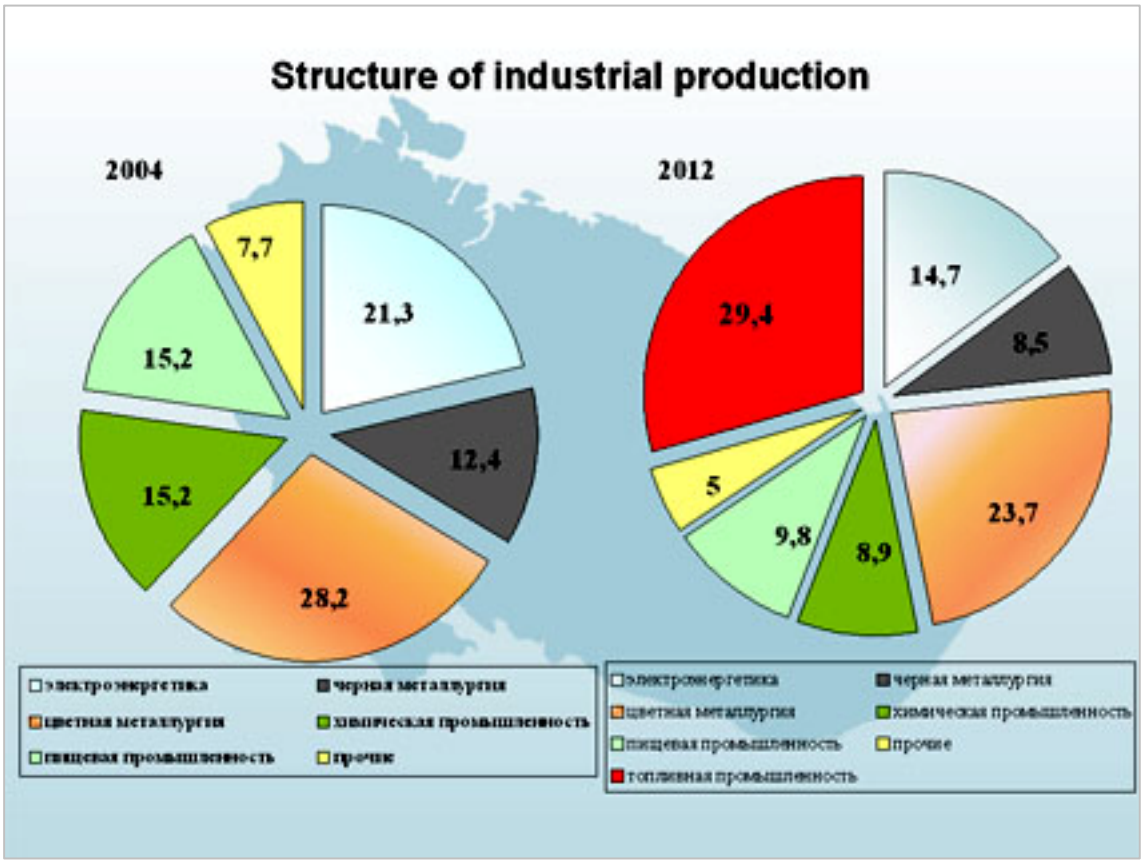
Russian transport corridor «The Northern Sea Route»
in the system of international transport corridors



IMPORTANCE OF EXPLORATION OF THE ARCTIC SHELF FOR THE RUSSIAN FEDERATION AND MURMANSK REGION

Exploration of the shelf will drive to:

- Increase of direct revenue return to the budget from use of natural resources;
- attracting investments to the real economy sector;
- growth of domestic consumption and export;
- growth of GDP and GRP;
- decrease of import dependence in the sphere of equipment and hi-tech;
- social and economical development of the northern regions of the Russian Federation and zones of special geopolitical interests;
- support of employment and creation of new working places;
- increase of living standards.



Discussion

The planned ecological information centre for the Murmansk Region was discussed. Mr Selin told about the cooperation between the new centre and the existing enterprises and research facilities. He mentioned cooperation plans with Murmansk Marine Biological Institute, Kola Institute and the Mining Institute, among others. There'll also be an open access to the database, including citizens and organisations, as described in the presentation.

The cooperation plans between the new information centre and the new training and information centre, which is to be established in Vårdö, Norway were discussed. Mr Selin described the cooperation and current activities with the Norwegians in the NSR. He mentioned, that the Russian specialists and emergency and rescue administration personnel go on training courses in Vårdö. All the cooperation is all targeted at emergency response and preventive measures.

Conclusions

Murmansk region is developing as an industrial and scientifical center in the Russian North. Thanks to a favourable location and the ice-free coast, growth is expected also in the hydrocarbon transportations. Murmansk is actively building a position as a hub and a gateway to the Northern Sea Route.

The numerous oil and gas projects are likely to bring jobs and industrial activity in the Murmansk Area. The meeting attendants were pleased to note that the environmental considerations have not been forgotten either. Murmansk is already cooperating with Norway and Finland in projects related to environmental protection and training of personnel.

6. FUTURE TRENDS IN THE DEVELOPMENT OF SEABORNE CARGO TRANSPORTATION IN THE ARCTIC REGION OF RUSSIA AND ITS ICEBREAKER SUPPORT FOR THE PERIOD UP TO 2020

Nikolay Monko, Federal Agency of Maritime & River Transport, RF Ministry of Transport

Abstract

Intensive exploitation of oil and gas fields on the coast and shelf of the Northern regions of Russia as well as plans for the development of new deposits will cause in the medium-term future the traffic in the western area of the Arctic to substantially increase.

Efficiency and safety of operation of cargo ships on the Northern Sea Route and in freezing ports of Russia depend, first of all, on the icebreaker support. Of key importance in the system of transportation facilities of the Far North are nuclear icebreakers that have high power and unrestrictive endurance. The availability of nuclear ships enables to successfully solve problems of the northern cargo delivery, mineral resource industry and fuel/energy complex of the Russian Arctic. Nuclear icebreakers provide for all-the-year-round navigation under any ice conditions in the western area of the Arctic.

1. Development of arctic cargo transportation

The prediction volumes and structure of cargo transportation in the Arctic region for the medium- and long-term future needed for the detailed analysis of the required icebreaker support are based on the information obtained from companies and institutions active in the Arctic and being principal shippers in this region.

In the nearest future, considerable growth of the sea traffic in the Arctic region is anticipated as a result of the development of shore and shelf deposits of hydrocarbon raw materials. By 2015, volume of seaborne cargo transportation, primarily of export oil and gas delivery, may exceed 40 million tons (presentation, fig. 1).

“Gazprom” company will install in 2006 the first in the Arctic fixed sea ice-resistant platform on the shelf oil field Prirazlomnoye in the south-eastern part of the Barents Sea (Pechora Sea) and plans to start production and shipping of oil in 2007. Maximum annual production is about 7 million tons. Oil will be carried by 2 tankers of 70 000 dwt with ice class LU6 (presentation, fig. 2).

Oil company “Rosneft” has at a design level considered an alternative of establishing by 2009 a deep-water shipping terminal near the port of Dikson for the annual export to the west of about 14 million tons of oil of the Nizhne-Yeniseiskiye fields of the Vankor group by 4-5 large tankers of 120 000 dwt with ice class LU7. This alternative may be replaced by a principally new option of the transportation of Vankor oil by a pipeline in the southern direction to join the main oil pipeline. Decision has not yet been made.

Oil company “LUKoil” in the nearest 3-5 years will increase the total capacity of the Varandey oil terminal to 10-13 million tons a year, this terminal serving fields of the Timan-Pechora oil and gas province, by the construction of a remote single point loading terminal at a depth of 17 m and using 4 tankers of 70 000 dwt with ice class LU6 (presentation, fig. 2).

Further extended will be the production and transportation of liquid hydrocarbons from the Obskaya and Tazovskaya bays.

In connection with the exploration of oil and gas fields on the Yamal peninsula, a part of goods for the fields installations will be delivered by sea through the port of Kharasavey on the western coast of Yamal and later on the shipment of liquid hydrocarbons by tankers is envisaged.

Oil export from the ports of Arkhangelsk and Vitino with a total volume of up to 10 million tons a year will be carried out by tankers of 20-30 thousand dwt with ice class LU5.

The “Transneft” company plans in the future to build a pipeline from the West-Siberian oil fields towards the coast of the Barents Sea (Indiga area) establishing a shipment terminal for tankers with a deadweight of up to 250 000 tons. Predicted volume of the oil export to Europe and to the USA is estimated as being 25 million tons per year.

As to the selection of a specific site for the construction of oil terminal and time of laying the oil pipeline, no decision has been yet taken.

In all the above projects it is supposed to use ice shuttle tankers that are to deliver oil to a roadstead transhipment terminal (storage tanker) in the area of the port of Murmansk.

All-the-year-round cargo transportation for the RAO “Norilsk Nickel” via the port of Dudinka is stabilized at an annual level of 1.2-1.3 million tons. “Norilsk Nickel” places orders for the construction of 5 arctic containerships of 14 500 dwt with ice class LU7.

Export is resumed of timber products from the ports of Arkhangelsk, Kandalaksha, Igarka and Tiksi reaching volume of up to 1.1 million tons. To take out timber, 15-20 timber carriers will be required.

Export of the production of metallurgy and chemical industry of the Krasnoyarsk Territory along the Northern Sea Route and the Yenisei River in a volume of up to 2 million tons will be provided for by sea going vessels as well as by ships of mixed river/sea navigation of the Yenisei River Shipping Company.

Products of industry of the Sakha Republic (Yakutia) and of the Chukotsky Autonomous District (oil, coal, tin concentrate, timber) will be carried by ships of the Murmansk and Far-Eastern shipping companies and also by “river-sea” ships of the Lena River Shipping Company.

Northern delivery of socially important cargoes using sea going vessels and “river-sea” ships will be carried out in a volume up to 1.5 million tons a year.

The anticipated volume of transit cargo transportation along the Northern Sea Route in the foreseeable future will not exceed 0.5 million tons per year. The NSR traffic structure by 2015 is presented in fig.3.

Taking into account the above stated, two versions of the freight flow formation for the prediction of need in the icebreaker support are considered:

- the first version provides for the realization of all prediction sources of the formation of freight flows obtained from main shippers;
- the second one excludes all the projects on which decisions have not yet been taken (including project of the exploration of the Vankorskoye field laying the oil pipeline to the north towards the port of Dikson as well as laying the pipeline from the West-Siberian oil fields to the coast of the Barents Sea).

2. Icebreaker support

The existing Russian icebreakers constructed mainly in the seventies and eighties of the last century are now becoming obsolete and subject to putting out of operation. Table 1 shows the composition of the Russian arctic icebreaker fleet as to 2005 and figures 4-7 present the general view of modern Russian icebreakers.

The arctic linear icebreaker fleet is a federal property. Duties of operators are performed by two shipping companies: Murmansk Shipping Company (MSCO) and Far East Shipping Company (FESCO). Under the control of MSCO there are 7 nuclear and 2 linear diesel-electric icebreakers; under FESCO – 3 linear diesel-electric icebreakers and one auxiliary diesel icebreaker. Linear diesel-electric icebreakers are under the asset management of operators or are leased.

Composition of the nuclear fleet being under the asset management of MSCO is as follows:

- 6 operative nuclear icebreakers and nuclear icebreaker Sibir the latter being out of operation since 1992 and requiring repair/restoration works and the extension of lifetime of its reactor plant;
- nuclear lighter carrier Sevmorput;
- 4 nuclear technology service vessels.

To ensure steady navigation on seaways of the Northern Sea Route the existing freight flow being 1.5-1.8 million tons (disregarding the export of hydrocarbons from the south-eastern part of the Barents Sea) during usual (summer) period of the arctic navigation and all the year round in the western arctic area it is always necessary to have at the disposal 5 nuclear icebreakers (three ones of Arktika type and two shallow draft ones of Taimyr type). Besides, in winter, as a rule, assistance of a nuclear icebreaker in the White Sea is needed. Through this sea more than 10 million tons of cargo is transported including 7 million tons of hydrocarbons. Due to the necessity of repair, maintenance and recharge of atomic reactors, one nuclear icebreaker is always put for some time out of operation. Allocation of nuclear icebreakers in winter period is shown in fig. 8.

At present, rated service life of nuclear steam-generating plants (NSGP) is restricted to 100 thousand hours. Experience of the operation of nuclear icebreakers permitted to arrive at a conclusion about the possibility of extending service life of nuclear plants from 100 thousand hours to 150 thousand hours on icebreakers of Taimyr type (one reactor) and to 175 thousand hours on icebreakers of Arktika type (two reactors) thus allowing to extend life time of nuclear icebreakers up to 30-32 years. Time of the removal of nuclear icebreakers from operation depending on service life of NSGP is shown in table 2.

Similar measures are taken on the extension of service life of existing diesel-electric icebreakers. Schedule of the dynamics of putting out of operation of nuclear and diesel-electric icebreakers taking into account the extension of their service life are presented in tables 3-5.

When rated and extended service life of NSGP is over in 2008 it is planned to remove nuclear icebreaker Arktika from operation the same to be done in 2012-2013 in relation to shallow draft nuclear icebreakers Taimyr and Vaigach. If this takes place, after 2013 the “Norilsk Nickel” transportation system will remain without icebreaker support, by 2018 three nuclear icebreakers will be in operation – Yamal, Sibir and 50 Let Pobedy, by 2020 only one – 50 Let Pobedy.

To design and build a nuclear icebreaker of the new generation 9-10 years are required. At present a request for proposal for the design of icebreaker is preparing and in 2006 it is envisaged to assign funds from the federal budget for the development of a conceptual design. Consequently even having started in 2006 the designing of a universal double draft nuclear icebreaker of the new generation of LK-60 type replacing icebreakers of Arktika and Taimyr types, the first icebreaker can be delivered not earlier than in 2015. In this case, the icebreaker gap for “Norilsk Nickel” will be reduced down to two years (from 2013 to 2015).

With the aim of optimizing expenses for the construction and maintenance of future icebreakers, nuclear icebreaker of the new generation should be of universal type. Three such double-draft icebreakers capable of operating both in open sea and in shallow water at mouth of the Yenisei River can replace five operating icebreakers of Arktika and Taimyr types.

Appropriate calculation of the icebreaker support of the seaborne cargo transportation for the future up to 2020 has been made bearing in mind the extension of service of operating nuclear and diesel icebreakers, designing and allocation of nuclear and diesel icebreakers of the new generation, as well as taking into account technical parameters and operational capabilities of the latters. Results of calculations are presented by years and objects for the above indicated two versions of the formation of freight flows (tables 6 and 7).

According to the first version, up to 2021, it will be necessary to build six variable-draft nuclear icebreakers of the new generation with power of about 60 MW (of LK-60 type), five diesel-electric icebreakers with power of about 25 MW (of LK-25 type) and four diesel-electric icebreakers with

power of about 18 MW (of LK-18 type). Besides, one should restore nuclear icebreaker Sibir and complete construction of nuclear icebreaker 50 Let Pobedy.

According to the second version, up to 2021, it is necessary to build three universal nuclear icebreakers of LK-60 type, four diesel-electric icebreakers of LK-25 type and three diesel-electric icebreakers of LK-18 type. The principal characteristics of the icebreakers of new generation are given in table 8.

The calculations shown are agreed with principal shippers and shipping companies. Resulting schemes of the anticipated development of cargo transportation in the Arctic and its icebreaker support are presented in figures 9 and 10.

Presentation

POSSIBLE TRAFFIC VOLUME ALONG THE NORTHERN SEA ROUTE UP TO 2015 (PROGNOSIS)

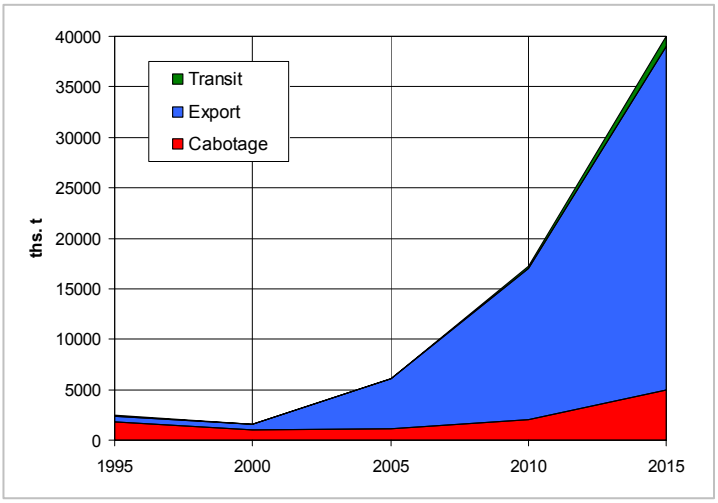


Fig. 1

DYNAMICS OF OIL EXPORT FROM NIZHNE-YENISEYSKOYE (VANKORSKOYE), PRIRAZLOMNOYE AND TIMANO-PECHORSKOYE (VARANDEYSKOE) OIL-FIELDS UP TO 2020

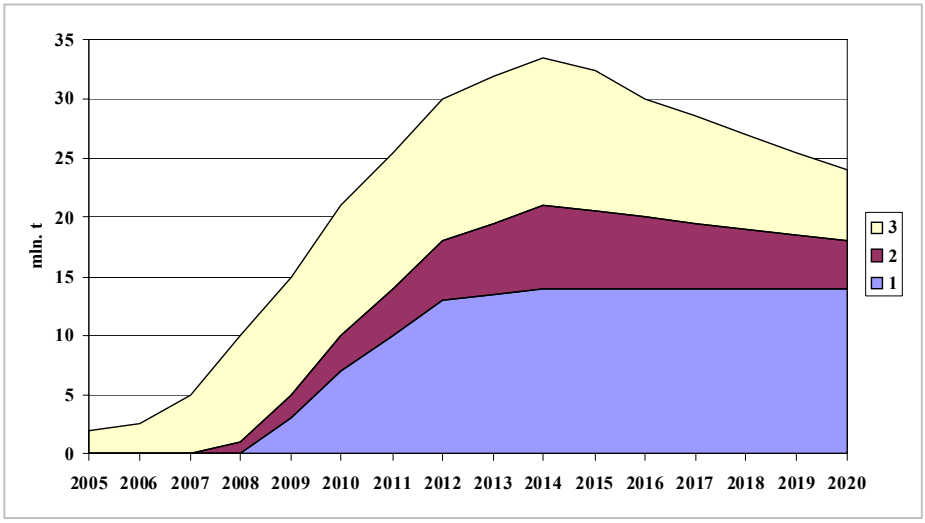


Fig. 2

Maximum of oil transportation, million tons/year	
Vankorskoye	14
Prirazlomnoye	7
Transportation via Varandey terminal	12,5

STRUCTURE OF CARRIAGES ALONG THE NORTHEN SEA ROUTE IN 2015

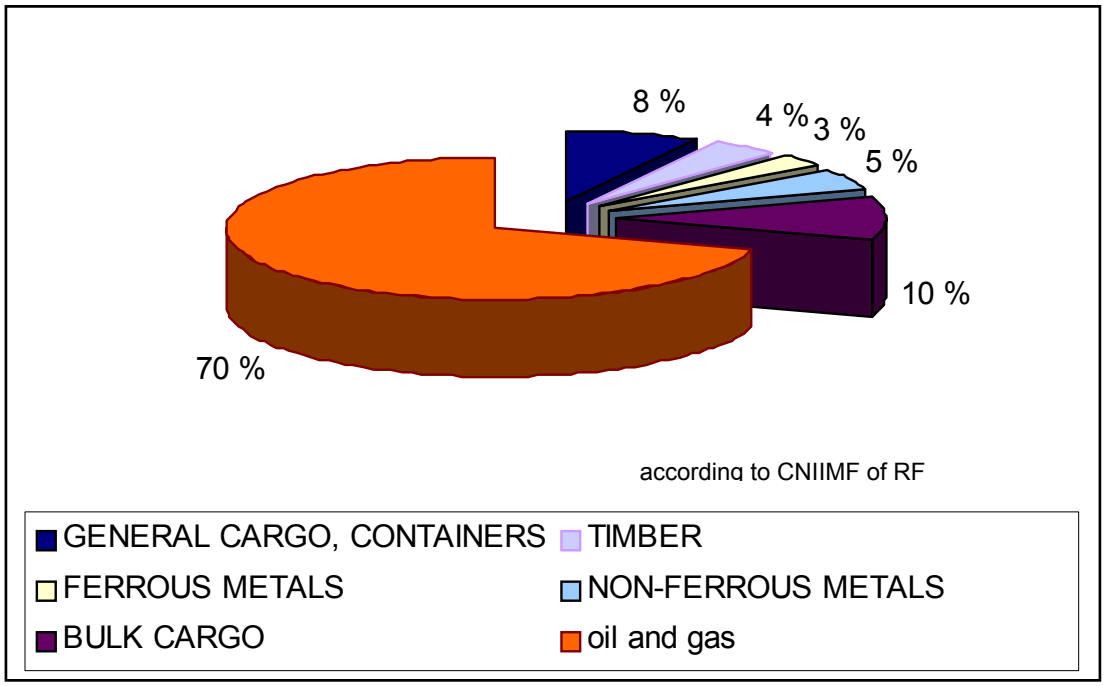


Fig. 3

RUSSIAN ARCTIC ICEBREAKER FLEET BY 2005 ***Table 1***

Name	**Year of built**	**Shaft power, kW**	**Builder**	**Operator**
Nuclear icebreakers				
Arktika	1974	49000	USSR	MSCO
Rossiya	1985	49000	USSR	MSCO
Sovetskiy Soyuz	1989	49000	USSR	MSCO
Yamal	1992	49000	USSR	MSCO
Taimyr	1989	32500	Finland, USSR	MSCO
Vaigach	1990	32500	Finland, USSR	MSCO
Diesel-electric icebreakers				
Admiral Makarov	1975	26500	Finland	FESCO
Krasin	1976	26500	Finland	FESCO
Kapitan Nikolaev	1978	16200	Finland	MSCO

Kapitan Dranitsyn	1980	16200	Finland	MSCO
Kapitan Khlebnikov	1981	16200	Finland	FESCO

***Fig 4**. Nuclear icebreaker Rossiya assisting cargo ship by close towing in Kara Sea*

***Fig. 5**. Shallow-draft nuclear icebreaker Taimyr*

***Fig. 6**. Diesel-electric icebreaker Yermak in the Eastern Arctic*

Fig. 7. Shallow-draught icebreaker Kapitan Sorokin in Yenisei Gulf

ALLOCATION OF NUCLEAR ICEBREAKERS DURING WINTER PERIOD TO PROVIDE FOR THE TRANSPORTATION OF CARGOES OF “NORILSKIY NICKEL” AND EXPORT OF OIL AND TIMBER FROM PORTS OF THE WHITE SEA

icebreakers of *Arktika* type (*Arktika*, *Rossiya*, *Sovetskiy Soyuz*, *Yamal*)

icebreakers *Taimyr* and *Vaigach*

Fig. 8.

TIME OF THE REMOVAL FROM OPERATION OF NUCLEAR ICEBREAKERS

Table 2.

Name	Year of built	Termination of the rated period, year	Termination of extended period, year
Arktika	1974	1990	2008
Sibir	1976	2009	2020
Rossiya	1985	2006	2017
Taimyr	1989	2004	2012
Sovetskiy Soyuz	1989	2008	2018
Vaigach	1990	2005	2013
Yamal	1992	2009	2019

SCHEDULE OF WORKS FOR THE EXTENSION OF SERVICE LIFE AND PUTTING OUT OF OPERATION OF NUCLEAR ICEBREAKERS OF RUSSIA

Table 3.

Number of icebrea-kers in operation	Arktika	Sibir	Rossiya	Sovetskiy Soyuz	Yamal	50 Let Pobedy	Taimyr	Vaigach
6	In operation	Out of operation	In operation	In operation	In operation	Building	In operation	In operation
6	In operation	Out of operation	In operation	In operation	In operation	Building	In operation	In operation
6	In operation	Out of operation	In operation	Extension of service live	In operation	In operation	In operation	In operation
7	Utilization	In operation	In operation	In operation	In operation	In operation	In operation	In operation
6		In operation	In operation	In operation	Extension of service live	In operation	In operation	In operation
7		In operation	In operation	In operation	In operation	In operation	In operation	In operation
7		In operation	In operation	In operation	In operation	In operation	In operation	In operation
6		In operation	In operation	In operation	In operation	In operation	In operation	In operation
5		In operation	In operation	In operation	In operation	In operation	Utilization	In operation
5		In operation	In operation	In operation	In operation	In operation		Utilization
5		In operation	In operation	In operation	In operation	In operation		
5		In operation	In operation	In operation	In operation	In operation		
4		In operation	Utilization	In operation	In operation	In operation		
3		In operation		Utilization	In operation	In operation		
2		In operation			Utilization	In operation		
1		Utilization				In operation		

TIME OF THE REMOVAL FROM OPERATION OF DIESEL ICEBREAKERS OPERATING IN ARCTIC AND WHITE SEA

Table 4.

Name	Shaft power, kW	Year of built	Areas of operation	Termination of the rated period, year	Termination of extended period, year
Linear icebreakers					
Admiral Makarov	26500	1975	Arctic, Far-Eastern Basin, Finnish Gulf	1999	2015
Krasin	26500	1976	Arctic, Far-Eastern Basin	2000	2017
Kapitan Nikolaev	16200	1978	Shallow water areas of Arctic, White Sea	2002	2017
Kapitan Dranitsyn	16200	1980	Shallow water areas of Arctic, White Sea	2004	2019
Kapitan Khlebnikov	16200	1981	Arctic, Far-Eastern Basin	2005	2017

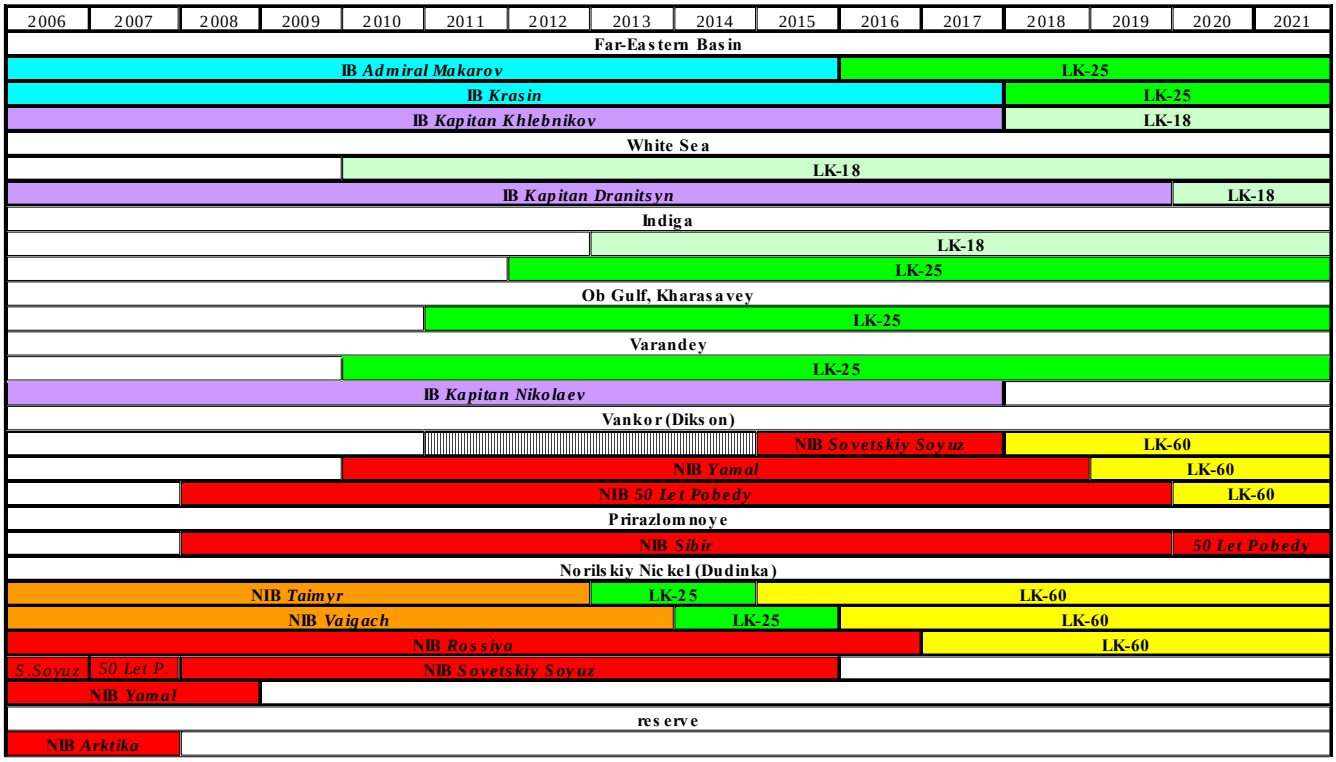
DYNAMICS OF THE PUTTING OUT OF OPERATION OF LINEAR DIESEL-ELECTRIC ICEBREAKERS WITH THE INDICATION OF AGE

Table 5.

Year	Number of icebreakers in operation	Admiral Makarov	Krasin	Kapitan Nikolaev	Kapitan Dranitsyn	Kapitan Khlebnikov
2005	5	30	29	27	25	24
2006	5	31	30	28	26	25
2007	5	32	31	29	27	26
2008	5	33	32	30	28	27
2009	5	34	33	31	29	28
2010	5	35	34	32	30	29
2011	5	36	35	33	31	30
2012	5	37	36	34	32	31
2013	5	38	37	35	33	32
2014	5	39	38	36	34	33
2015	5	40	39	37	35	34
2016	4	Utilization	40	38	36	35
2017	4		41	39	37	36
2018	1		Utilization	Utilization	38	Utilization
2019	1				39	
2020	0				Utilization	

DEMAND IN LINEAR ICEBREAKERS FOR THE ARCTIC REGION AND FAR EAST BASIN FOR THE PERIOD UP TO 2021 (VERSION 1)

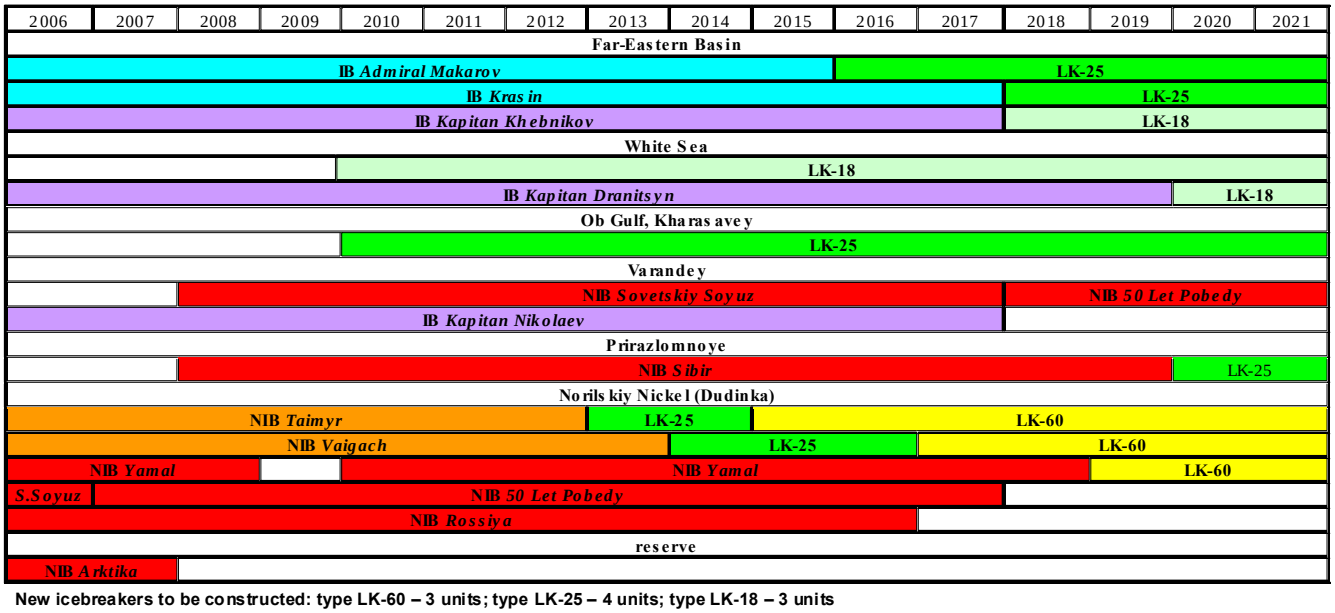
Table 6.



New icebreakers to be constructed: type LK-60 – 6 units; type LK-25 – 5 units; type LK-18 – 4 units

DEMAND IN LINEAR ICEBREAKERS FOR THE ARCTIC REGION AND FAR EAST BASIN FOR THE PERIOD UP TO 2021 (VERSION 2)

Table 7.



New icebreakers to be constructed: type LK-60 – 3 units; type LK-25 – 4 units; type LK-18 – 3 units

CHARACTERISTICS OF ARCTIC ICEBREAKERS OF NEW GENERATION

Table 8.

Characteristics	*LK-60*	*LK-25*	*LK-18*
Length, m			
overall	176.0	139.6	118.0
on design WL	164.0	129.6	112.8
Breadth, m			
overall	34.0	30.0	29.0
on design WL	32.2	28.0	28.0
Depth, m	15.8	13.2	12.8
Draft, m			
on design WL	10.5	8.5	8.5
design minimum	8.5	-	-
Displacement on design WL, t	32400	19500	15900
Type of powerplant	nuclear	diesel-electric	diesel-electric
Shaft power, MW	60	24	18
Number of propellers	3	3	2
Open water speed, knots	22.3	19.2	18.2
Icebreaking capability, m	2.9	2.0	1.6
Fuel endurance, days	unlimited	35	25
Crew	80	30	25
Time for built, years	8-10	3-4	2-3

DEVELOPMENT OF CARGO TRANSPORTATION FOR THE ARCTIC REGION AND ITS ICEBREAKER SUPPORT (TAKING INTO ACCOUNT VANKORSKOYE DEPOSIT)

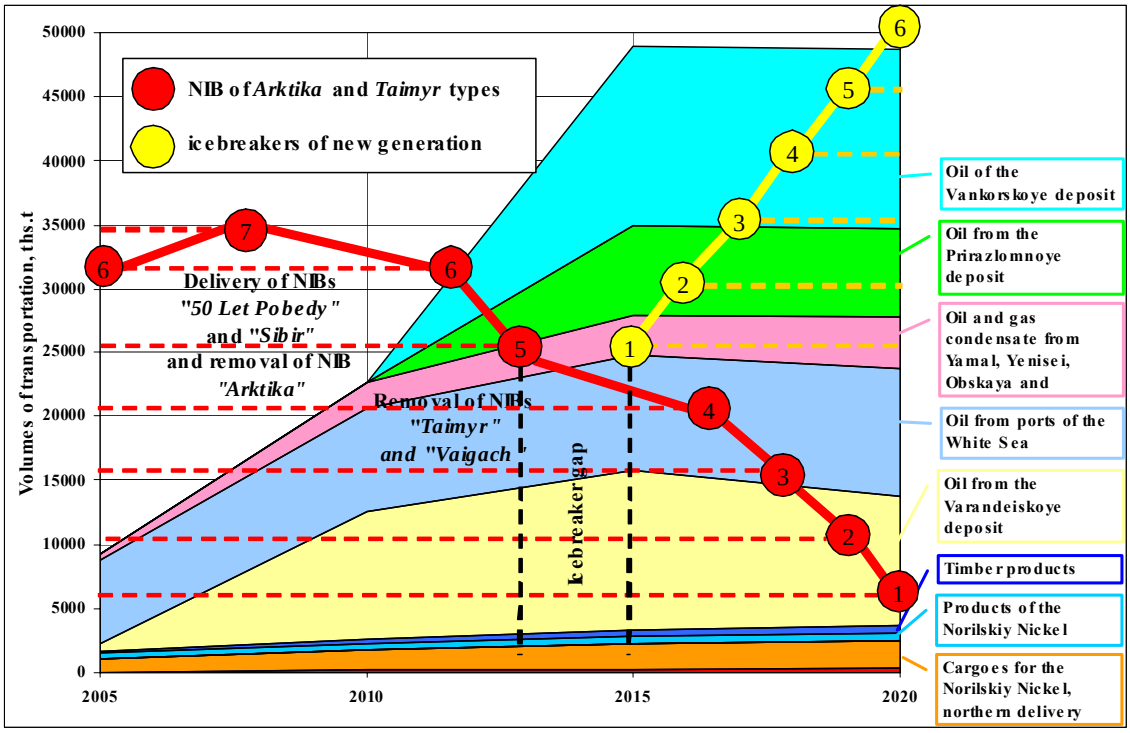


Fig. 9

DEVELOPMENT OF CARGO TRANSPORTATION FOR THE ARCTIC REGION AND ITS ICEBREAKER SUPPORT (WITHOUT TAKING INTO ACCOUNT VANKORSKOYE DEPOSIT)

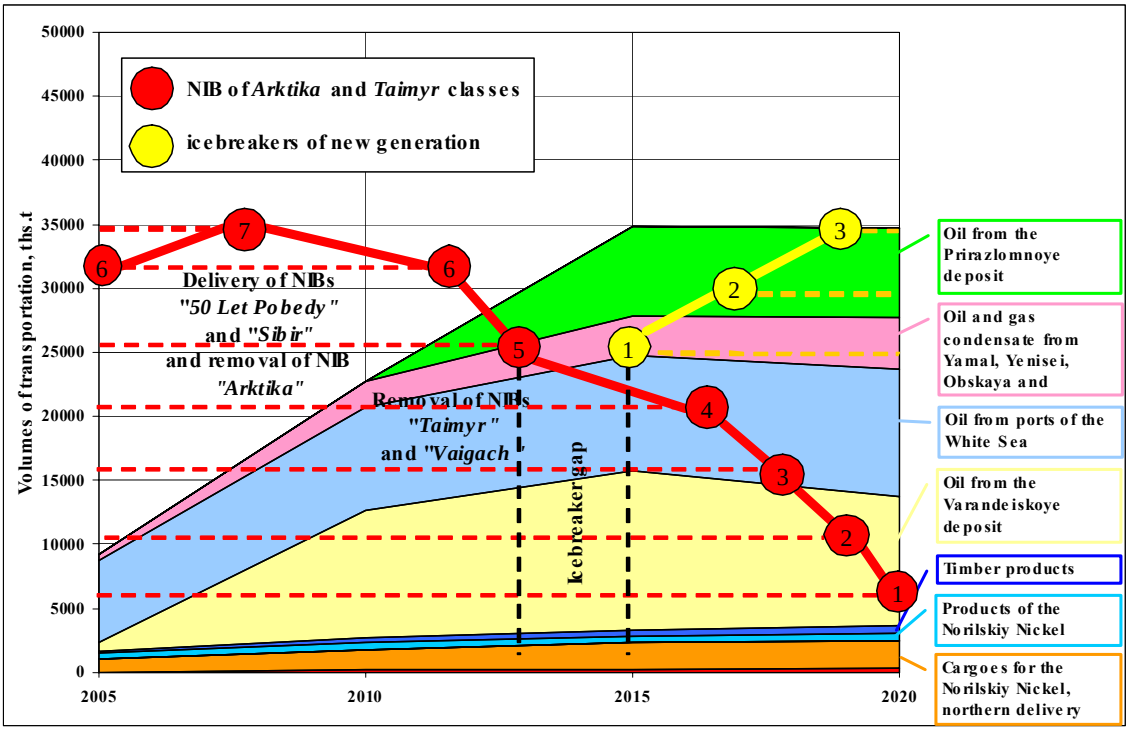


Fig. 10.

Discussion

The NSR sailing tariffs were discussed. Mr Monko told, that on route Vankor – Murmansk the tariff has been 16 dollars per ton until recently. Starting from October 4th 2005 a new tariff is in place. They are increased by 23%.

Mr Monko emphasized, that the costs have risen and that tariffs are not raised in order to make profit. At the moment there is no federal funding supporting the icebreaker fleet.

Conclusions

The newbuilding plan for the Russian icebreaker fleet is quite challenging. It worth noting, that the future of the fleet is based on the use of nuclear power.

Regardless of the challenging newbuilding plan, according to the estimates, the icebreaking capacity will not be sufficient during the nearest years. There will be periods during which there will not be enough icebreakers to secure the export transportation of the current main client, Norilsk Nikel.

Furthermore, the growing icebreaker fees are already threatening the profitability of the NSR transportation.

7. SHIPPING THROUGH THE NORTHERN SEA ROUTE: NAVIGATIONAL AND HYDROGRAPHIC SUPPORT

Victor Medvedev, Hydrographic Department, RF Ministry of Transport

Abstract

The Hydrographic Department under the RF Ministry of Transport has its subsidiaries in Arctic which provide hydrographic support for the specified areas of NSR in the following seas of Arctic – Barents Sea, Kara Sea, Laptev Sea, Eastern-Siberian Sea and Chukchi Sea, as well as into the north-west part of the Bering Sea (from Franz Josef Land on the west, Novaya Zemlya and Vaigach till Bering Strait and Provideniya Bay on the east).

The Federal State Unitary “Hydrographic Department” owns a biggest in the World fleet of ice-classed hydrographic vessels, including 14 ships built in Finland (the series of vessels “Dmitriy Ofsin”, “Fedor Matisen”, “Aleksey Maryshev”). These ships were destined for expeditions, hydrographic researches for the purposes of mapping of a sea bottom contour, installation and service of navigational aids.

Main objective of activity of the SHD is the providing of navigational-hydrographic seafaring and safety of shipping industry at delivery of economic cargoes to regions of the Far North by marine and river vessels, trade, research, special and other vessels, irrespective of their departmental and national belonging. The area of liability of the SHD includes waterways of NSR, area of archipelago Franz Josef Land and mouth sites (bottom current) of the rivers Yenisey, Khatanga, Anabar, Lena and Kolyma accessible to marine shipping industry. The aids to navigation on the waterways of NSR are equipped with equipment which works by use of sources of electrical power, including radioactive nuclide propulsive plants (RNPP) in which are used radiating sources of heat (RSH) on a basis of the radioactive nuclide - Strontium - 90.

The hydrographical research and support is an essential part of developing the transportation routes and enhancing the efficiency of those activities.

Discussion

The hydrographical research equipment was discussed in detail. The equipment uses radioisotope power sources, and during the 30 years of use no accident has occurred. Some of the devices will be dismantled during the next few years with the help of international funding.

The project coordinator commented that when planning ARCOP work, the hydrographical works were neglected. He expressed satisfaction with the workshops and reporting which have allowed also this information to be included. He noted that costs of the hydrographical services should also be covered by the fees, and thus will have an impact on them.

The transport vehicles’ suitability for tundra conditions was discussed. Any vehicle will leave traces and sags on the frozen tundra. In the spring, the surface will melt, creating ponds and marshland along the traces. Mr Medvedev explained that currently the Hydrographic Department uses Swedish-made special tractors. The use of hovercrafts was suggested, for one of the workshop participants had positive experiences from those.

Conclusions

The importance of the hydrographic services will be emphasized by the growing number of vessels and in-experienced crews in the future.

8. DEVELOPMENT OF TRANSPORT STREAMS THROUGH BALTIC AND BARENTS SEAS

Mikhail N. Grigoriev, Gecon Ltd.

Abstract

The Arctic regions connected with NSR, according to Power strategy of Russia for the period ‘till 2020, are, alongside with Eastern Siberia and the Far East, the basic region of growth of the oil and gas production that is especially important in connection with the exhaustion of the deposits in the traditional regions.

Prospective growth of oil, gas condensate and gas production will cause growth in freight traffic on the NSR and, as a consequence, a growth in the probabilities of ecological incidents.

The modelling of possible streams of oil should consider not only growing volumes of transported oil, but also its qualitative characteristics. The struggle against oil spills of different structure demands application and development of various response methods.

Oil transported through the NSR can be divided into three streams:

1. Transported directly from the fields.
2. Transported as a mix of oils from the regions with the known regional crude oil type parameters.
3. Transported as a mix of oils from the regions with the high variety of the crude oil types.

For the first stream a proved forecast of the parameters can be executed, for the second a likelihood forecast can be made; parameters of oil the third stream cannot be predicted.

At the same time, the analysis of the dynamics of the development of the transport schemes of the NSR shows, that the basic traffic will be provided with the first two streams. Knowledge on the oil characteristics considerably raises the reliability of the modelling of the parameters of the future streams, the estimations of the parameters of spills and as a consequence a substantiation of development of a necessary variety of methods against them.

Comparison of qualitative oil characteristics of the Russian Arctic regions and the Northern Sea shows significant distinction in features of their qualitative structure that reduces reliability of modelling of parameters of spills of Russian oil by analogy with Norwegian. It is obvious, that modelling of parameters of the future spills is necessary for spending proceeding from concrete characteristics of Russian oil.

For planned work it is supposed to use an available database under characteristics of all oil pools of Russia, containing key parameters such as: Tars, Asphaltenes, Paraffin, Sulphur, Viscosity, Density, and Pour Point.

Use of retrospective data of dynamics of oil parameters of the Arctic oil producing centers (OPC) allows more realistic to spend modelling of structure of the future streams.

For the purposes of detailed researches possibly reception of oil tests of the Arctic deposits from the oil companies, or use given by them of wider list the characteristic.

Information and program resources of the planned project include:

Data Banks

- Russian oil (12 000) & condensate (1 700) pools characteristics, 1994-2005
- Planned and approved oil field development projects
- Transport schemes and terminal capacities (oil, condensate, products)

Spatial Data

- Hydrocarbon Resources of Russia and adjacent areas: licensing areas, fields, prospects & oil&gas bearing provinces (ARCGis)
- Transport routes for crude oil and oil products: existed and planned pipelines, railroad stations & terminals (ARCGis)

Software

- OPC Crude Oil Streams Modelling (Katran®, SPOT®)
- Spatial Data Analysis (ARCGis)

Expected results include the Barents and Baltic. Transported Crude Oil and Products Modelling:

- Cargo flows volume and structure
- Necessary fleet (tankers, icebreakers)
- Terminals
- Fluid characteristics prediction

The forecast of the volumes, physical and chemical characteristics of the oils flows, transported and planned to transportation by water areas of Baltic, White, Kara, Pechora and Barents seas on the basis of projects of field development and its oil parameters.

The knowledge of properties of the transported oil is necessary for development of mathematical model of behaviour of oil in water, a choice of forces and means for struggle against spills and their consequences.

Data can be used by ecological institutes and other organizations.

Presentation

PLANNED PROJECT

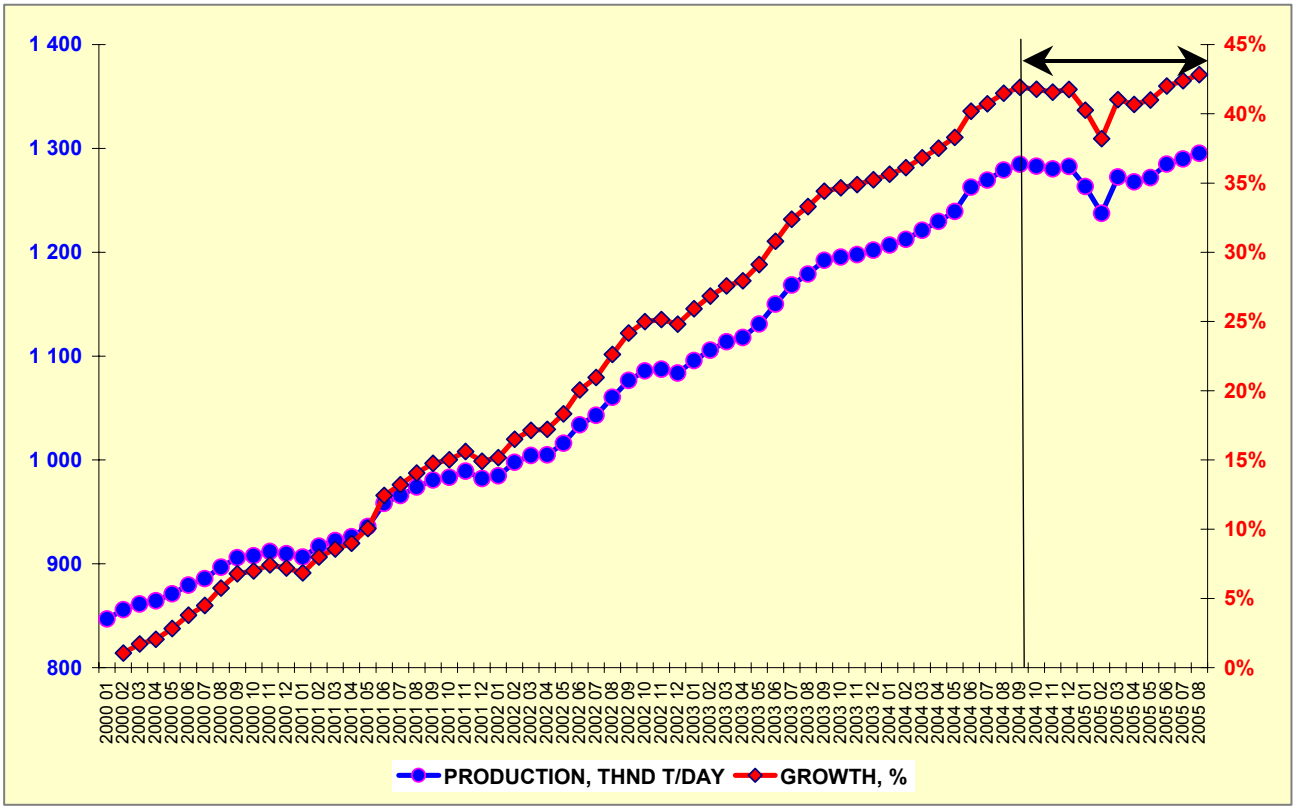
Target

The forecast of physical and chemical characteristics of the oils flows, transported and planned to transportation by water areas of White, Kara, Pechora and Barents seas on the basis of projects of field development and its oil parameters.

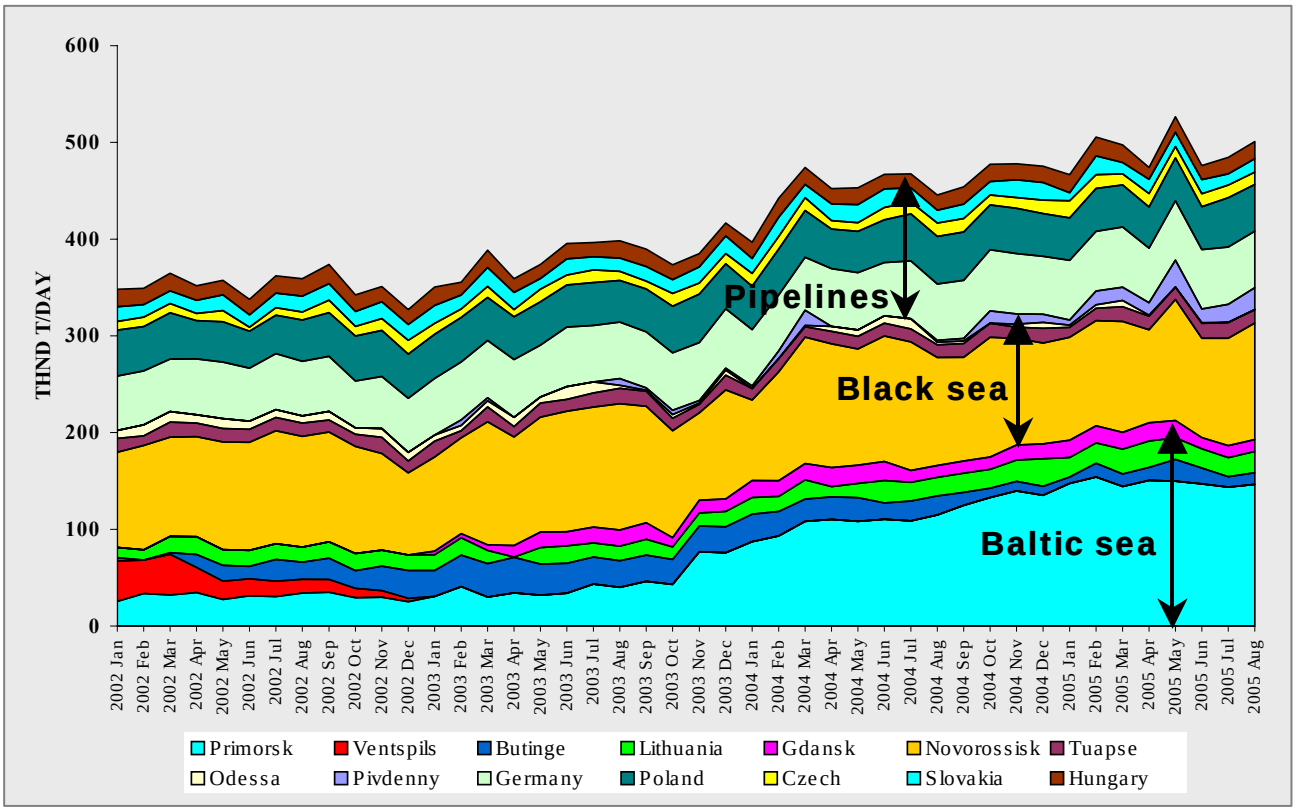
The knowledge of properties of the transported oil is necessary for development of mathematical model of behaviour of oil in water, a choice of forces and means for struggle against floods and their consequences.

Data can be used by ecological institutes and other organizations.

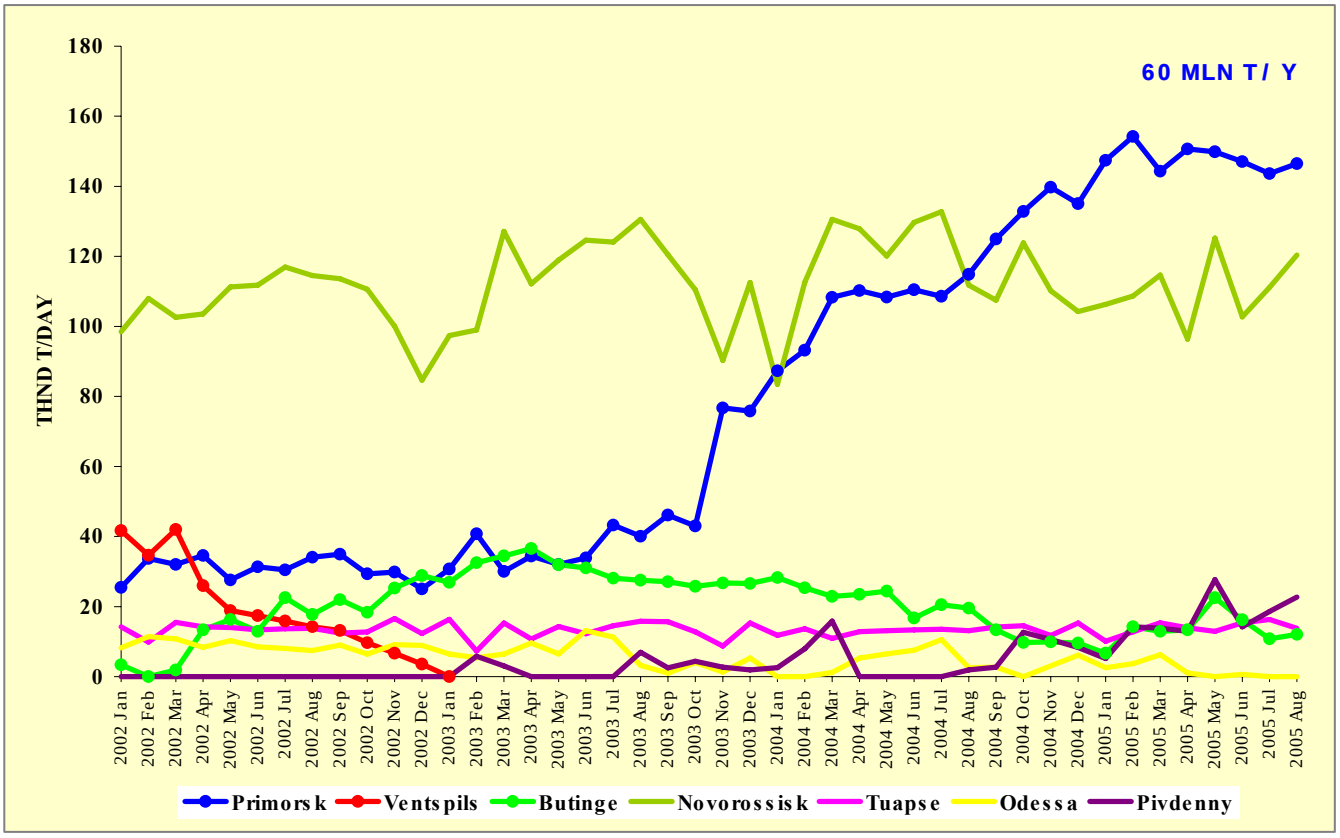
RUSSIA: CRUDE OIL PRODUCTION 2000-2005

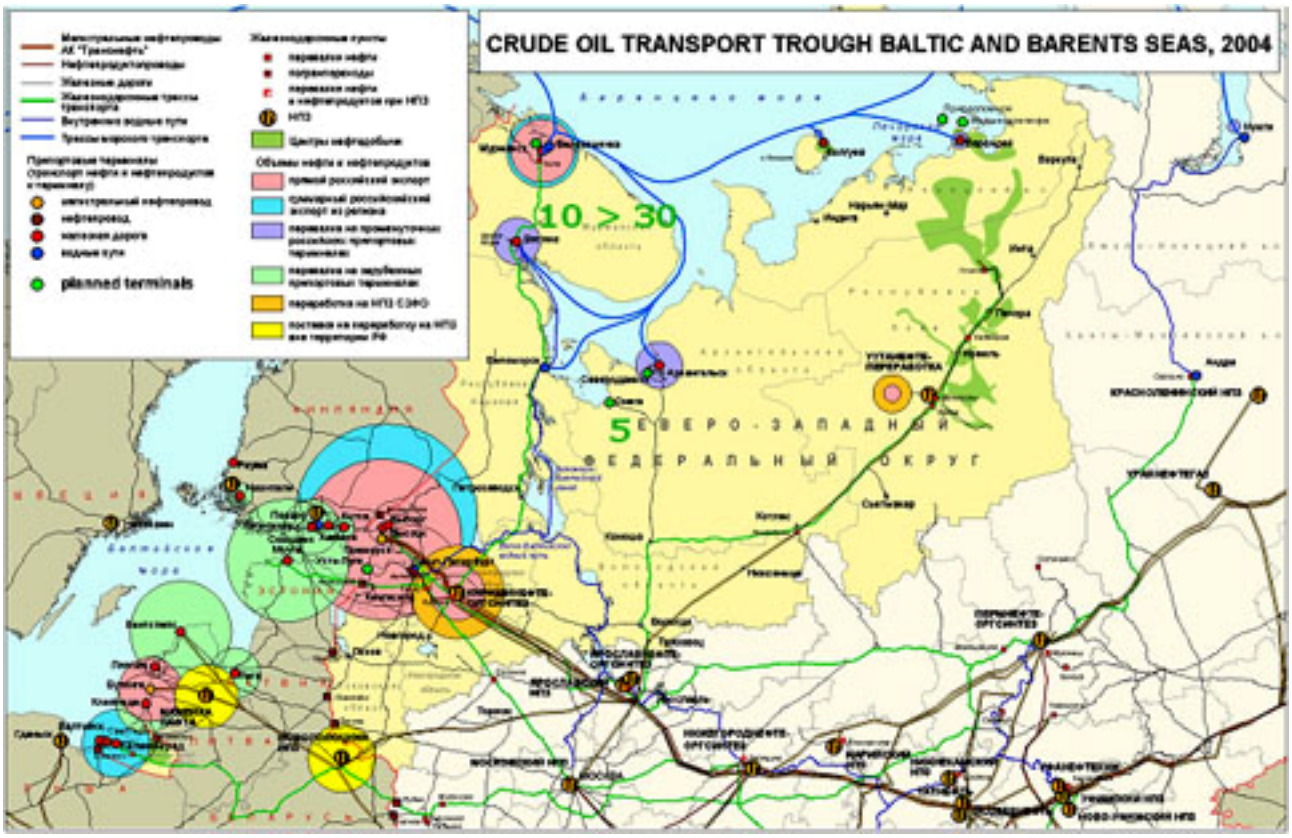


CRUDE OIL EXPORT THROUGH TRANSNEFT PIPELINES

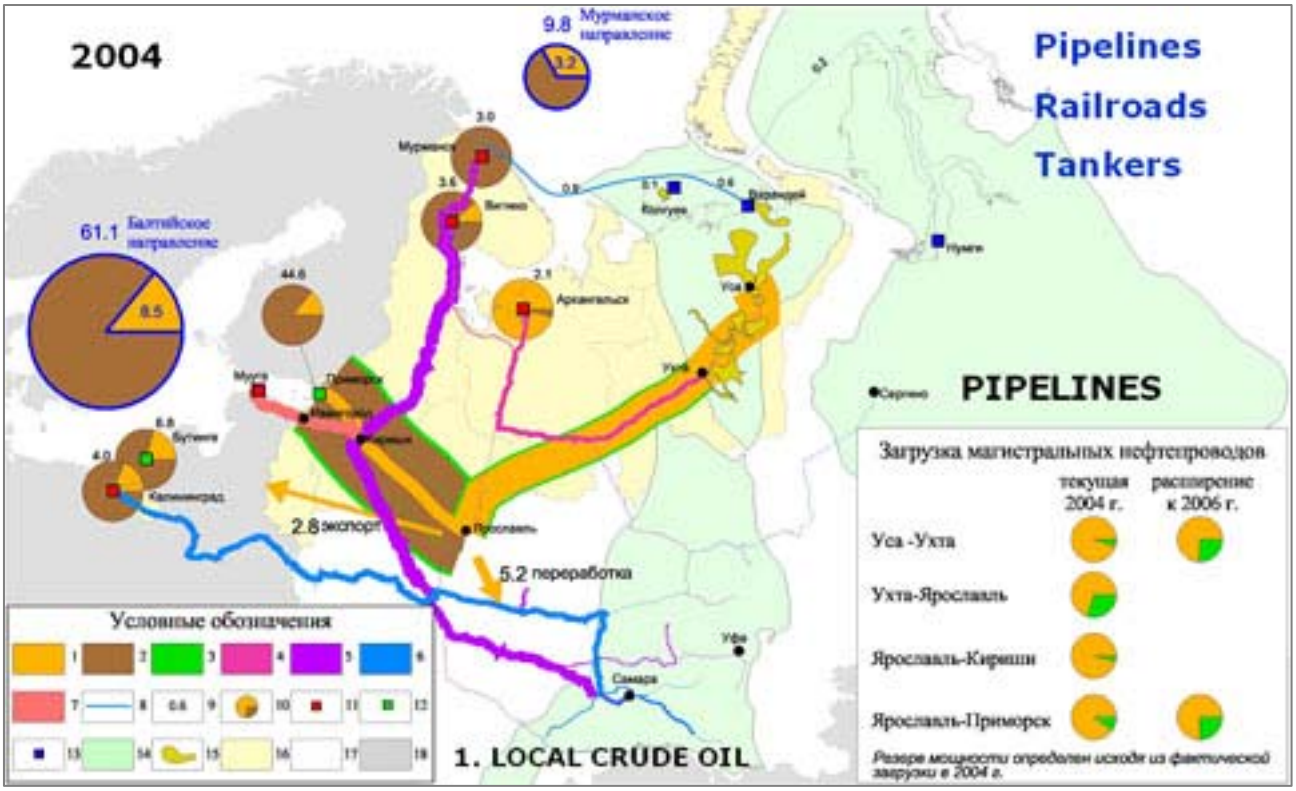


SEA TERMINALS





CURRENT CRUDE OIL NW TRAFFIC

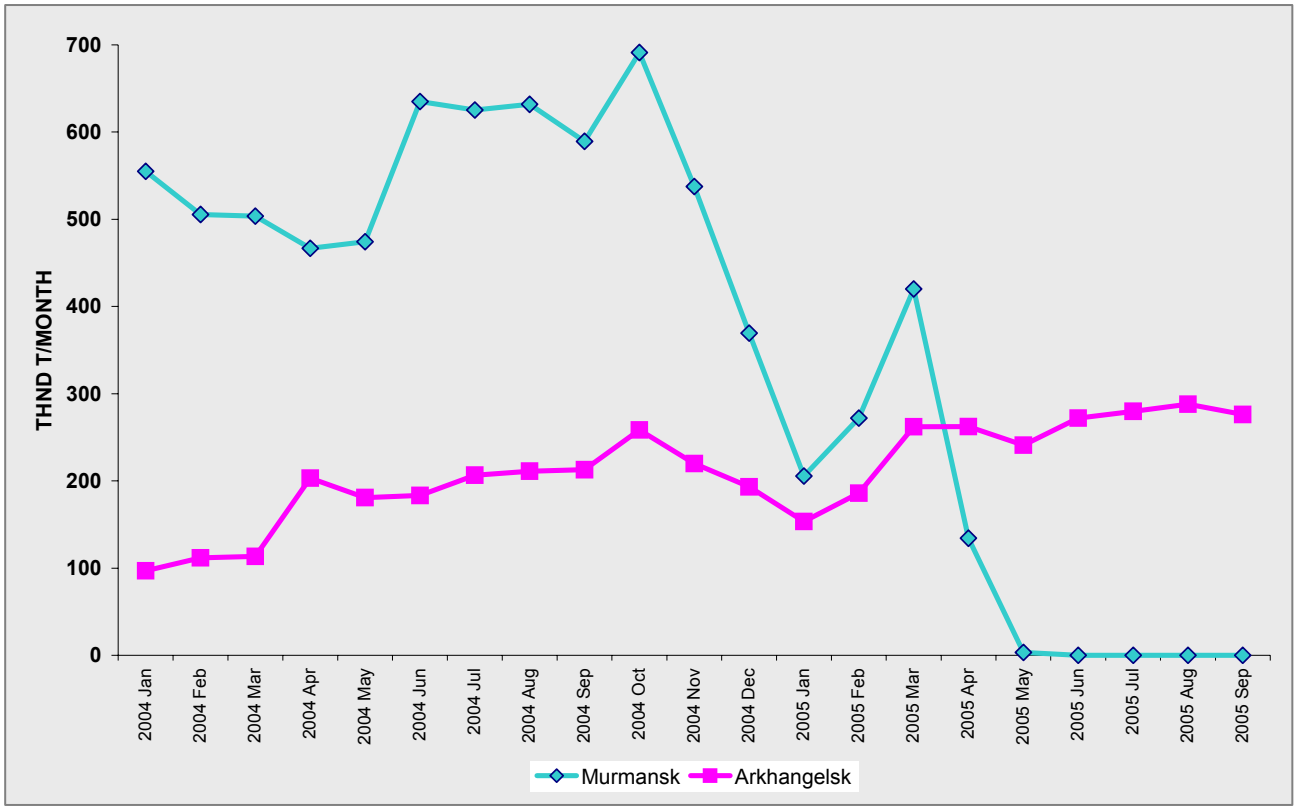


CRUDE OIL STREAMS THROUGH MURMANSK HUB

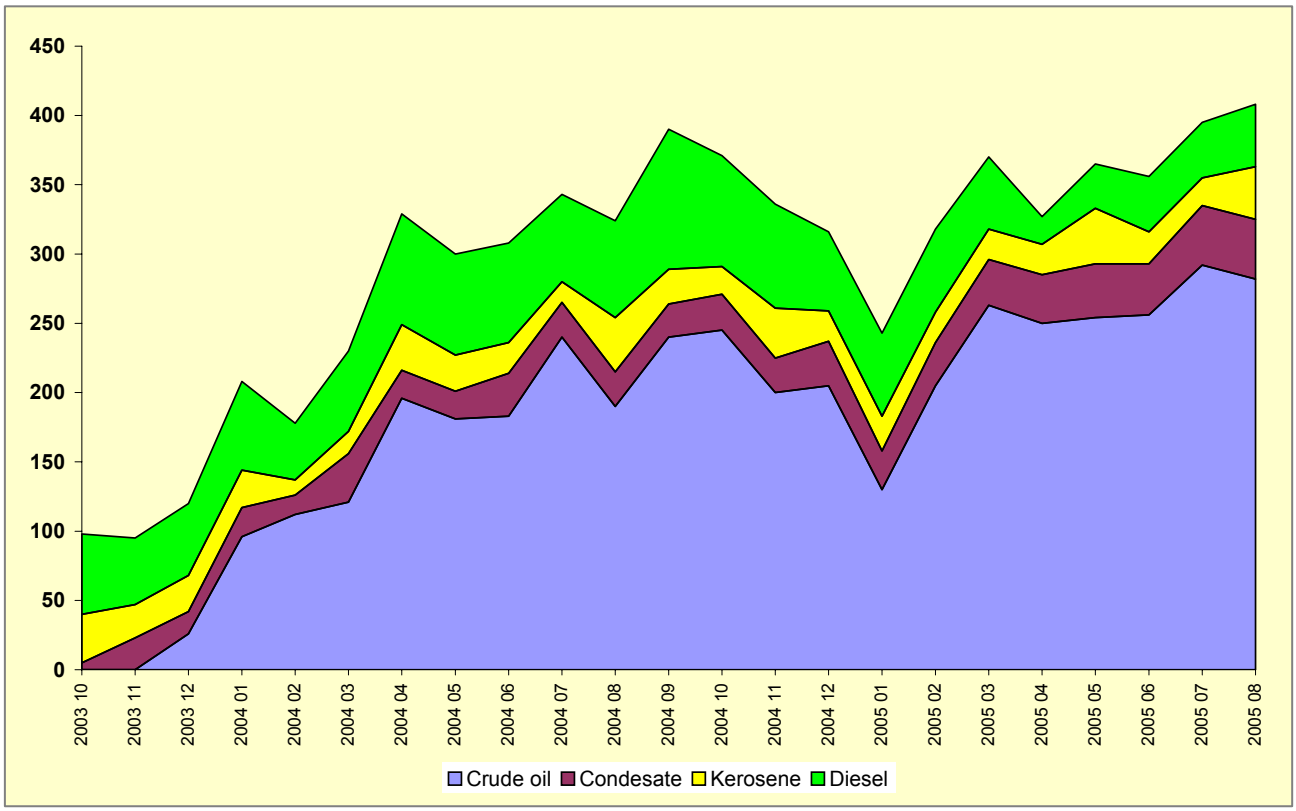
- Current transportation:
  - from Volga region by railway road directly to Kola and Murmansk
  - mainly from Volga region by railway road to station Beloe More with reloading in Vitino for the shuttle tankers for Murmansk BOB terminal
  - mainly from Timan-Pechora by railway road to Archangelsk with reloading for the shuttle tankers for Murmansk BOB terminal or exported directly
  - from Varandey and Kolguyev sea terminals
  - from Numgi (West Siberia) river-sea terminal
- Future transportation: current streams strengthening and new routes (Prirazlomnoe, Med-Var offshore etc.)


Проектируемый нефтепровод
Железные дороги
существующие
проектируемые
Нефтеналивные станции
Железнодорожные станции
Нефтеналивные терминалы
строящиеся и проектируемые
существующие
Разгрузочно-перевалочные комплексы
аэропорт
БАРЕНЦЕВО МОРЕ
ПОЛЯРНЫЙ
Кольский залив
Килп
Кулонга
Белокаменка
РПК3
РПК1
Мишуково
СЕВЕРОМОРСК
Лавна
САФОНОВО
Пяйве
СРЗ №35
в Печенгу
АБРАМ-МЫС
Мохнаткина Пахта
Мурманский рыбный порт
МУРМАНСК
Кола
Тулома
Выходной
МУРМАШИ

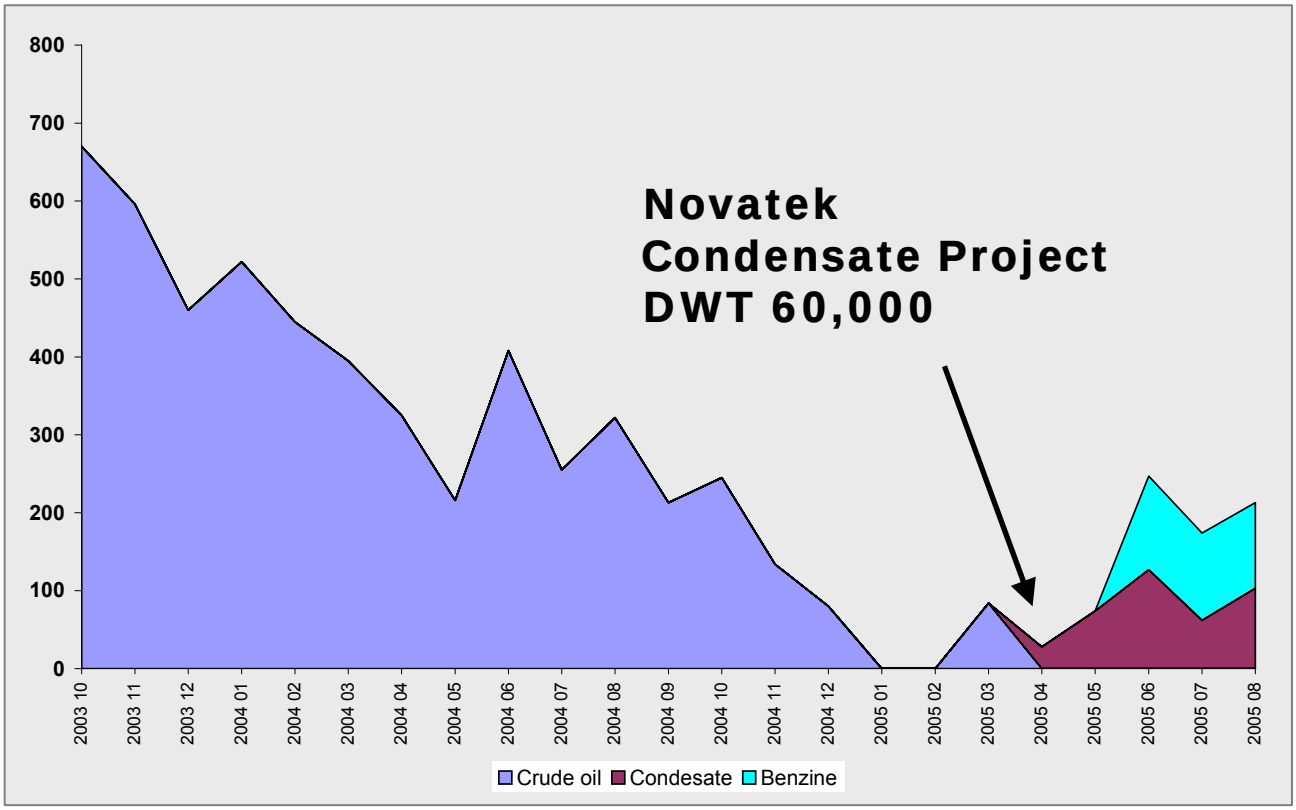
CRUDE OIL: BY RAILROAD TO THE BARENTS SEA



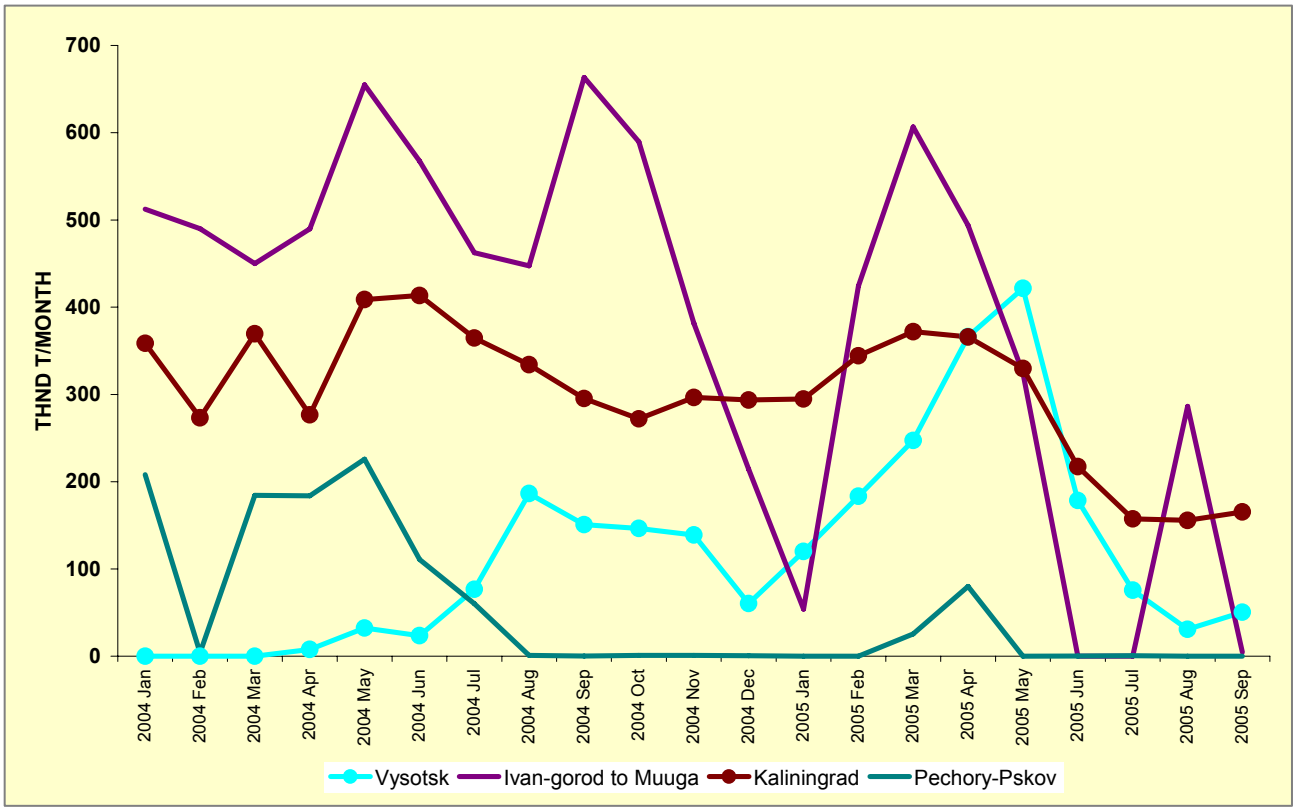
ARKHANGELSK



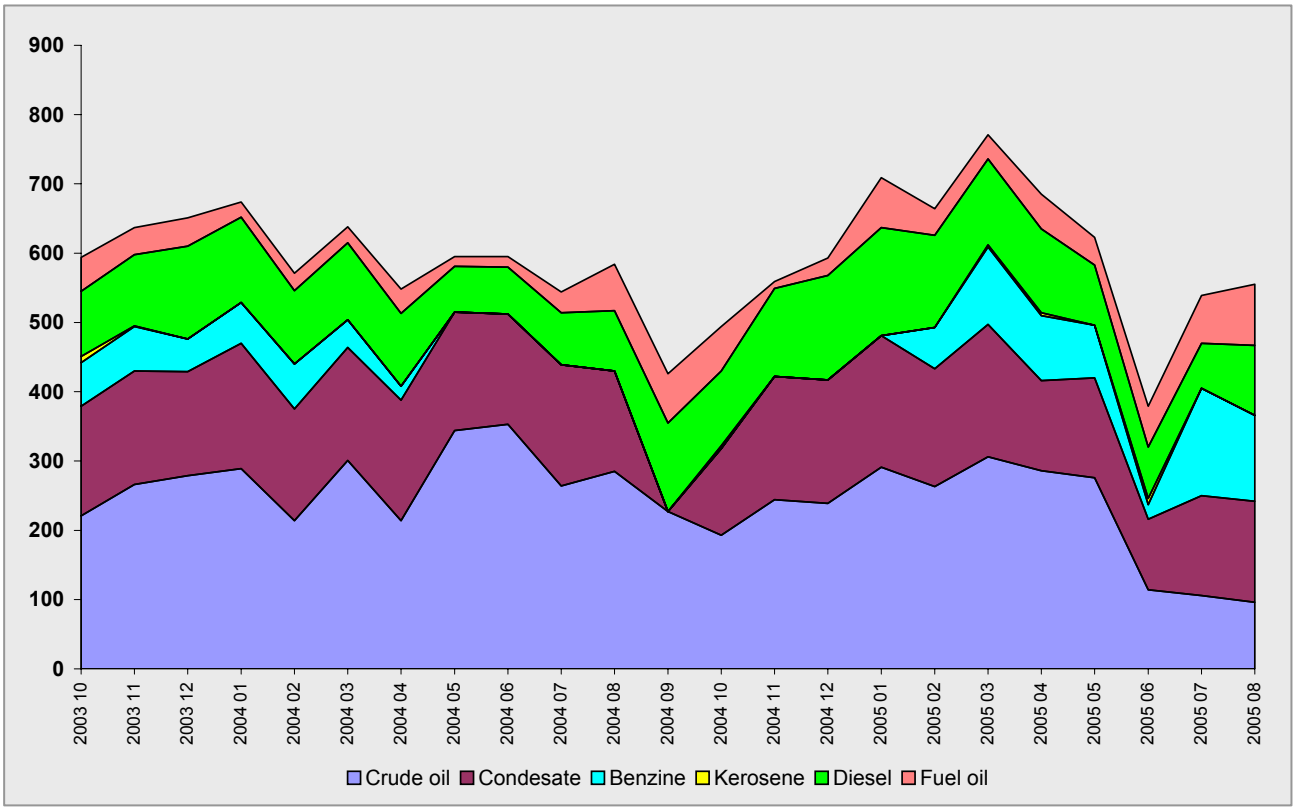
VITINO



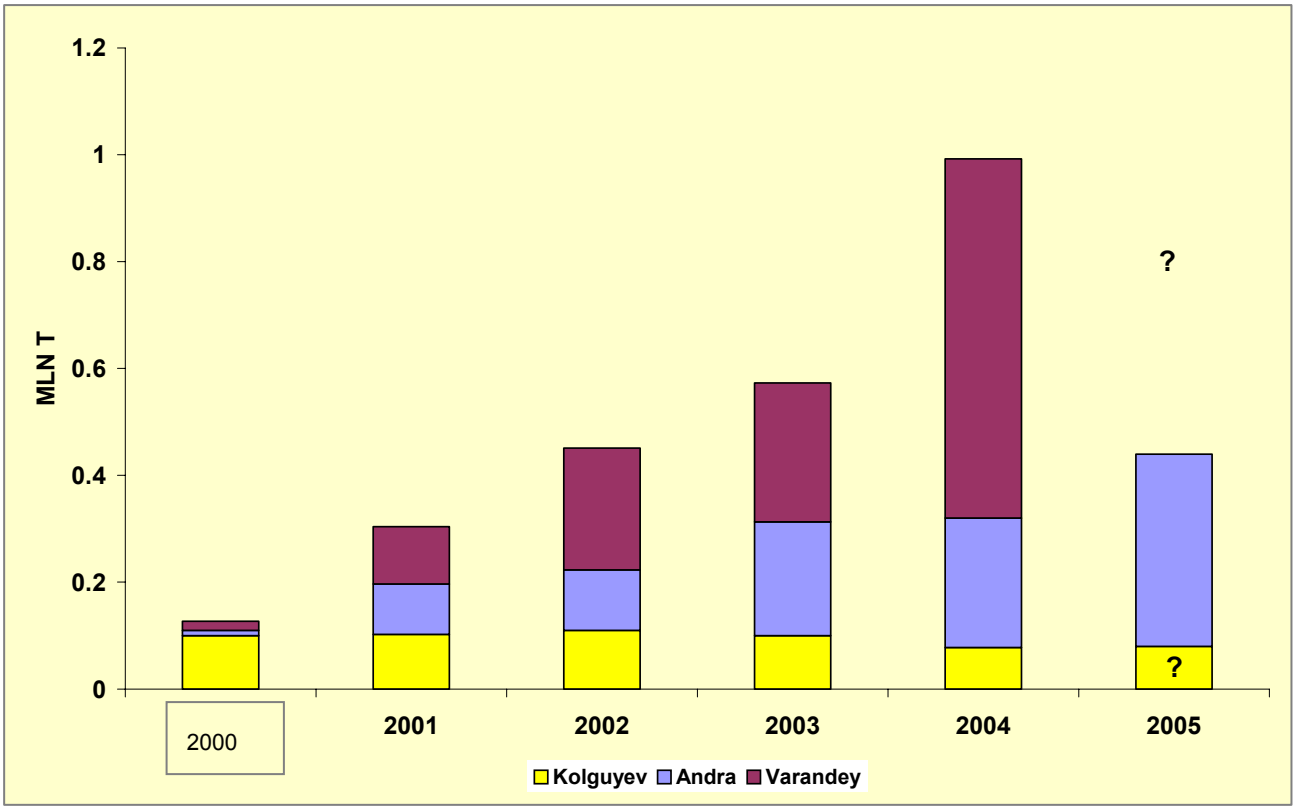
CRUDE OIL: BY RAILROAD TO THE BALTIC SEA



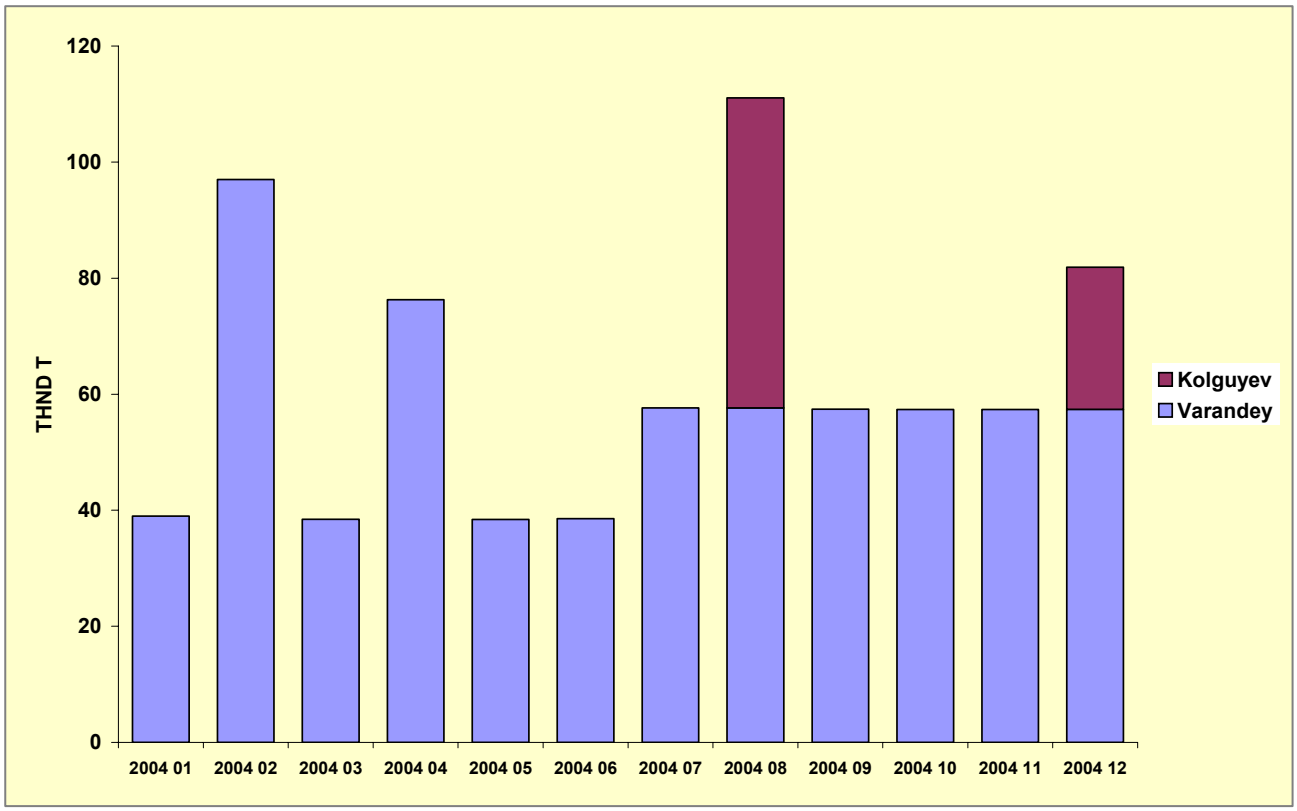
KALININGRAD



NS ROUTE TRANSPORTATION 2000-2005



TANKERS: VARANDEY AND KOLGUYEV



ROUTES

TRANSPORT FLOWS MODELLING: KEY PROBLEMS AND SOLUTION

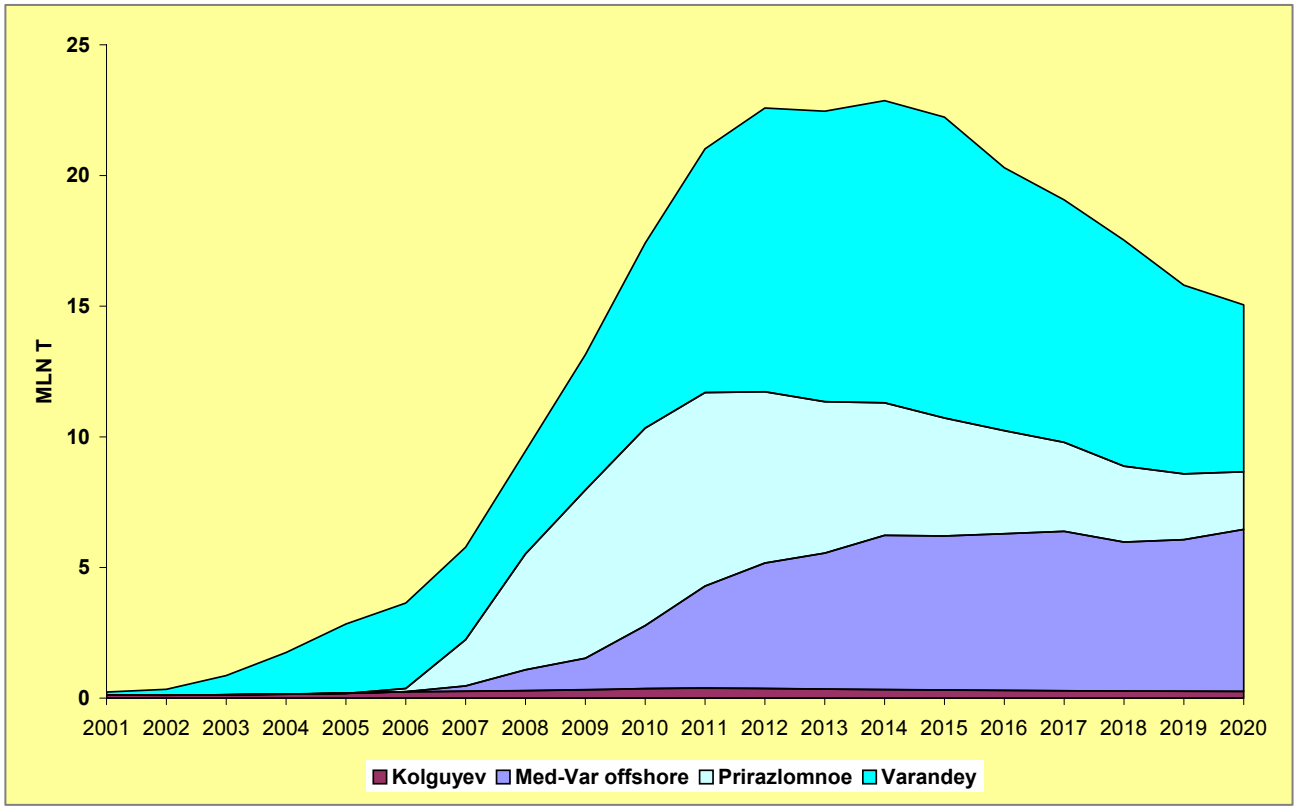
- Uncertainties
  1. Developed fields production
  2. Planned production projects – changes of the on-stream date and transport scheme
  3. New areas licensing
  4. Terminal capacities
  5. Railroad tariffs
  6. Icebreaker fleet
  7. Markets
- Solution – permanent parameters monitoring

CRUDE OIL STREAMS

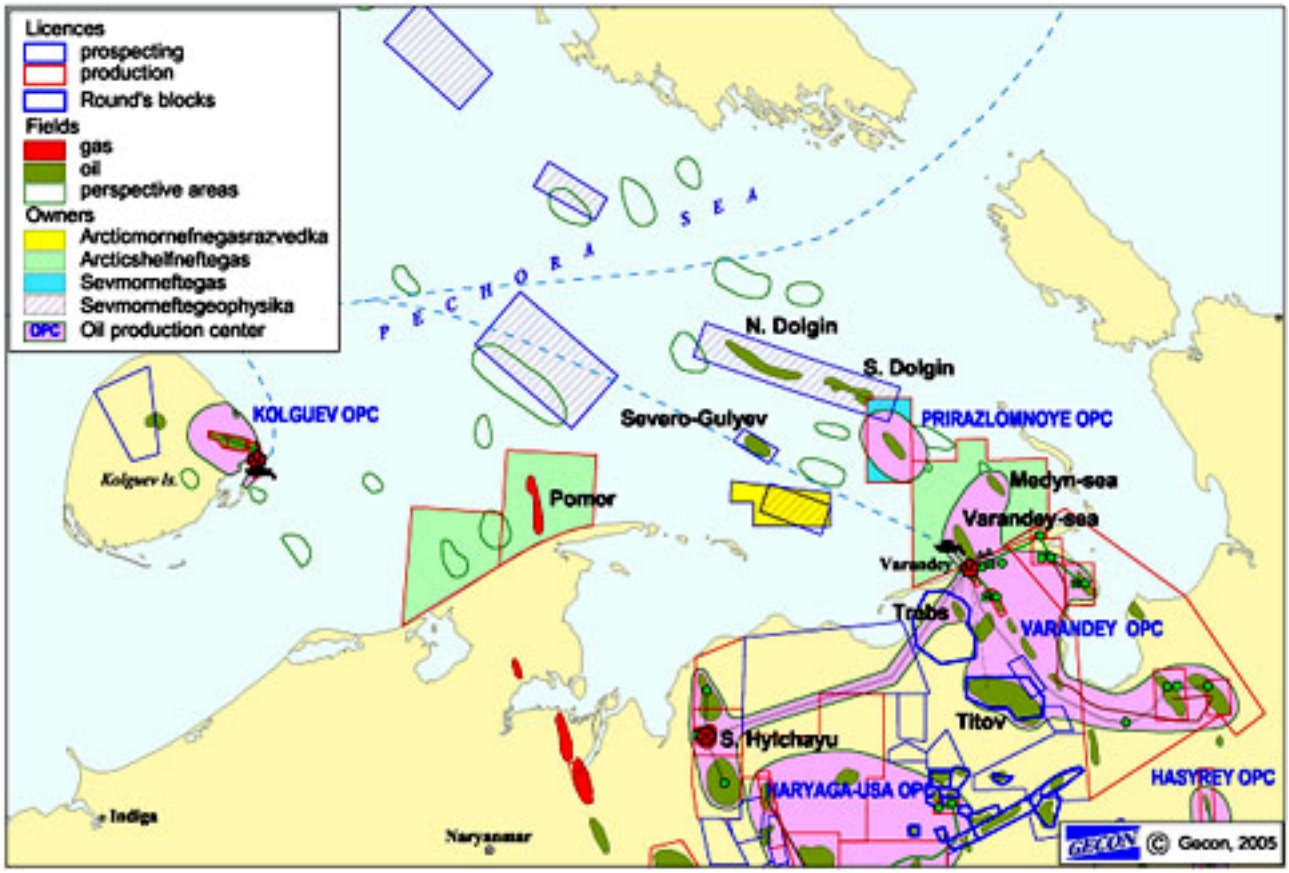
1. Transported directly from the fields
2. Transported with mixing from the regions with the known regional crude oil type parameters
3. Transported with mixing from the regions with the high variety of the crude oil types

STREAM	TERMINALS	SEAS				
		Kara	Pechora	Barents	White	Baltic
1	West&East Siberia (Numgi +?)	x	x	x		
	Varandey OPC		x	x		
	Kolguyev OPC		x	x		
	Prirazlomnoe OPC		x	x		
	Var-Medyn offshore		x	x		
	Kaliningrad					x
2	Archangelsk			x	x	
3				x	x	
	Vitino			x	x	
	Murmansk			x	x	
	Primorsk					x
	Baltic sea terminals					x

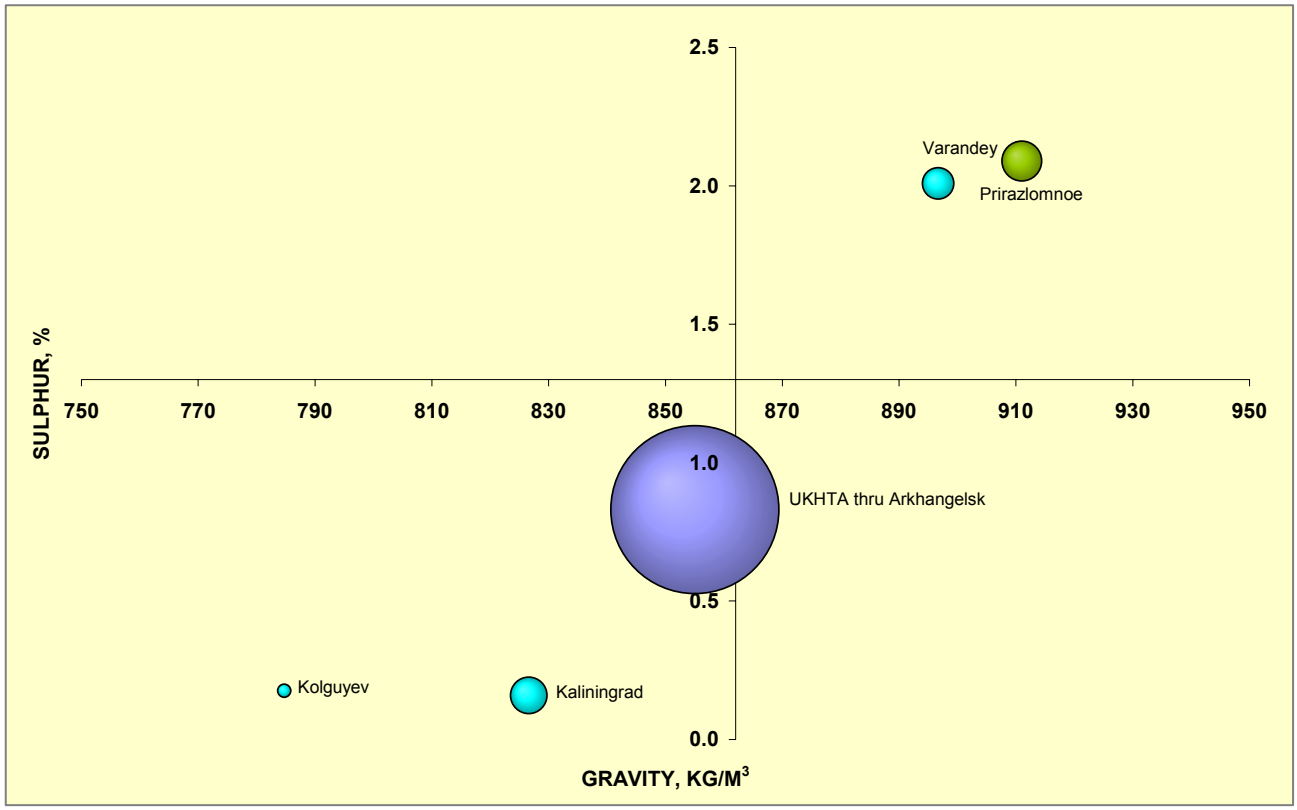
PECHORA: PRODUCTION FORECAST



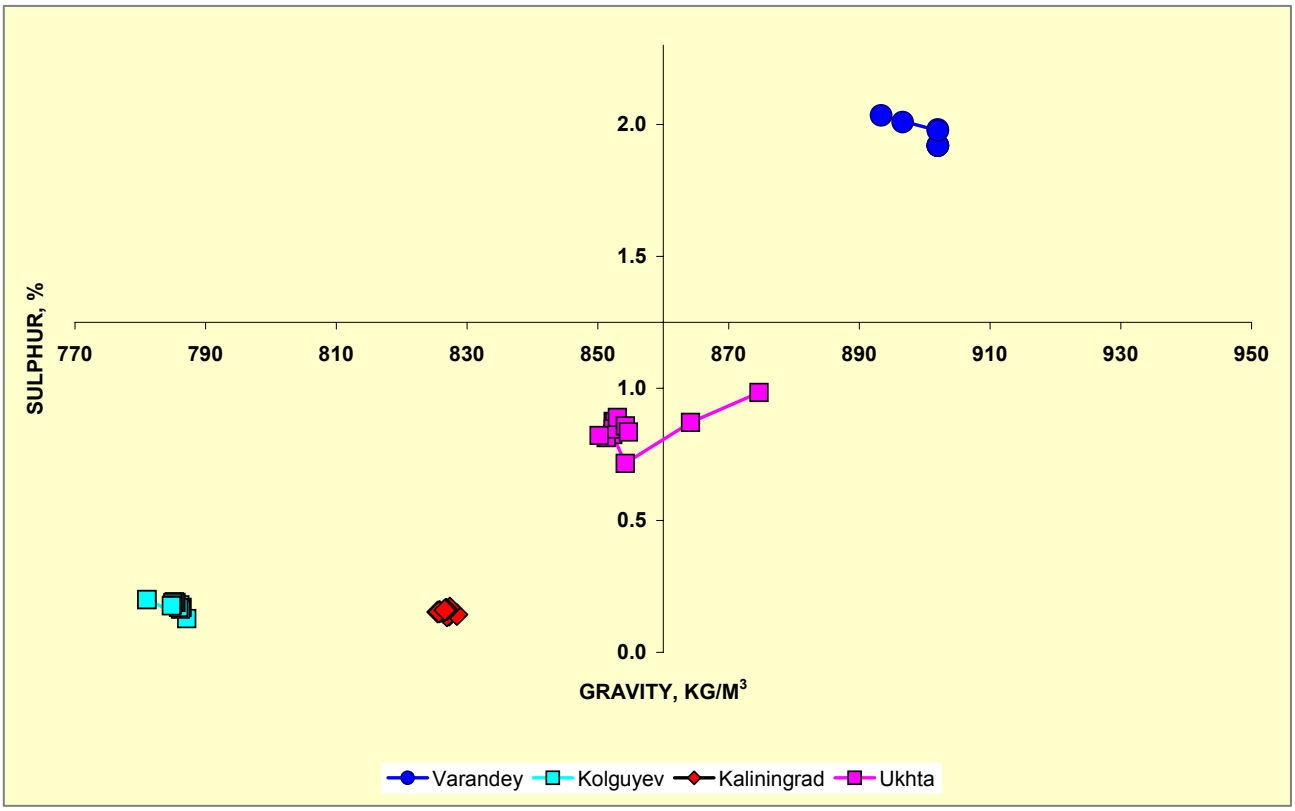
PECHORA OPC



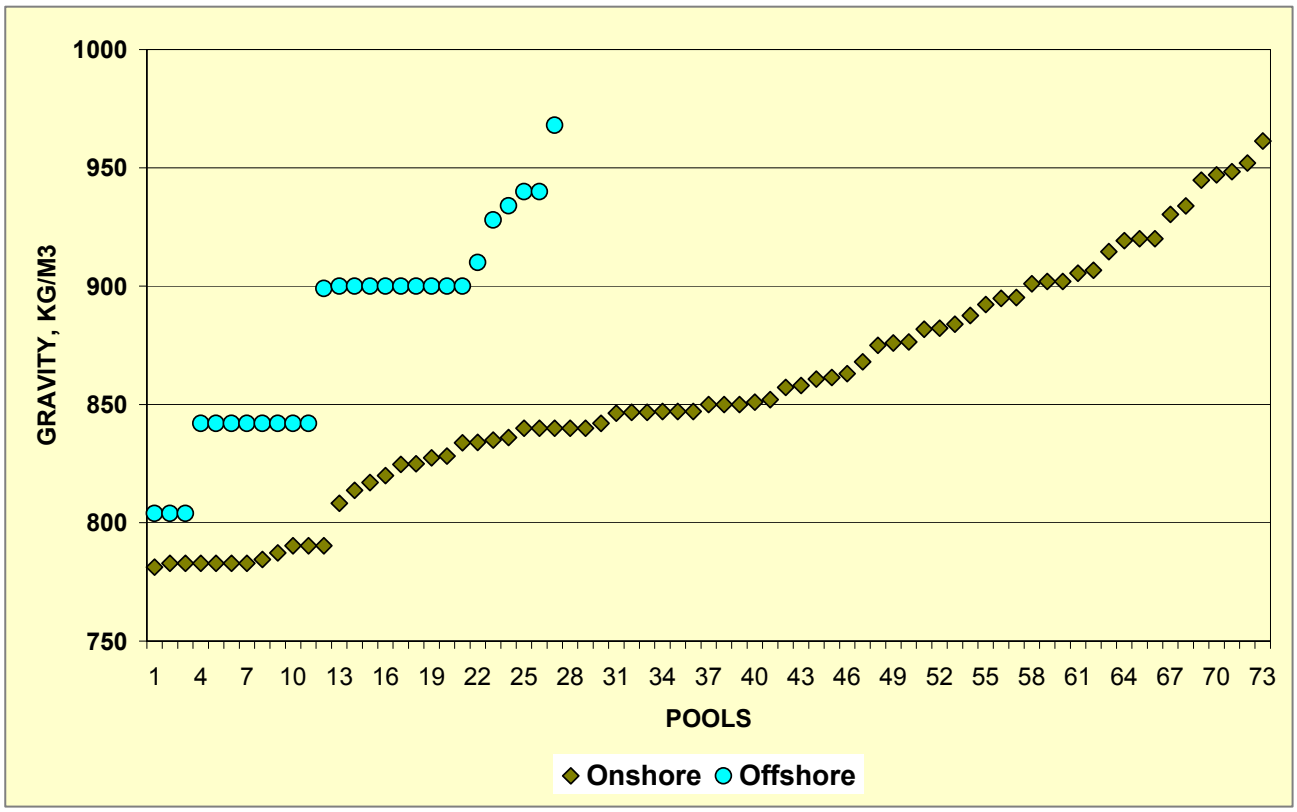
OPC CRUDE OIL TYPES



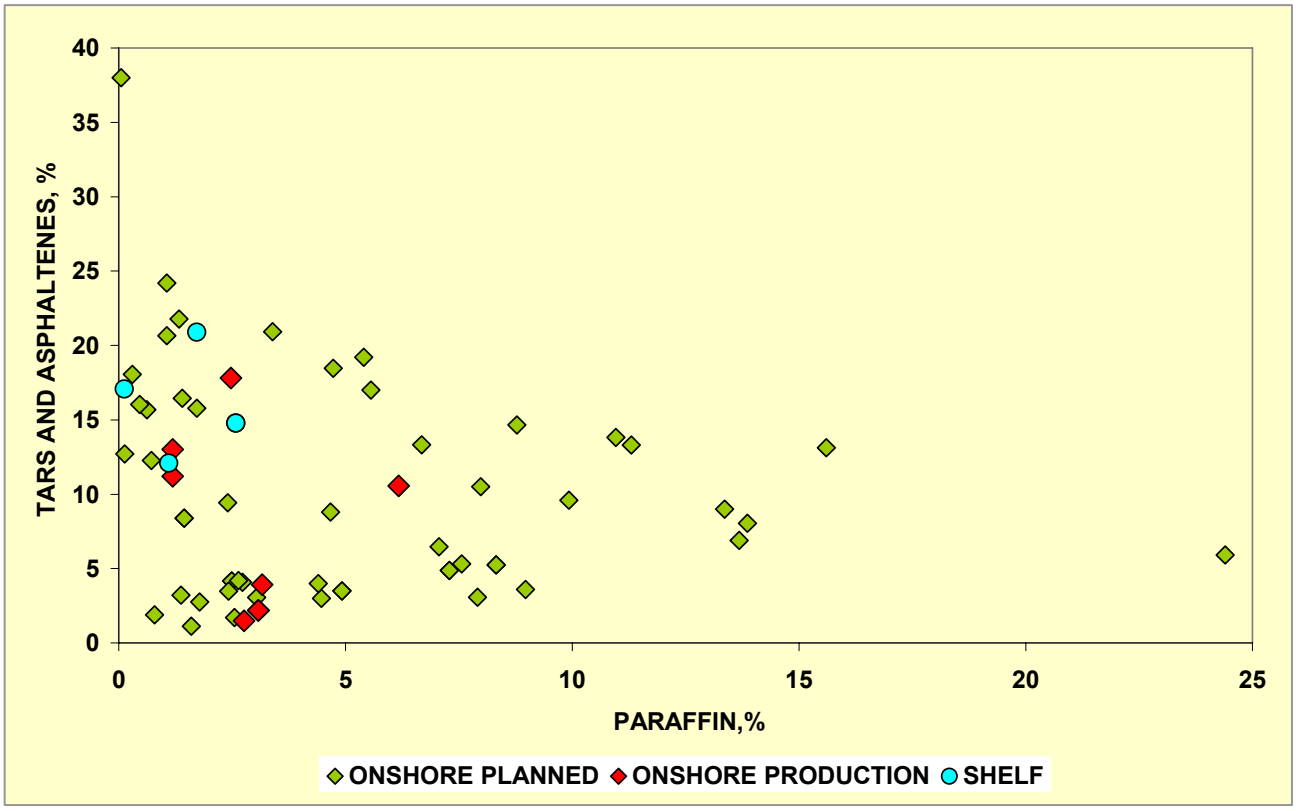
CRUDE OIL TYPES DEVELOPMENT (1993-2004)



PECHORA: GRAVITY



PECHORA: TARS & ASPHALTENES VS PARAFFIN



PROJECT DATA

- Available Oil characteristics:
  - Tars
  - Asphaltenes
  - Paraffins
  - Sulfur
  - Viscosity
  - Density
  - Freezing point

Interaction of parameters and new discoveries parameters prediction

- Available Data quality:
  - Accuracy
  - Completeness

Some data to be collected and revised

- OPC: oil characteristics monitoring
- Crude oil samples for the detailed study – oil companies courtesy

Discussion

The theme of the presentation, forecasting the characteristics of the future oil streams, was noted to be very important in the future. It was also described as a very complex one. The impact of the East Siberia – Pacific Ocean pipeline on the development of the oil streams in the whole of Russian North was noted to be considerable.

The situation of the port of Vitino was noted to have changed since the Russian Railways changed the tariff policy. The shipments of crude oil stopped. Gas producing company Novatek has launched a project to transport condensate via Vitino. Novatek estimates it feasible to transport 60000 tons annually.

Rosneft is planning to increase transportation of condensate up to 4 + 3 mln tons from Pur. From economical point of view, this project seems advantageous. In the north, the most advanced project is Yamal gas condensate transport project. Due to changes in regional government, the momentum of the project has now changed for worse.

The transhipment of oil was discussed. Currently there are two ports, which can be regarded as transhipment ports: Archangelsk and Murmansk. Mr Grigoriev was asked to give a projection for the future regarding transhipment. He forecasts that in the future, the transhipment activities in Murmansk port will grow so that Murmansk will become the most active transhipment port in the area (??).

The eastern oil and gas streams from Yamal peninsula were questioned. Mr Grigoriev explained that the transportation from Yamal to Numgi terminal is a seasonal activity. Shallow barges are used for the transport.

Mr Grigoriev mentioned the Dolgin oil fields as one of the most promising new fields. The Dolgin field is being explored by Gazprom. Gazprom is waiting to receive a licence for the field, and after that the planning phase will start. The forecast does not mention Dolgin, for the schedule of the development has not been decided upon. The transport forecasts do not mention Yamal LNG either. Mr Grigoriev noted that it is still too early to consider Yamal in the forecasts.

Oil company representatives brought up the question of oil quality data bank. It was noted, that in the future the oil price should depend on the quality of the product. Murmansk transhipment hub does not seem to have any plans to keep the different oil streams separate even though for

instance the Prirazlomnoye and Varandey oils are heavier and contain more sulphur, and thus have lower quality. In oil spill contingency planning the information on the oil qualities might prove to be very useful.

Conclusions

Up-to-date information on the properties of the transported oils is needed since the properties of the various oil grades in the region differ from each other. This is of vital importance for combating oil spills.

The current network of oil streams might, however, be changed completely by the large investment decisions like the Eastern Siberia –Pacific Ocean. A project of this magnitude will have a considerable impact on the whole industry.

9. OIL INDUSTRY AND OIL TRANSPORTATION SYSTEMS IN THE NENETS AUTONOMOUS OKRUG AND PERSPECTIVES FOR DEVELOPMENT

Vladimir M. Shibeko, Directorate for Natural Resources Complex Use, NAO Administration

Abstract

The Nenets Autonomous Okrug (district) is located in the most northeastern part of European Russia. It has an area of 176,700 square kilometres, with distances of about 300 km from north to south and al-most 1,000 km from east to west. At present the population is over 40,000 people (41,800 on January 1st, 2004), about half of whom live in Naryan-Mar and half in the countryside. The density of population is 0.24 persons per square kilometre. The number of economically active population is 23,000, while 784 persons have been registered as unemployed.

The Okrug is without an advanced transportation system. The road Naryan-Mar - Kharyaga - Usinsk (with distance of about 200 km to Kharyaga) is under construction, about 120 km having been completed so far. The main routes of transportation for economic freight to Naryan-Mar are by sea (with distance of 1,097 km to Archangelsk) and by the Pechora River (with distance of 780 km from Pechora railway station). Freight can be delivered by sea or river to most settlements in the Okrug to secure their vital needs.

During wintertime goods are transported along snow and ice roads, which allows deliveries to practically everywhere in the Okrug. Problems can arise only with heavy structures with large dimensions that cannot be dissembled for transportation. The main bulk of cargo is delivered via Usinsk railway station, and lesser quantities from Naryan-Mar. In summertime most essential goods are delivered to their destinations by air transport. For the transport of personnel, air transport is used all the year round.

The Okrug's own labour force is not sufficient for implementing large oil production and transportation projects in the region. Neither are there companies capable of transporting freight to the extent required for large-scale building. The existing transportation system of the Okrug allows delivery of freight in summertime by sea along the whole length of the coastline and up to Naryan-Mar, but problems can arise in the autumn due to stormy weather and in wintertime when the ice conditions deteriorate, especially in the eastern part of the Barents Sea. Emergence of large building projects near the coast in connection with production and transportation of oil will strongly increase the volumes of sea transport.

The recoverable oil reserves of the Okrug (explored and proven according to international classification) amount to more than 800 million tons, of which more than 300 million tons or approximately 37 % are located in non-licensed areas. Forecast resources amount to more than 1,100 million tons of oil and 500 billion cubic metres of gas. Exploration of oil deposits is ongoing. At present, the Territorial Agency on Mineral Resources of the Nenets Okrug presents for exploration 12 blocks, each of them with estimated resources of 1.5 to 20 million tons. In October 2005, an auction was held for awarding licences for oil production at 2 fields: North-Kharyaga (with reserves amounting to 6.4 million tons) and Lek-Kharyaga (2.16 million tons). The prices at the auction came up to 1.7 billion roubles (about $ 60 million) and 168 million roubles ($ 6 million) respectively. It is probable that in 2006 four blocks with discovered deposits from 12 to 22 million tons each will be presented for bidding. Possibly also Anatoly Titov and Roman Trebs fields are to be auctioned (with recoverable reserves of more than 50 million tons and 38 million tons respectively).

Companies with licenses for fields have presumably made plans on their development to a certain level of production. According to the records for 2004, the main oil production companies in the Okrug are those of the LUKoil Group (more than 3.7 million tons), the Polar Lights Company (a joint company of ConocoPhillips with Rosneft, more than 1.3 million tons), Total RRR (800,000 tons), Severnaya Neft (Rosneft, 2.2 million tons), and SeverTEK (LUKoil and Finnish Fortum, 1.3 million tons). The following companies have plans to substantially increase their oil production over

the next few years: Severnaya Neft, an increase of 2 million tons by 2006, SeverTEK 500,000 tons by 2008, LUKoil - Zapolyarneft 600,000 tons by 2008.

Oil production of the biggest companies

Company	2003	2004	Plan for 2005	Prognosis for 2006	Prognosis for 2007	Prognosis for 2008
Naryanmarneftegaz	0.42	0.8	0.6	0.55	0.9	5.8
LUKoil Sever	0.1	0.18	0.22	0.39	0.65	0.86
LUKoil Komi	2.6	2.7	2.75	2.89	2.62	2.6
LUKoil-Zapolyarneft (Bowell)	0.36	0.62	0.85	0.98	1.01	1.21
SeverTEK	0.5	1.3	1.5	1.38	1.5	1.9
Total RRR	0.7	0.8	0.8	0.96	0.97	1.16
Severnaya Neft	1.12	2.22	3.4	4.1	3.95	3.63
Polar Lights	1.33	1.33	1.31	1.34	1.18	1.32
Pechoraneft	0.15	0.31	0.34	0.42	0.4	0.37
Total in the Okrug	7.43	10.47	11.6	13.4	13.5	19.1

Central oil collecting point of SeverTEK at the Yuzhno-Shapkino field in Nenets AO

These companies (except for Naryanmarneftegaz) transport the produced oil to Kharyaga-Usinsk and further through the Usinsk-Ukhta-Yaroslavl trunk pipeline. By the end of 2006, state-owned Transneft plans to improve the throughput of the pipeline to 23,3 million tons a year, which would ensure sufficient pumping capacity also allowing for an increase in production by these companies.

The plans of Naryanmarneftegaz (LUKoil 70 %, ConocoPhillips 30 %) to increase their production by more than 5 million tons by the year 2008 are most interesting. The growth would be guaranteed mainly by developing the Yuzhno-Khylchuyusk field (with reserves of more than 60 million tons).

Naryanmarneftegaz has prepared a project on building an oil pipeline from Yuzhno-Khylchuyusk field to Varandey (161 km in length, D530 mm, with annual capacity of more than 8 million tons). This project has already got a positive conclusion at an ecological examination.

Transportation of oil to the Varandey terminal

Work on expanding the Varandey terminal oil reservoir complex has started. Construction of this oil pipeline, expansion of the terminal and construction of a sea-loading jetty are the largest projects connected with the development of the Okrug's oil transportation system at present. Estimated cost of the project on developing the Yuzhno-Khylchuyusk field and construction of an oil pipeline amounts to about $ 2 billion, and the expansion of the Varandey terminal to about $ 900 million. More than 150,000 tons of goods will have to be delivered to the site through temporary mooring points in Varandey and Dresvyanka area.

The system of shipment now used in Varandey consists of a turret type facility located at a distance of 3,8 km from shore at a depth of about 11 meters, allowing to load tankers up to 20,000 tons of dead-weight. A hose is connected to a tanker through an external loading device. The system has a through-put capacity of 1,5 million tons. According to plans, the amount of shipments in 2005 will be approximately 600,000 tons of oil.

A project that will allow an increase of the annual throughput via Varandey terminal to 12-12.5 million tons is at stage of implementation. In addition to an expansion of the oil reservoir complex to 320,000 cubic metres and installation of additional equipment, it will also be necessary to construct an underwater oil pipeline of 22 km in length (at a depth of approximately 17 meters) and a sea loading jetty for 70,000 dwt tankers (presumably it will be a piled ice-resistant jetty with an outstretched turning loading arm). According to the plans, the loading jetty will be commissioned at the end of 2007.

With the production at peak, the fields of the Yuzhno- Khylchuyusk group will yield up to 8 million tons of oil and those of the Varandey group furthermore approximately 1.5 million tons.

The Titov and Trebs fields with total recoverable reserves of about 90 million tons are located adjacent to Varandey. These fields are situated in a non-licensed area; consequently nobody has yet got the licenses for development of these fields. Auctions on awarding licences will possibly be held in 2006. It is obvious that these fields will interest Naryanmarneftegaz, but also other strong players can appear. However, no matter who will acquire the rights for developing these fields, the terminal at Varandey will be the most likely point for oil transportation. Later on delivery of oil from Naulskoye and Labaganskoye fields can be expected (with resources of more than 60 million tons); also for them the Varandey direction is preferable.

According to forecasts, by 2008 the volume of production on the territory of the Nenets Autonomous Okrug will amount to approximately 19 million tons. It is presumed that the oil flow will be distributed between the northern (Varandey) and southern (Kharyaga-Usinsk) directions in volumes of 5.8 million tons and 13.2 million tons respectively. Development of the Titov and Trebs fields will start earliest in 2009, and at the initial stage the capacity of the Varandey terminal would

probably be sufficient for the oil flowing from these fields. In case of simultaneous development of the largest fields in the area (Titov, Trebs, Naulskoye and Labaganskoye with total reserves of more than 150 million tons), the capacity of the Varandey terminal would become insufficient for transportation of all extracted oil. According to available information, LUKoil is deliberating long-term plans on increasing the capacity of the Varandey terminal to 25 million tons a year

When considering various transportation schemes, the reserves of Yuzhno-Khylchuyusk (more than 60 million tons) and nearby Khylchuyusk + Yareyusk fields (more than 25 million tons) have always been taken into account when calculating economic efficiency of various projects.

During the last years, various schemes for transporting oil from the Nenets Okrug have been presented, amongst them the projects on the construction of the Western Siberia -Murmansk, Surgut-Kharyaga-Indiga and Kharyaga-Indiga oil pipelines, also the Nenets pipeline consortium project, the Northern Territories project and others.

It is presumed that an increase in the capacity of the main Usinsk - Ukhta oil pipeline of Transneft to 23,3 million tons a year in 2006 would ensure transportation of oil from those companies whose pipe-lines have an outlet to Kharyaga-Usinsk, allowing for an increase in annual oil production by those companies to 15 million tons. After reaching at the Varandey terminal its designed annual throughput of 12 million tons, the capacity of the Okrug's transport system can amount to 27 million tons a year. Further increase in production to 30 or even 35 million tons a year might not be enough to justify a decision to build an oil pipeline to Indiga. At the same time, reaching the designed annual throughput of 12 mil-lion tons at Varandey terminal together with its successful operation will essentially increase the probability of its further expansion.

A decision to build the Yuzhno-Khylchuysk - Varandey oil pipeline and to expand the Varandey terminal can prove to be a decisive factor when defining the schemes for transporting oil from the Okrug, giving priority to the northern direction through Varandey with further shipping by tankers to the consumers.

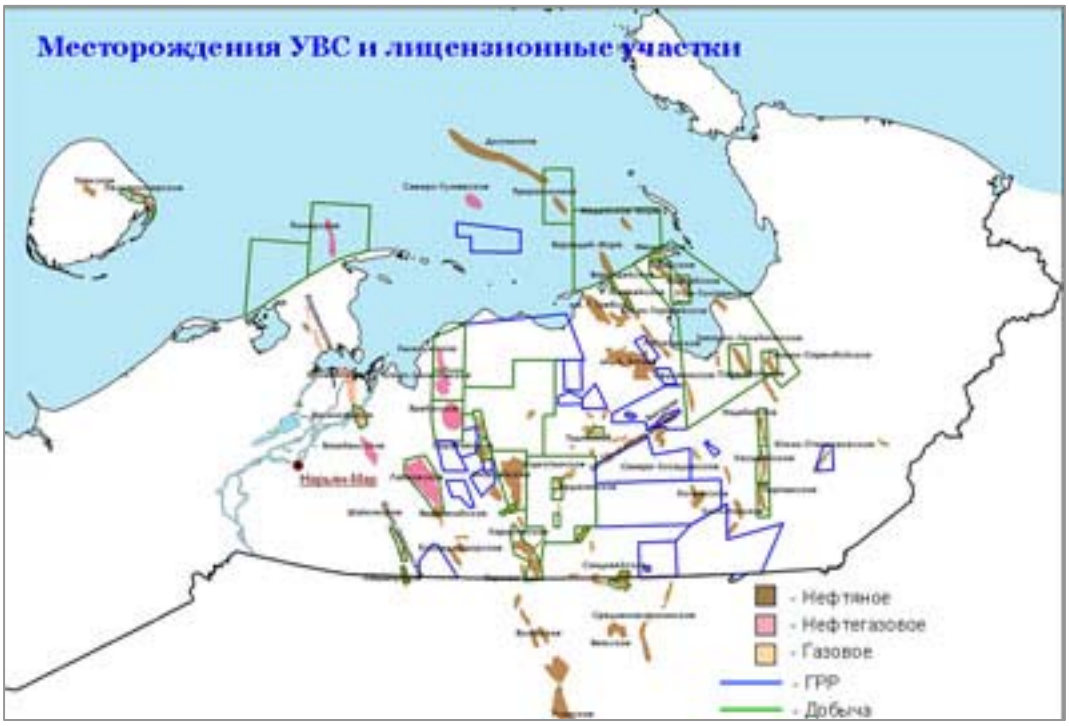
One way or another, the development of oil production industry influences practically all spheres of life in the Okrug, although the impact is not entirely unambiguous.

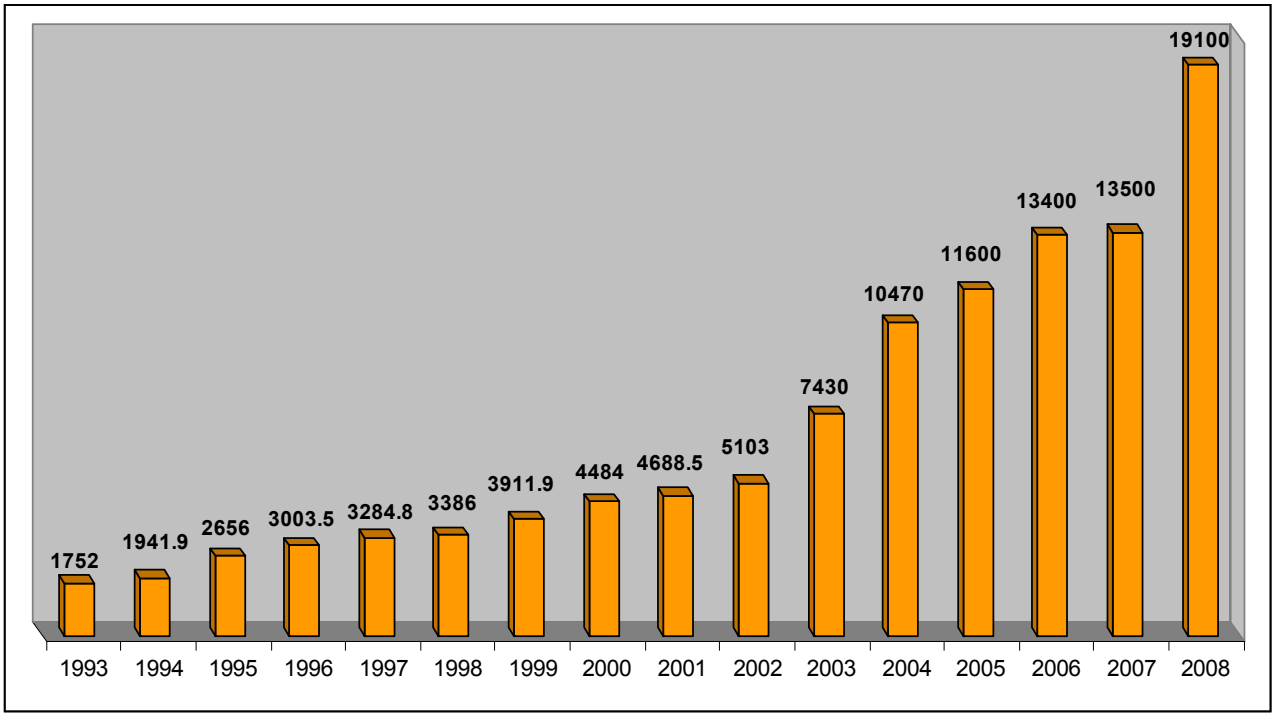
Tax revenues from the companies involved in oil production account for nearly 70 % of the Okrug's budget. On the other hand, practically all emissions of pollutants come from installations of the oil companies. Every quarter the Total RRR Company alone burns at the flares 20,000,000 cubic metres of oil production side gas that contains hydrogen sulphide; the quarterly emissions amount to more than 1,000 tons of polluting substances.

Many companies, e.g. the Polar Lights Company and Naryanmarneftegaz spend significant amounts of money on various social programmes that are directed on development of the Okrug as a whole as well as assistance granted to separate groups of the population, first and foremost to those of the indigenous population occupied with traditional forms of livelihood: reindeer husbandry, hunting and fishing. In the year 2004 alone, Polar Lights transferred almost 200 million roubles (approximately $ 7 million) to the Socio-Economic Development Foundation of the Okrug. At the same time, oil companies in their activities frequently break the requirements of the environmental legislation, causing complaints from the inhabitants. The most typical offences are pollution of soil by oil products, discharge of untreated wastewater, destruction of the vegetative cover of tundra by heavy machinery, negligence in technical and biological restoration of soil, and other offences.

The intense development of oil industry and pipeline transport in Nenets Autonomous Okrug imposes on oil companies, regional and federal authorities as well as non-governmental and scientific organizations many tasks of technical, economic, social and ecological nature. They can only be solved by joint and coordinated efforts. For solving these problems it would be advantageous for the Okrug to cooper-ate also with foreign commercial, scientific and non-governmental organizations.

Presentation





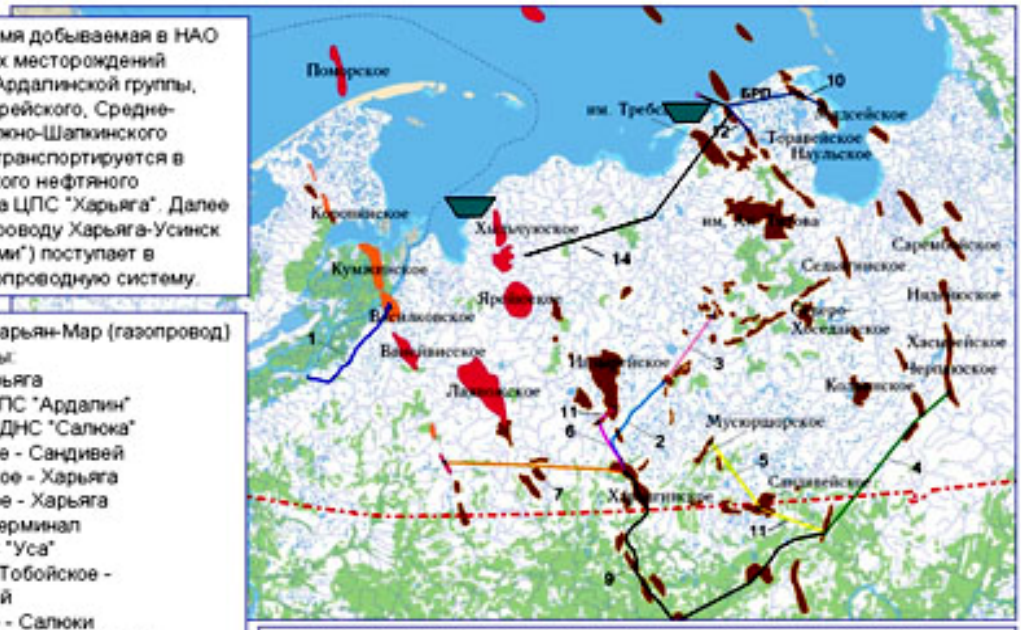
Предприятие	2003	2004	2005 план	2006 прогн.	2007 прогн.	2008 прогн.
ООО «НАРЬЯНМАР-НЕФТЕГАЗ»	0,42	0,8	0,6	0,55	0,9	5,8
ОАО «ЛУКОЙЛ-СЕВЕР»	0,1	0,18	0,22	0,39	0,65	0,86
ООО «ЛУКОЙЛ-КОМИ»	2,6	2,7	2,75	2,89	2,62	2,6
ООО «ЛУКОЙЛ-Заполярнефть» (ООО «Бовэл»)	0,36	0,62	0,85	0,98	1,01	1,21
ЗАО «Север ТЭК»	0,5	1,3	1,5	1,38	1,5	1,9
ОАО «Тоталь РРР»	0,7	0,8	0,8	0,96	0,97	1,16
ЗАО «Северная нефть»	1,12	2,22	3,4	4,1	3,95	3,63
ООО «Компания полярное сияние»	1,33	1,33	1,31	1,34	1,18	1,32
ОАО «Печоранефть»	0,15	0,31	0,34	0,42	0,4	0,37
Всего по округу	**7,43**	**10,47**	**11,6**	**13,4**	**13,5**	**19,1**

ДОБЫЧА НЕФТИ КРУПНЕЙШИМИ КОМПАНИЯМИ

ТРАНСПОРТИРОВКА УВС

Карта действующих и строящихся трубопроводов

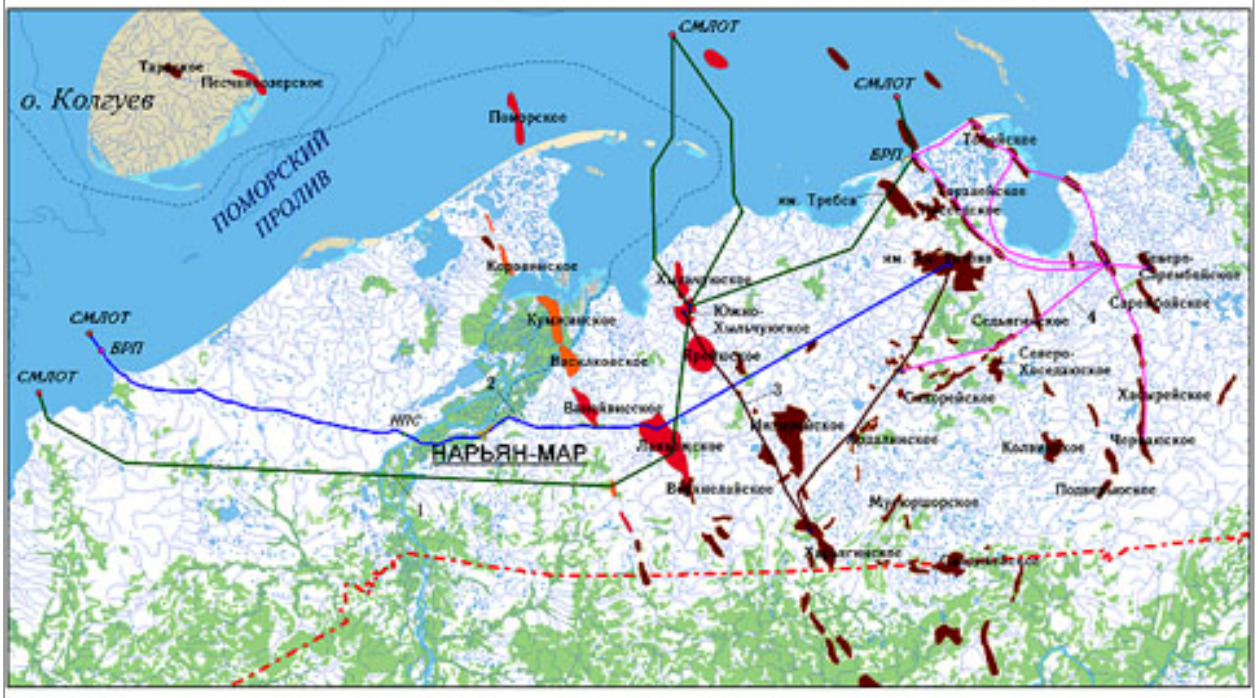
В настоящее время добываемая в НАО нефть с нефтяных месторождений (месторождений Ардалинской группы, Тэдинского, Инзырейского, Средне-Харьягинского, Южно-Шапкинского месторождений) транспортируется в район Харьягинского нефтяного месторождения на ЦПС "Харьяга". Далее нефть по нефтепроводу Харьяга-Усинск (ООО "Лукойл-Коми") поступает в Балтийскую трубопроводную систему.



1. Василково - Нарьян-Мар (газопровод)
   Нефтепроводы:
2. Ардалин - Харьяга
3. Тэдинское - ЦПС "Ардалин"
4. Черпаюское - ДНС "Салюка"
5. Мусюршорское - Сандивей
6. С.-Харьягинское - Харьяга
7. Ю.-Шапкинское - Харьяга
8. Колгуевский терминал
9. Харьяга - ГНС "Уса"
10. Мядсейское - Тобойское - БРП Варандей
11. Сандивейское - Салюки
12. Торавейское - БРП Варандей
13. Инзырейское - Ср. Харьяга
14. Ю.Хыльчуюское - БРП Варандей

В северном направлении нефть транспортируется морским путем с острова Колгуев (Песчаноозерское НГКМ) и из района пос. Варандей (Варандейское, Торавейское, Мядсейское, Тобойское месторождения).

Предлагаемые варианты транспортировки нефти



1. Проект «Северные территории»
2. Проект Ненецкого трубопроводного консорциума
3. Декларация ОАО «Северные магистральные трубопроводы»
4. Декларация ЗАО «Лукойл-Север»

СМЛОТ – стационарный морской отгрузочный ледостойкий терминал
БРП – береговой резервуарный парк

Discussion

Mr Shibeko told about the complaints of the local people regarding the activities of the oil companies. He explained that even though the areas suffering damage are not large, the problem is that they are outside the areas that have been licensed for the oil industries' use. Companies tend to violate construction documentation and use larger areas. The trails of heavy vehicles melt and swamp, and the damage to the flora in the permafrost conditions is considerable.

Military activities also violate their licences, and the contractors of the oil companies, not necessarily oil companies themselves.

Mr Shibeko was questioned about the controlling of the work of the oil and gas companies. He said that according to the Russian legislation, the authorization of control and regulation is with the federal authorities. These are the bodies of ecological monitoring and control. Rosprinadzor is the central authority, also the committee of land use might come to question if the state of the land is concerned. NAO's role is to make observations and report to the relevant regulators.

Representative of oil industry commented that international oil companies have non-negotiatiable responsibilities towards the environment. Any development will cause some harm to the nature. For instance the road Kharyaga- Naryan-mar has changed the flow of water in the area of the wetlands, so that the trees around it have died. It would be important to coordinate the impacts, so that all activities do not cause their own impacts. The infrastructure is another problem. In Kharyaga the plan was to inject the gas that was produced as a by-product, but due to conditions beyond the powers of the company in question, the gas cannot be injected even though facilities are in place.

There is a pipeline from Kharyaga to Usinsk and to Komi; all the other fields are flaring the gas today. If all the projects were coordinated, all gas could be put in the pipeline, and no flaring would be needed. There is simply not sufficient infrastructure in the Nenets AO.

The effects of global warming were discussed. The Arctic Climate Impact Assessment of the Arctic Council did not touch upon regional effects. Mr Juurmaa said that within the Arctic Marine Shipping Assessment the ACIA scenarios will be used to describe the global change, but the reseachers will use the given model data and develop the models further to find out about the local impacts.

Currently this task is in the planning phase and the method for predicting the local ice conditions has not been decided upon. The model results are not robust enough to serve as basis for infrastructure design, but they can be used for planning on a more general level.

Conclusions

The presentation proves that NAO really is a growing oil province. There seems to be a number of issues to be solved: the regional / federal interests, the oil companies / administrations interests, and the interests of the local people and the industries.

Also the underdeveloped infrastructure is a challenge to be met. Modern, environmentally more sound technologies cannot be utilized in the harsh conditions.

10. OTHER ONGOING WORK AND PLANS FOR THE FUTURE - ARCTIC MARINE SHIPPING ASSESSMENT (AMSA)

Lawson Brigham, US Arctic Research Commission

Abstract

The Arctic sea ice cover is undergoing an unprecedented transformation – sea ice thinning, a reduction in extent, and a reduction in the area of multi-year ice in the central Arctic Ocean. These changes are documented in the Arctic Climate Impact Assessment, which also provides sea ice projections for the 21st century. These simulations show increasing ice-free areas in the Arctic coastal seas and suggest plausible increases in marine access throughout the Arctic Ocean.

Increased economic activity together with the current retreat of Arctic sea ice presents several plausible futures for the Arctic's regional seas, the Northern Sea Route, the Northwest Passage, and the central Arctic Ocean. Continued sea ice reductions will likely lengthen the navigation season in all regions and increase marine access to the Arctic's natural resources.

These changes represent both a challenge and an opportunity for governments and local Arctic communities. Of key significance are the effects of expanded marine activities on the cultures and well being of Arctic populations, especially indigenous residents whose traditional way of life has been partially protected in the past by the very nature of the remote and extreme Arctic environment in which they live.

This assessment is a direct follow-up to the Arctic Marine Strategic Plan, which was adopted by the Arctic Council Ministers at the 4th Arctic Council meeting in November 2004. PAME was requested to:

"conduct a comprehensive Arctic marine shipping assessment as outlined in the Arctic Marine Strategic Plan under the guidance of Canada, Finland, and the United States as lead countries and in collaboration with the EPPR (Emergency, Prevention, Preparedness and Response) working group and other working groups of the Arctic Council and Permanent Participants as relevant."

Key Finding # 6 of the Arctic Climate Impact Assessment (ACIA), also released in November 2004, is furthermore directly relevant to why the Arctic Council has called for this assessment:

"Reduced sea ice is very likely to increase marine transport and access to resources"

This assessment is circumpolar in focus and promotes cooperation and collaboration with a wide range of stakeholders and relevant organizations and recognizes the importance of contributions from the broader maritime community.

This assessment will span a three-year period (2005-2008) with the Final Report to be presented to the 6th Arctic Council Ministerial in Autumn 2008.

Presentation

ARCTIC COUNCIL
ARCTIC MARINE SHIPPING ASSESSMENT (AMSA)

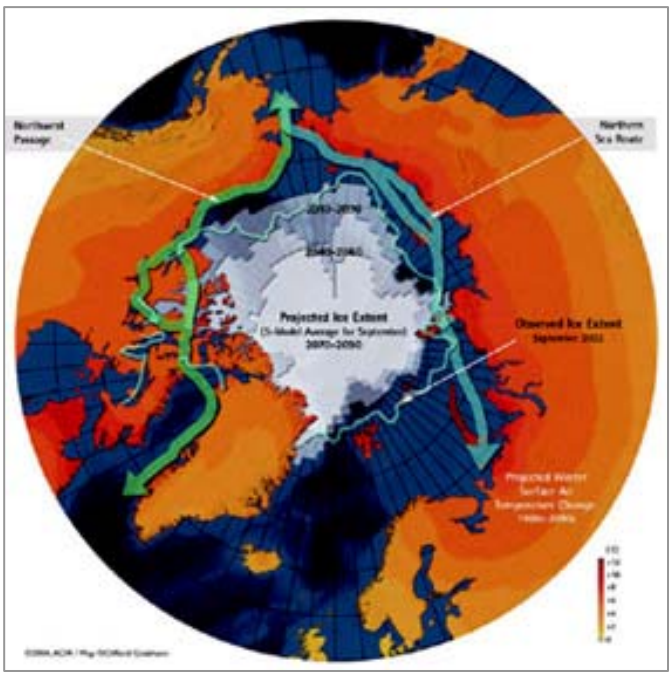
Reykjavik Declaration, 4th Ministerial

" Request PAME to conduct a comprehensive Arctic marine shipping assessment as outlined in the AMSP under the guidance of Canada, Finland, and the United States as lead countries and in collaboration with the EPPR working group and other working groups of the Arctic Council and Permanent Participants as relevant."

KEY POINTS

- AMSA Natural Follow-on to:
  - Arctic Climate Impact Assessment (ACIA)
  - Arctic Marine Strategic Plan (AMSP)
- Inclusive - Host of Stakeholders
  (Many Outside the Arctic Council & the Arctic)
- Circumpolar, yet Regional (Large Marine Ecosystems) and Local Focus
- Member State Commitment & Support with Data Collection Effort

ACIA KEY FINDING #6: REDUCED SEA ICE IS VERY LIKELY TO INCREASE MARINE TRANSPORT AND ACCESS TO RESOURCES



THE MARITIME ARCTIC OF TODAY

Modes of Arctic Marine *Transport*:

- Destination & Regional
- Trans-Arctic
- Trans-Arctic with Transshipment
- Intra-Arctic

SIGNIFICANT SUMMER 2004 ARCTIC MARINE OPERATIONS

- 8 Icebreakers to the North Pole
  (5 - tourism, 3 - science)
- International Arctic Ocean Drilling Program
  (3 icebreakers ~ Central Arctic Ocean)
- Canadian Arctic Voyages (107)
  - Canadian Vessels – 62
  - Foreign Vessels – 32
  - Canadian Government Vessels - 8
  - NWP Transits: Canadian Coast Guard – 2,
  - Foreign Cruise Ship – 1, Foreign Yachts – 2
- Northern Sea Route Regional Voyages (No Transits)
  - 52 Vessels ~ 165 Voyages
  - 1.75 million tonnes of cargo
- Cruise Ships & Expedition Vessels ~ Greenland – 27
- Icebreaking Research Vessel Operations – 6
- Svalbard & Barents Sea ~ hundreds of transits/operations

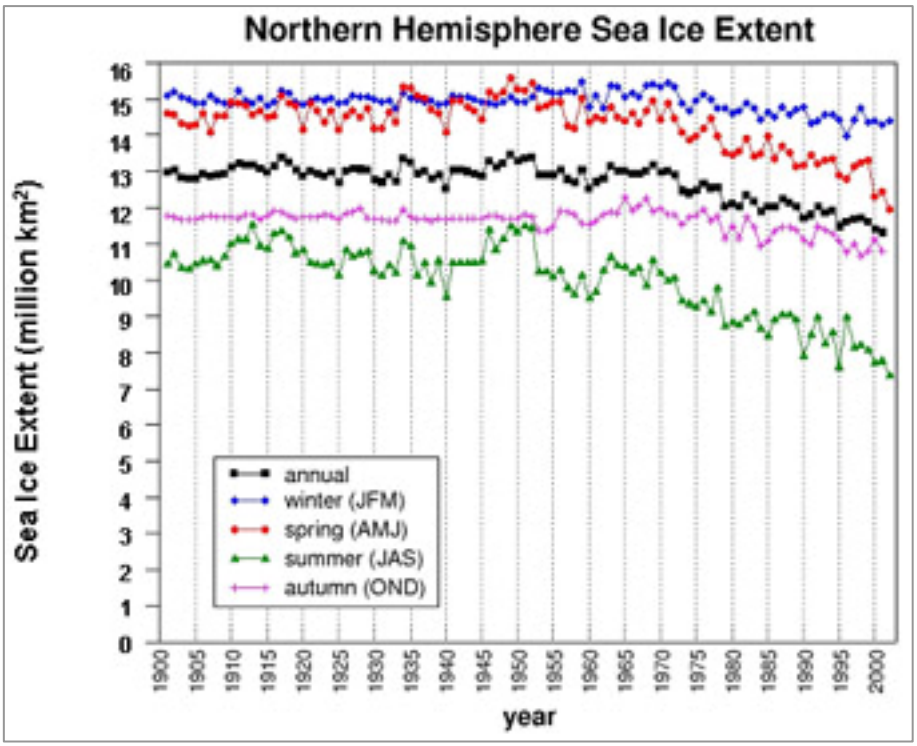
NORTH POLE & TRANS-ARCTIC VOYAGES: 1977- 2005

- 61 NP Transits
  (17 for 2004-05)
- 7 Trans-Arctic
  (1991, 1994, 1996, 2005)

ARCTIC MARINE ACTIVITY

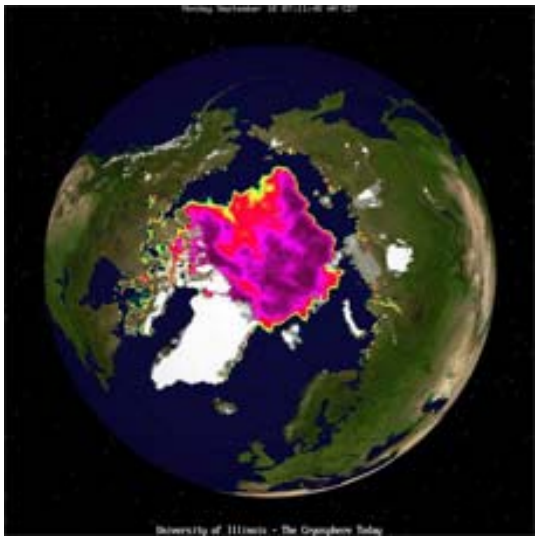
- Tankers
- Bulk Carriers
- Container Ships
- Tug-Barge Combinations
- Fishing Vessels
- Ferries
- Passenger Vessels/Cruise Ships
- Research Vessels
- Icebreakers (Government & Commercial)
- Offshore Supply Vessels
- Others

SEA ICE

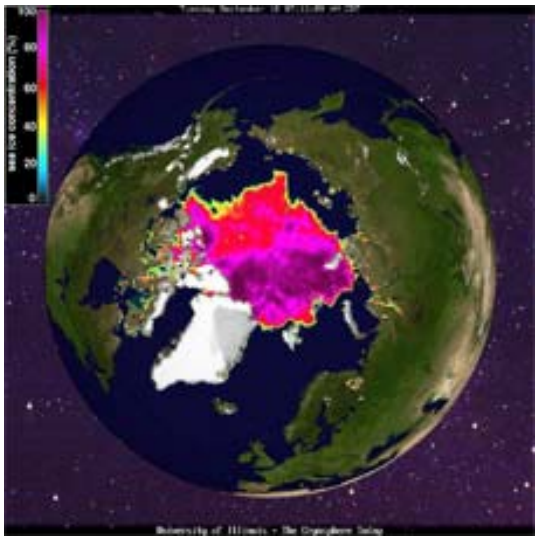


Observational data show a decrease of coverage

- Decrease is largest in summer
- Decrease is largest since late 1980s



16 September 2002



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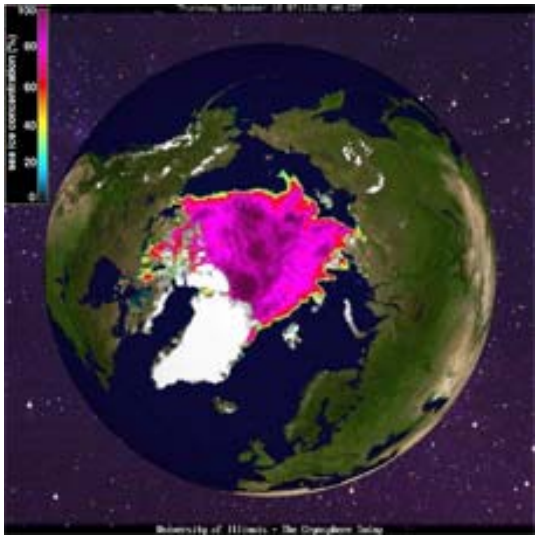
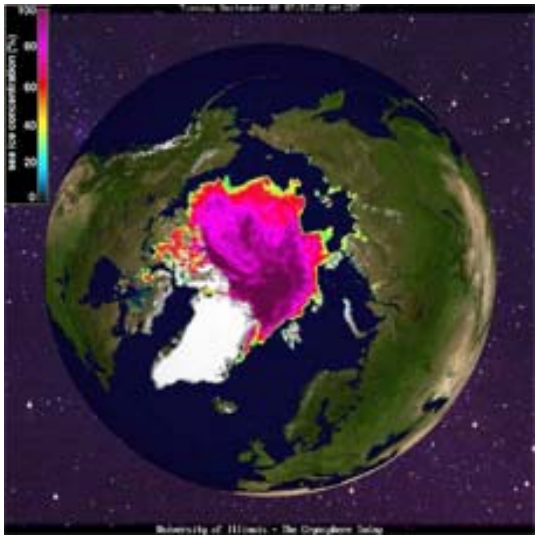
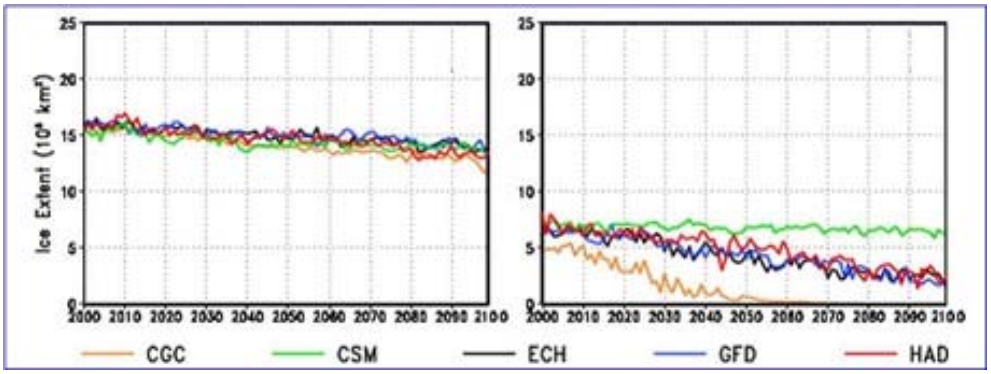


16 September 2004



6 September 2005

ARCTIC CLIMATE IMPACT ASSESSMENT CLIMATE MODEL PROJECTIONS OF SEA ICE EXTENT: 2000 – 2100

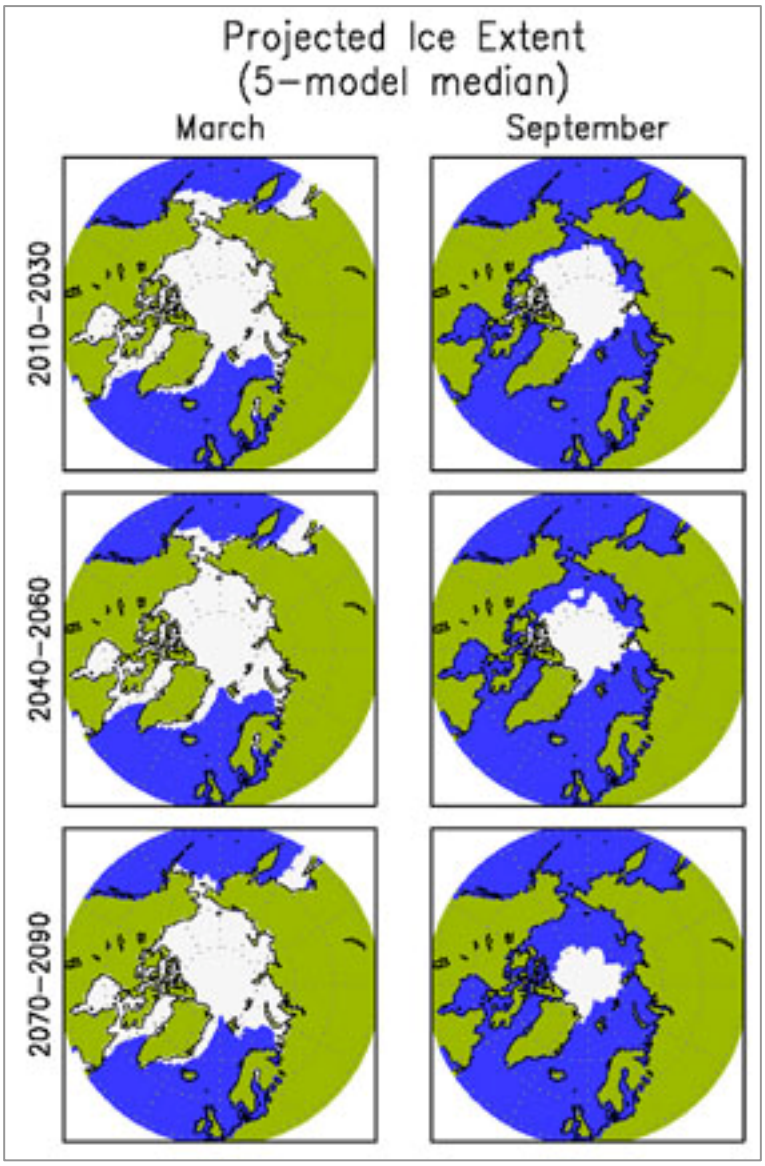


B2 IPCC Moderate Global Scenario

March

September

ARCTIC CLIMATE IMPACT ASSESSMENT



SELECTED RESOURCES

Arctic Climate Impact Assessment

Arctic Marine Strategic Plan

IMO Guidelines for Ships Operating in Arctic Ice-covered Waters

Rules for Navigating the Northern Sea Route

Canadian Arctic Waters Pollution Prevention Regulations

Snapshot Analysis of Arctic Maritime Activities (PAME ~ Norway)

Alaska Arctic Marine Trafficability Studies (1979-1986)

International NSR Programme (1993-1999)

Arctic Operational Platform (ARCOP)

Cambridge Arctic Marine Transport Workshop (Sept 2004)

AMSA WORK PLAN PHASES

Phase 1 Project Planning & Management

Phase 2 Determination of Current Level of Arctic Marine Activity
(Database Collection ~ Member States)

Phase 3 Projected levels of Arctic Marine Activity in 2020 & 2050
(Plausible Future Scenarios ~ ACIA Sea Ice Projections and Regional Economics)

Phase 4 Environmental Impact of Today's Arctic Marine Activity

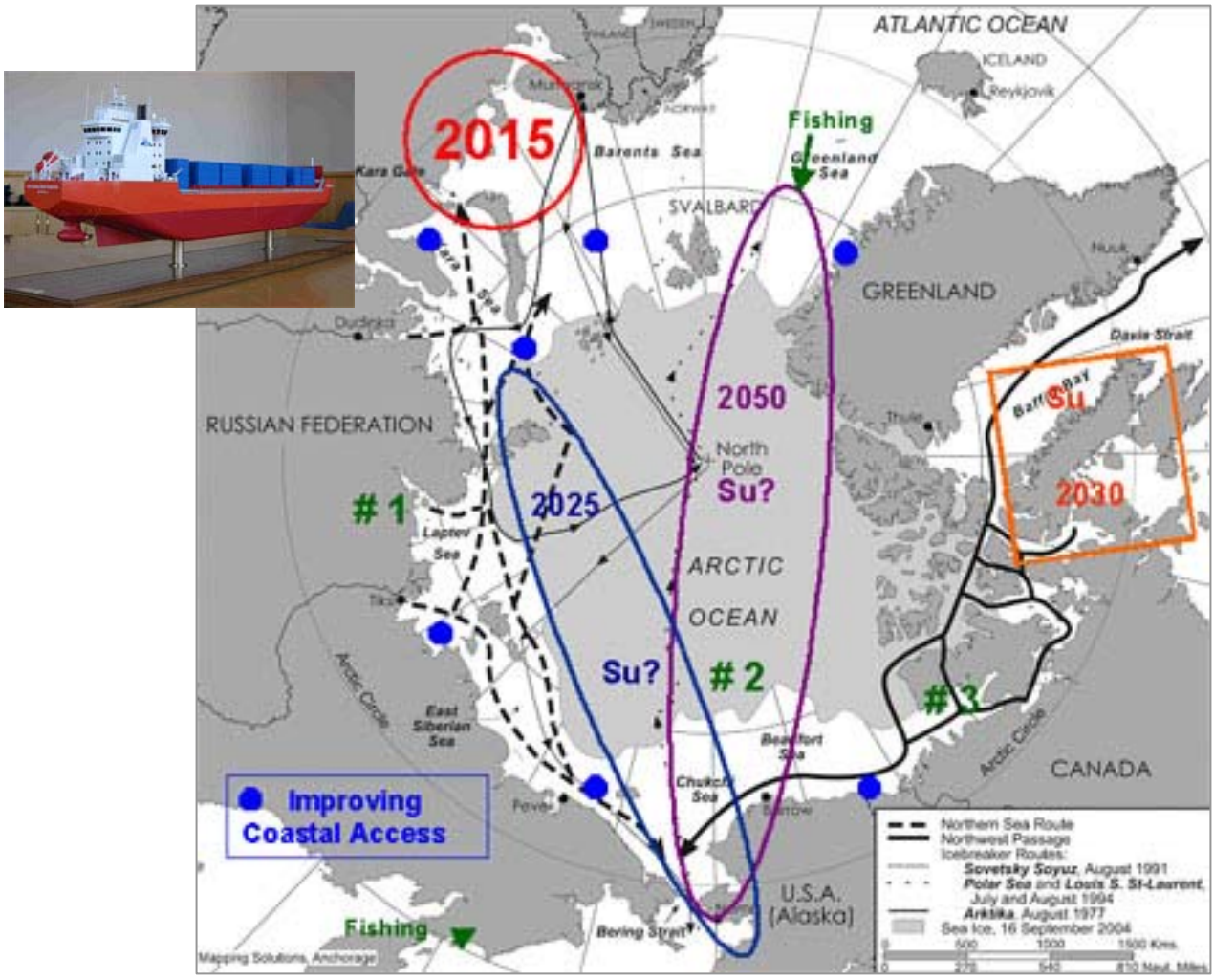
Phase 5 Environmental Impact of Arctic Marine Activity in 2020 & 2050

Phase 6 Risk Analyses

Phase 7 Social and Economic Impact

Phase 8 Analysis & Recommendations

PHASE 3: THE MARITIME ARCTIC OF THE FUTURE?



AMSA ORGANIZATION

- PAME – led Assessment for the SAOs *Policy Direction*

  Arctic Council Working Group & Permanent Participant Involvement

- Lead Countries – Canada, Finland, USA
- Steering Group / Roundtable *Research Direction by Experts*

  (estimated 16 – 18 members)

  6 – lead country experts

  3-4 – Barents Sea experts from Russia & Norway

- Expert Groups: AMSA Phases 2 – 7

  Steering Group Member

  Arctic Council Working Group Experts, others

- Steering Group & Relevant Experts:
  AMSA Phase 8 (Recommendations)

ARCTIC MARINE ACTIVITY SURVEY

- Survey Instrument Under Development
- Calendar Year 2004
- All Arctic Shipping Included
- Data Collected & Presented in GIS Format
- To be Sent to the Senior Arctic Officials of the Arctic Council

ENGAGEMENT & INVOLVEMENT: 2005 – 2008

- PAME Meetings (Next: Oslo, 1–2 Mar 06)
- Town Hall Meetings in the Arctic (2006)
- Stakeholder Meetings
- Steering Group / Roundtable Discussions
- Expert Groups ~ AMSA Phases
- Venues : Conferences / Workshops
- (ICETECH, Calgary, 16-19 July 2006)

Conclusions

ARCOP results will be utilized in the AMSA work, which is essential. The planned AMSA work is important to better understand the development of the marine shipping and its impacts.

11. PANEL DISCUSSION – "THE CHALLENGE REMAINS"

The theme of the panel was the remaining challenges of Arctic transportation. The workshop speakers answered questions about four main topics: training, icebreaker services, fees and environmental concerns.

Training

Mr Aysinov spoke briefly about the importance of the skills and the training of the people that work in the oil and gas transportation.

The NSR training requirements and certification was discussed. The RF Ministry of Transport representatives were asked about the qualification to navigate a ship at the NSR. They described the typical career development of an officer. After graduating from a Maritime Academy, the graduate takes a position as a deck officer. They undergo a thorough practical training of 12-15 years. Most promising candidates are invited to take position as icebreaker captains.

All vessels are inspected before they are let enter the NSR. Inspection can be held at any convenient port. If the vessel and the crew are approved, permission is issued. It is a permit for receiving escorting along the NSR.

There are no international or Russian requirements regarding the crew. There are the STCW requirements. In practice, the shipping company assesses the skills of the captain, and their assessment is trusted. This leads to situation in which shipping companies have certified crews, who have never seen real ice.

Training can still substitute some part of the experience. Not all crewmembers or officers can have complete onboard practical training, because the demand for skilled officers is rising.

The project coordinator noted that the final report regarding training has not been issued yet. The workshop participants were asked to contact Meriturva Training Centre or Wagenborg, if they wished to have their views included in the final report.

It was also commented that when discussing the ice navigation training requirements one should differentiate between areas. Baltic, Kara, Barents and Baffin Bay are all ice-infested seas, but still very different from navigation point of view. An experienced master from Baffin Bay might still damage his vessel by driving too fast in other sea areas. A solution might be that requirements were differentiated according to area and type of ice (first year ice, multi-year ice).

It was noted that in addition to STCW code regarding crew and masters, there is another code: the international safety management code, putting requirements on the management of the vessel. There are certain paragraphs about the foreseeable risks and how the shipping company should prepare for them. This is also connected to training of people on board.

The future of the NSR icebreaker fleet

NSR icebreaker services and their future have been discussed during ARCOP. There have been numerous opinions regarding the organisation of the icebreaker services, whether they should be federally owned or operated or whether the services should be organised in some other way.

The representatives of RF Ministry of Transport commented on the matter. The nuclear-powered icebreakers are subject to law regarding nuclear power, and thus have to be federally owned. In the 90's much of the state operations were privatized, but icebreakers

stayed. In the NSR there are currently only state owned icebreakers. MSCO collects an icebreaker fee to maintain the services. Concerning privately owned icebreakers, there is a loophole in the legislation. There are some icebreakers owned by subsidiaries of oil companies, but they are service vessels, not linear icebreakers. Experience from working with privately operated icebreakers in Baltic exists. In this case the private icebreakers are charted by state enterprises. This experience should be legalised and entered into Russian legislation. Also the issue of using foreign icebreakers has not been resolved in the legislation. Experience shows that international cooperation in this field is vital.

A participant commented that in Canada there has been lot of private icebreakers. At this moment all icebreakers are owned by the Government of Canada. In the southern part there are fees, but in the Arctic no fees have been placed. Canada encourages the use of vessels, which do not require icebreaker assistance. Canada also encourages new development projects to factor in the ice navigation requirements in newbuilding projects.

The representative of the US Arctic Research Committee commented that the problem is the replacement of the state owned vessels, and whether they can be replaced at all. This is an issue for both Canada and the US. He said, that in his opinion, all arctic states need at least some icebreaking capability, for there is a need of regulatory and search&rescue abilities. He forecasted that in the next decade there would be a mix of private and state owned icebreakers. There should also be flexibilities to allow the capable and independent vessels to navigate in these areas.

The project coordinator commented that the situation is still somewhat different from the Northern America, for in Russia there will be a huge increase in the transport volumes whereas in USA and Canada the transport volumes will be close to zero level during the nearest years.

How all the needed icebreaker services will be organised in the future remains unclear. In the Varandey project the oil companies will acquire their own icebreakers to secure the flow of transport.

Representative of Transport Canada commented, that a state should also consider what is the state's preparedness if either an independent vessel or vessel with private icebreaker assistance gets stuck in ice. In Canada one transport developer asked the state what level of icebreaker support could be provided. The answer was that icebreaker would be made available only in a case of an emergency. The developer decided to build a vessel capable of moving in 4ft of ice. In other words, Canada does not have plans to provide icebreaker assistance.

The representatives of Central Marine Research and Design Institute CNIIMF commented that surely there are some seasons when icebreaker free navigation is possible. But effective year around transport requires icebreakers; there are a thousand episodes that confirm this statement.

It was commented that the Arctic states are required to maintain safety of sail. But who pays for it, was asked. USA for instance wants to enforce these safety requirements, but the difficulty is to decide whether to collect the fees and let the users pay for it all, or pay the costs partly or totally from the state budget.

Fee system

ARCOP's Oslo workshop discussed the fees intensively. The director of the Finnish Maritime Administration director explained the Finnish fee system and openly showed and explained the figures in the budget. When talking about the Russian fee system we are talking about the same issue, but there are no figures on how much money Russia is planning to collect by these fees and how is the money allocated. Oil companies

expressed a wish to know how these fees are formed and the money used. It would be practical if the figures were on the table.

The Russian representatives commented that in Russia and in Finland there are different ways of fairway collection. In Russia there is no fairway fees, but an icebreaker fee and a service fee.

It should also be mentioned, that there are different fees in the freezing ports and in the NSR ports.

The representatives of industry insisted that the link between the cost and the cargo becomes questionable. The Russian side replied that the NSR has other roles as well - it is a national transportation corridor. The state has a responsibility in supporting the navigating at the NSR.

The fee income is used to maintain the fleet. The operations are not profitable. The total cost of the NSR icebreaker fleet is $100 mln. The Russian side did not comment on the question on future transport flow –based fee system, in which the fees would be based on some reliable future projection of the transported volumes. The industry reminded that it should be remembered, that there are optional ways for the oil to leave Russia. East Siberian pipeline will draw all free oil from Eastern and Western Siberia. This kind of situation is encouraged by the fact that fees are not predictable.

Environmental concerns

The management of oil spill in ice is a challenge that the Arctic states will have to meet soon. The Arctic states should be better prepared for accidents, but so far there has not been enough research in the area. Studies and research programs have been carried out in the Gulf of Finland, but experience from the actual Arctic areas is needed. Aker Arctic representative commented that the company will conduct an oil spill trial in the old model basin. The trial will be participated by a number of companies.

The representative of Makarov Maritime Academy commented that he fully supports the tone of the discussion. The conjunction between training and environmental safety is an interesting one. When transported volumes grow, the risk will increase as well. The question is not whether something will happen, but when it will happen. He made some comments regarding modelling of oil spill in ice conditions. The Academy is in cooperation with the officials of St. Petersburg, Kotka and Tallinn, to establish crisis management centers. The centers are established for oil spill combating and training for the Baltic conditions and in open water conditions. There has been interest from University of Lapland regarding Kola Bay and the Arctic.