Oil transport from the Russian part of the Barents Region

Status per January 2009

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Bioforsk, the Norwegian Institute for Agricultural and Environmental Research, is a national research-and-development institute under the Norwegian Ministry of Agriculture and Food. Bioforsk Soil and Environment have national responsibility for the research areas as soil, environment and resources. The department at Svanhovd works with issues related to natural resources, environment and agriculture in the Barents Region, as well as Norwegian-Russian environmental co-operation.

The report can be ordered from the Norwegian Barents Secretariat or Akvaplan-niva. Electronic version is available and distributed for free. ISBN 978-82 449-0064-5

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1 Summary

Oil transportation from the Russian part of the Barents Region along the Norwegian coast had insignificant volumes before 2002. However, in 2002 there was a dramatic increase in oil shipment, when 4 million tons of oil was delivered westwards by the Barents Sea. In 2003, the volume reached 8 million tons. The trend continued in 2004, and about 12 million tons of export oil and oil products were transported from the Russian part of the Barents Region to the western market along the Norwegian coast. From 2005 to 2008, the annual shipment volumes of crude oil and petroleum products were on the levels between 9.5 and 11.5 million tons. In 2009, 20 million tons of oil and gas products can be transported through the Barents Sea. Russian seaports will send more than 15 million tons of oil and petroleum products for export by the northern route, half of it will be crude oil from the new Varandey terminal put on stream in 2008. Norwegian Snøhvit, the first offshore production in the Barents Sea, will add on 5 million tons of liquefied gas (LNG and LPG).

The terminals loading oil for export in the Russian Western Arctic seas have been continuously developed, and the overall shipping capacity has been enlarged. The changes in oil volumes carried for export through the Barents Sea during the recent years were not so much dependent on the terminals’ capacities and logistic schemes as on the external factors. The change in the rates for cargo transportation by Russian railways, development of the Baltic Pipeline System by Transneft and bankruptcy of Volgotanker were a few examples that induced oil transport operators to develop new terminals in the Kola Bay and to focus more on petroleum products than crude oil.

The year of 2007 started with a big oil export challenge due to the conflict between Russia and Belarus upon oil transit to Europe via the Druzhba (Friendship) pipeline. It made the Russian Government and Transneft to reorient the Russian oil export routes and increase the capacities of the Baltic Pipeline System (BPS) to 75 million tons in 2008, with the prospects to reach 150 million tons in 2015. Construction of Eastern Siberia – Pacific Ocean (ESPO) pipeline was launched, and the projects of Burgas-Alexandroupolis pipeline in the south and Kharyaga-Indiga pipeline in the north developed.

The year of 2008 started pushing oil prices up to high record levels, and ended with oil prices falling down due to world economic crisis. The year of 2009 came with new export conflict, when European customers could not receive Russian gas through Ukrainian pipelines. The Government of Russia and Gazprom highlight the importance of developing Nord Stream and South Stream projects of constructing gas pipelines through the Baltic and Black seas to let Russia export gas to Western Europe bypassing its neighbouring countries, the former Soviet sister-republics.

In February 2009, when this report was prepared for printing, Russia launched its first LNG plant in Far East in Sakhalin. The second plant will be built in the Kola Peninsula, and it can start shipping LNG from Shtokman field in the Barents Sea in 2014.

The first oil from offshore production in the Russian Barents should come from Prirazlomnoye oil field. The new plan is to put Prirazlomnoye on stream in 2011. The Prirazlomnaya platform will be the second big offshore installation in the Pechora Sea. The first one, 12 million tons Varandey terminal, was launched in 2008 and had symbolic first crude oil shipment to the tanker that delivered the load to the Northern America.

In the present report on oil transportation in the Barents Region, we have given special attention to the description of the existing and prospective offshore and onshore oil and gas terminals in the northern regions of Russia and Norway, and their connection to hydrocarbon reserves on one hand and to the export routes on the other. We demonstrate that even without a Russian oil trunk pipeline to the Barents Sea coast, the overall capacity of the terminals shipping oil and gas for export along the northern coast of Russian and Norway can be over 100 million tons in 2015.

In Russia, about 50 million tons of crude oil and petroleum products can be delivered by railway to the Murmansk ports in the Barents Sea, and
Kandalaksha and Arkhangelsk in the White Sea. In addition, up to 20 million tons of oil will come from the northern Timano-Pechora oil fields – 12.5 million via the new Varandey terminal, and 7.5 million from Prirazlomnoye oil field. Dolginskoye oil field, which is estimated to be three times as big as Prirazlomnoye, will be the next offshore field in the Pechora Sea put on stream. The terminals in the Kara Sea can load 2-3 million tons of Western Siberia crude oil for transhipment in the Kola Bay of the Barents Sea. And Shtokman gas field should give the first LNG production in 2014.

In Norway, in addition to 5 million tons of liquefied gas shipped from Snøhvit, Goliat oil field in the Barents Sea should be put on stream in 2013 and produce 5 million tons of oil in 2014.

In the European part of Russia there are three possibilities for shipping oil for export - through the Black Sea, through the Baltic Sea, and through the Barents Sea. Out of these three options only the northern one, the Barents Sea route, can provide the possibility of stable shipping large amounts directly to major European and North American harbours, avoiding the challenges of transit through the neighbouring countries or heavy traffic in the sea straits.

Oil pollution prevention should be the central issue during oil transportation in the Barents Sea. In this report, we pay attention to the environmental safety matters in oil transportation and Norwegian-Russian co-operation in the oil pollution prevention. We see more advanced and safer terminals and vessels operating in the region that comply with international safety rules. Traffic control and monitoring services are developed both in Norway and Russia. Establishment of an early warning and notification system between two countries should be the next step that will considerably improve the oil spill prevention and response preparedness.

Figure 1.1 Northern regions of Russia and Norway. Red dots with numbers (1-19) point the locations of the terminals operated for shipping oil and petroleum products for export through the Barents Sea. These terminals are described in the present report. The locations are: (1) the port of Tiksi on the Laptev Sea coast; (2) the port of Dudinka on the Yenisey River, (3) the port of Dikson, and (4) the terminal in the Ob Bay of the Kara Sea; (5) Varandey terminal, (6) Prirazlomnoye oil field, (7) the terminal on the Kolguev island, and (8) Indiga settlement in the Pechora Sea; (9) the terminal in Talagi near Arkhangelsk, (10) the town of Severodvinsk, (11) the terminal in the Onega Bay, and (12) Vitino port in the Kandalaksha Bay of the White Sea; (13) Talagi settlement, (14) the terminals in Murmansk and in the Kola Bay, (15) the Pechenga Bay, (16) the terminal in Bøkfjord near Kirkenes, and the town of Vadsø, (17) the terminal in Sarnesfjord near the North Cape, (18) Kvalsund town, Melkøya and Sørøya island near Hammerfest in West Finmark, and (19) Goliat field in the Barents Sea.
2 Introduction

Oil transportation along the coastline of the northern Norway has become one of the hottest topics discussed in the region for the recent years. It is also an important issue of today’s political agenda and bilateral discussions between Norway and Russia.

This report is based on the previous ones, namely “Oil Transport from the Russian Part of the Barents Region” released in 2003, 2005 and 2007. In 2003, Svanhovd Environmental Centre published the first report where we described the existing and planned oil terminals in the Russian part of the Barents Euro-Arctic Region1. In 2005, the report was extended and updated with information about oil transportation in the period from 2002 to 2004. The report gave an overview of oil production and transport systems, as well as environmental aspects of oil shipment. Both reports from 2003 and 2005 were prepared and published with the financial support from the Norwegian Barents Secretariat, and the second one was co-financed by WWF Arctic Programme. In the 2007 report, we provided data about Russia’s hydrocarbon resources, status and prospects of oil and gas production and transportation systems. We gave updated description of oil export schemes and their development plans for the northern regions of Russia and Norway.

The present report, as well as the 2007 one, is a joint project of the Norwegian Barents Secretariat and Akvaplan-niva, with participation of Bioforsk Svanhovd. The purpose of this updated version is to provide the reader with new and additional information, both at general and concrete levels. The logistic of oil deliveries for export through the Barents Sea is being continuously developed. This report gives the current status of terminals and schemes of transportation of oil and gas products through the Barents Sea. We present the dynamics of cargo volumes shipped to the end of 2008, and look at oil transport development prospects in the northern regions of both Russia and Norway. Moreover, we look at the Barents export channel for oil and gas in the perspective of developing the hydrocarbon production and transportation system in Russia in general. We pay attention to environmental safety of the oil shipment and Norwegian-Russian co-operation in oil pollution prevention.

In the section “Oil and Gas Production in Russia”, we give information about hydrocarbon resources, oil and gas production and development potential with a main focus on the Timano-Pechora oil-and-gas province, Yamal and the western Arctic shelf of Russia.

General description of the transport systems in Russia, including information about railways, sea transport, waterways and pipelines is given in the next section “Oil and Gas Transport”.

In the chapter “Oil Transportation Routes in the Barents Region”, we describe oil and gas loading terminals along the Arctic coast of Russia and Norway with logistic schemes and export delivery routes. In the next chapter “Dynamics and Prospects of Oil Exports through Northwest Russian ports”, we publish an article prepared by an external expert for this report on our request.

The section “Environmental Safety” provides information about Norwegian system of oil shipment monitoring and control, and the Norwegian-Russian cooperation in oil pollution prevention. We look at environmental problems that have occurred as a result of the oil transportation in the region. We also include some information about a big accident with an oil spill happened in 2007, and following actions.

In the section, “Conclusions”, we give our own reflections and comments about oil transportation safety, and point out factors that we believe are essential for building efficient oil spill protection in the region. We have used a number of sources for making the report that are given in the list of references. These sources of information consist of press releases from governmental institutions, transport operators and oil and gas companies; speeches given at the international conferences; news published by information agencies and local newspapers. The facts of the report have been discussed with authorities, companies, research institutes, and environmental NGOs in Russia and Norway.

1 The Barents Euro-Arctic Region was founded in 1993. Today it includes 13 regions: Finnmark, Troms and Nordland in Norway; Norrbotten and Västerbotten in Sweden; Lapland, Oulu and Kainuu in Finland; Murmansk and Arkhangelsk Regions, the Republics of Karelia and Komi, and the Nenets Autonomous District in Russia.
3 Oil and Gas Production in Russia

3.1 OIL AND GAS RESERVES

The main sources of information in this section are reports of the Ministry of Nature Resources and Ecology of the Russian Federation, and the Federal Subsoil Resource Management Agency of Russia (Rosnedra), as well as news published in media.

According to the estimates made by British Petroleum, the proven reserves of natural gas in Russia (the resources that according to the available geological, technical and economical data can be extracted from the productive layer), at the end of 2004, were considered to be 48 trillion cubic metres or 26.7% of the world’s confirmed reserves. The proven oil reserves of the Russian Federation (including gas condensate and oil and gas containing liquids) were estimated at 9.9 billion tons, which was 6.1% of the world’s reserves. According to these estimates, Russia was the first in gas reserves and the seventh in oil reserves after Saudi Arabia, Iraq, Kuwait, United Arabian Emirates and Venezuela. British Petroleum presented its independently researched estimates based on information from open sources. The official data on Russian oil reserves are classified.

Ministry of Nature Resources and Ecology of Russia stated that in 2006 Russia possessed 12% of world’s oil resources with 40.5 billion tons of oil, and 45% of world’s gas resources with 79.3 trillion cubic metres of gas. In 2007, Russia produced 490 million tons of oil and had 741 million tons in reserves; the gas production was at the level of 620 billion cubic metres and gas reserves were estimated at 780 billion cubic metres.

According to Rosnedra, the potential natural gas resources are estimated to be at the level of 150 trillion cubic metres. Up to 60% of the recovered natural gas is delivered to Russian consumers; in gas export volume Russia still holds the first position in the world. In explored reserves of oil, which are 25% of initial total resources, Russia holds the third position in the world. Selling 60% of the extracted oil at home, Russia is the second largest oil exporter in the world.

According to Rosnedra’s data, in 2005-2007, 194 new oil and gas fields were discovered in Russia. In 2007, the discovery additions to hydrocarbon reserves were 550 million tons for oil and gas condensate, and 670 billion cubic metres for natural gas, that altogether gave 6.7 billion tons of standard fuel. Western Siberian oil-and-gas bearing province is still the largest Russian oil and gas region with two third of the country’s discovered oil reserves. And more than two third of Russia’s discovered gas reserves are located in the northernmost area of the Western Siberia – Yamalo-Nenets Autonomous District.

Another prospective region for hydrocarbon resources is Eastern Siberia, which already has a number of discovered oil and gas fields. The special attention in geological research is given to the Arctic regions and the continental shelf of Russia.

![Figure 3.1 Oil production and addition to reserves in Russia in 2001-2007 (Sources: MNRE RF).](image1)

![Figure 3.2 Gas production and addition to reserves in Russia in 2001-2007 (Source: MNRE RF).](image2)
3.1.1 THE CONTINENTAL SHELF

According to the Ministry of Nature Resources and Ecology of Russia the extractable reserves of hydrocarbons on the Russian Continental shelf are assessed to be 10.8 billion tons in oil equivalent, and hydrocarbon recoverable resources are estimated to be 98.7 billion tons in oil equivalent (see table 3.1). The prospective oil and gas territory in the Russian sea areas is estimated as 4 million square kilometres of the total area of the continental shelf of 6.2 million square kilometres.

The Arctic shelf of Russia has a total area of about 4.5 million square kilometres and about 75% of it has prospects for hydrocarbon resources. The best researched area is the western sector of the Arctic shelf with large deposits of Prirazlomnoye, Shtokmanovskoye, Leningradskoye, Ledovoye, Rusakovskoye and others (the total of 22 deposits).

Rosnedra agency has elaborated a programme for licensing mineral resources areas on the continental shelf, proposing holding auctions till 2010 and forecasts for the period ending in 2020. As proposed by the Programme, there should be held 6 auctions until 2010:

- Barents-2, consisting of 4 sectors in the eastern part of the Pechora Sea with total recoverable reserves of 640-680 million tons in oil equivalent.
- Barents-3, including Barents-Pechora region with total recoverable reserves of 350-380

Table 3.1 Distribution of hydrocarbon reserves and resources in the continental shelf of the Russian Federation, round in million tons of oil equivalent (Source: MNR RF, 2007).

<table>
<thead>
<tr>
<th>Seas</th>
<th>Reserves</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barents</td>
<td>4 520</td>
<td>30 314</td>
</tr>
<tr>
<td>Kara</td>
<td>3 732</td>
<td>41 210</td>
</tr>
<tr>
<td>Laptev</td>
<td>-</td>
<td>3 260</td>
</tr>
<tr>
<td>East Siberian</td>
<td>-</td>
<td>5 583</td>
</tr>
<tr>
<td>Chuckchee</td>
<td>-</td>
<td>3 335</td>
</tr>
<tr>
<td>Bering</td>
<td>-</td>
<td>1 075</td>
</tr>
<tr>
<td>Okhotsk</td>
<td>1 737</td>
<td>8 735</td>
</tr>
<tr>
<td>Japan</td>
<td>5</td>
<td>486</td>
</tr>
<tr>
<td>Pacific Ocean</td>
<td>1</td>
<td>113</td>
</tr>
<tr>
<td>Caspian</td>
<td>802</td>
<td>3 453</td>
</tr>
<tr>
<td>Black</td>
<td>-</td>
<td>635</td>
</tr>
<tr>
<td>Azov</td>
<td>23</td>
<td>412</td>
</tr>
<tr>
<td>Baltic</td>
<td>10</td>
<td>66</td>
</tr>
<tr>
<td><strong>Russian shelf</strong></td>
<td><strong>10 828</strong></td>
<td><strong>98 678</strong></td>
</tr>
</tbody>
</table>

Figure 3.3 Major oil and gas fields of the Russian continental shelf. O – oil, G – gas, GC – gas condensate.

Figure 3.4 Plans for oil and gas exploration and licensing in the Russian Western Arctic seas to 2010.
### Table 3.2 Estimated characteristics of blocks on Russian continental shelf proposed for licensing in 2009-2012 (Sources: RBK daily, MNRE RF, 2008)

<table>
<thead>
<tr>
<th>Sea shelf</th>
<th>Name of the block</th>
<th>Resources</th>
<th>Area, sq. km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltic</td>
<td>Kurshsky gulf</td>
<td>D1 2.3 mln.t, D2 1.2 mln.t of oil</td>
<td>1 094</td>
</tr>
<tr>
<td></td>
<td>Yu.-Kurshsky</td>
<td>D1 0.5-0.7 mln.t, D2 0.8 mln.t of oil</td>
<td>513</td>
</tr>
<tr>
<td>Barents</td>
<td>Aynovskiy</td>
<td>D2 10 mln.t of oil eq.</td>
<td>429</td>
</tr>
<tr>
<td></td>
<td>Zubouvytsky</td>
<td>D2 15 mln.t of oil eq.</td>
<td>2 259</td>
</tr>
<tr>
<td></td>
<td>Terbersky</td>
<td>D2 15 mln.t of oil eq.</td>
<td>2 197</td>
</tr>
<tr>
<td></td>
<td>Semiostrovsky-yu.</td>
<td>D2 15 mln.t of oil eq.</td>
<td>4 062</td>
</tr>
<tr>
<td></td>
<td>Ust’-Pechorsky</td>
<td>D1+D2 29.8 mln.t of oil and 26.3 bln. cubic m of gas</td>
<td>3 432</td>
</tr>
<tr>
<td>Kara</td>
<td>Baydaratsky</td>
<td>D2 20-25 mln.t of oil eq.</td>
<td>14 439</td>
</tr>
<tr>
<td>Laptev</td>
<td>Enisey gulf</td>
<td>D2 35 mln.t of oil eq.</td>
<td>20 043</td>
</tr>
<tr>
<td></td>
<td>Khatanga gulf</td>
<td>D2 35 mln.t of oil eq.</td>
<td>14 446</td>
</tr>
<tr>
<td></td>
<td>Lena delta</td>
<td>D2 100 mln.t of oil eq.</td>
<td>10 063</td>
</tr>
<tr>
<td>Okhotsk</td>
<td>Varvarinsky</td>
<td>D1+D2 17.9 mln.t of oil and 140 bln. cubic m of gas</td>
<td></td>
</tr>
</tbody>
</table>

Besides, the Programme proposes 5 auctions in the Okhotskoye Sea of the Far Eastern shelf. These are Sakhalin-3 and Sakhalin-6 on the Sakhalin shelf, Magadan-1, 2 and 3 on the Magadan shelf.

According to amendments to the continental shelf legislation enacted in 2008, the licenses on Russian continental shelf are granted for exploration and production of oil and gas on non-tender basis. The license holders and users are chosen among the Russian incorporated companies with more than 50% shares or other control by the Russian Federation, and companies with at least 5 years experience of project development in the Russian continental shelf.

Foreign companies may act as operators.

The Ministry of Nature Resources and Ecology of Russia with the Ministry of Economical Development have elaborated the State programme for the Russian continental shelf exploration and development. The programme is planned up to 2020 and focused on: geological exploration of the continental shelf; technical and technological procurement; construction of coastal and offshore oil-and-gas production units and infrastructure; communication and hydrometeorological support; environmental protection and nuclear safety; scientific, legal and personnel support.

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**Figure 3.5** Forecast for oil and gas exploration and licensing in the Russian Western Arctic seas in 2011-2020.

**Figure 3.6** Forecast for licensing and geological surveys in the Russian Eastern Arctic seas in 2011-2020.
Oil transport from the Russian part of the Barents Region. Status per January 2009

Table 3.3  Expected basic results of oil and gas exploration on the Russian continental shelf to 2020 (Source: MNR RF, 2007)

<table>
<thead>
<tr>
<th>Seas</th>
<th>Growth in deposits</th>
<th>Growth in reserves, bln.t OE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barents &amp; Pechora</td>
<td>10-15</td>
<td>0.8-1.0</td>
</tr>
<tr>
<td>Kara</td>
<td>10-15</td>
<td>2.5-3.5</td>
</tr>
<tr>
<td>Laptev</td>
<td>3-5</td>
<td>0.5-1.0</td>
</tr>
<tr>
<td>Okhotsk &amp; Japan</td>
<td>10-15</td>
<td>0.5-1.0</td>
</tr>
<tr>
<td>Caspian</td>
<td>3-5</td>
<td>0.4-0.8</td>
</tr>
<tr>
<td>Azov &amp; Black</td>
<td>3-5</td>
<td>0.2-0.8</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>39-60</strong></td>
<td><strong>4.9-8.1</strong></td>
</tr>
</tbody>
</table>

According to the State Strategy for exploration and development of the continental shelf of the Russian Federation, in 2020, annual hydrocarbon production offshore may reach the levels of 95 million tons of oil and 320 billion cubic metres of natural gas; the reserves growth may give 1.6-1.6 billion tons of oil and 1.6-3.1 trillion cubic metres of gas; and the resources growth is expected to be on the levels of 3.4-5.1 billion tons of oil and 4.8-9.4 trillion cubic metres of gas.

### 3.1.2 OIL AND GAS RESERVES IN THE RUSSIAN PART OF THE BARENTS REGION

The main sources of information for the articles in this section were the reports of the Ministry of Nature Resources and Ecology of Russia, the Administration of the Nenets Autonomous District (2008), and the Ministry of Nature Resources and Environmental Protection of the Republic of Komi (2008). We also used press-releases and news from national and regional information agencies.

The amount of hydrocarbon resources in the Russian part of the Barents Euro-Arctic Region are mostly dependent on the Timano-Pechora oil-and-gas bearing province resources located in the territory of the Republic of Komi, the Nenets Autonomous District and the shelf area of the south-eastern part of the Barents Sea – the Pechora Sea.

Natural occurrence of oil in Timano-Pechora was first registered as long ago as in 1762, and for the first time oil was collected on the Yarega, a tributary of the Ukhta River. The first full scale expedition that made a methodical survey of all mineral resources of the Russian European North, including oil was held back in 1929. Systematic exploration in the Timano-Pechora province has been conducted since that time, and a real breakthrough was made during the last 50 years with discovery of large prolific oil fields (Western Tebukh, Pashninskoye, Usinskoye, Vozeyskoye, Kharyaginskoye, etc.) and the Vukhtyl oil and gas field. These discoveries drew attention to the region. New explorations let the industry re-evaluate the volume of the proven oil reserves, and gas and condensate reserves, and to run full-scale production.

Figure 3.7  Timano-Pechora oil-and-gas bearing province.
According to the Russian Ministry of Nature Resources and Ecology, there are over 200 oil and gas fields in the Timano-Pechora province with proven reserves of oil exceeding 1.3 billion tons and 634.5 billion cubic metres of natural gas. Timano-Pechora has a significant geological potential of oil reserves and good prospects to increase hydrocarbon production for a long period in the 21st century.

In both mid-term and long-term prospects, the Northwest of Russia will remain one of the regions providing oil and gas for the domestic and world markets. The production and export growth in the region beyond 2020 will be possible with the development of existing large offshore oil and gas deposits, as well as opening the new fields both onshore in the Timano-Pechora oil-and-gas bearing province and offshore in the Barents and Pechora Seas.

Development of hydrocarbon resources in the northern part of the Timano-Pechora oil-and-gas bearing province and the sea shelf, first of all, of Shtokman gas and Prirazlomnoye oil fields, should in both mid-term and long-term prospects secure the Russian part of the Barents Region as one of the most important regions in hydrocarbon exploration and production.

The degree of depletion of discovered oil reserves for the Timano-Pechora province is about 30% (in the Nenets Autonomous District it is about 8%). That means the most part of the explored oil reserves in the Nenets Autonomous District has not yet been developed.

Further on, we give description of hydrocarbon reserves and resources in oil-and-gas bearing territories of the Russian part of the Barents Region - Nenets Autonomous District and the Republic of Komi. We based the present description on our 2007 report and up-dated the articles.

We also add an article with an overview of hydrocarbon resources and reserves of the Yamalo-Nenets Autonomous District, which is not a part of the Barents Euro-Arctic Region but will play an important role in future increase of oil-and-gas transportation through the Barents Sea and the infrastructure development along the Arctic coast.

**Nenets Autonomous District**

According to the Administration of the Nenets Autonomous District, the total recoverable reserves of hydrocarbons are estimated to 3.6 billion tons of standard fuel. In total, 81 deposits have been discovered on the territory of Nenets region, most of them are oil deposits. Two oil fields are located on the territories of both Nenets Autonomous District and the Republic of Komi.

Seven of the discovered fields are referred to as large ones; each with initial recoverable reserves over 60 million tons of standard fuel. Two of them are oil fields - Kharyaginskyoye and Toboisoko-Myadseiskoye, one is oil and gas - Yuzhno Khylchuyu, two are oil and gas condensate - Layavozhskoye and Vaneyvisskoye, and two are gas condensate - Kumzhinskoye and Vassilkovskoye. 63 licences have been given for development of hydrocarbon resources.

In total 17 hydrocarbon fields are put in production: Kharyaginskoye, Ardalinskoye, Sredne-Kharyaginskoye, Tedinskoye, Inzyreiskoye, Nyadeyskoye, Khasyreiskoye, Cherpayayskoye, Vostochno-Kolvinskoye, Oshkotynskoye, Dyususheyskoye, Varandeyskoye, Toraveiskoye, Vostochno-Kharyaginskoye are oil fields; Peschanoozerskoye and Yuzhno-Shapkinskoye are oil and gas condensate fields; Vassilkovskoye contains gas condensate; and Yuzhno Khylchuyu is oil-and-gas – the one that started commercial production in 2008.

The rate of proven reserves production of in the Nenets region is about 8% for oil, and less than 1% for natural gas. The Administration of the Nenets Autonomous District estimates that with the present production rate the proven reserves will provide oil for 70 years and gas for 1000 years.

In the coming years, it is planned to start production on 10 more hydrocarbon deposits, and 8 oil fields are prepared for exploitation. The largest fields to be put in production are Kumzhinskoye and Korovinskoye gas condensate, Vaneivisskoye oil and gas condensate, Naulskoye and named after Trebs oil fields.

In the future, oil production in the Nenets Autonomous District should increase significantly by putting new fields into exploitation. Vast territories in the western and eastern parts of the Nenets region are not explored yet. Exploration rate of total oil resources inland constitutes about 40%, and gas resources - 52%.
The Republic of Komi
According to the Ministry of Nature Resources of Russia and Environmental Protection of the Republic of Komi, the initial total in place oil-and-gas resources in the Republic are estimated as 4.17 billion tons of standard fuel, including 2.18 billion tons of oil and 1.7 trillion cubic metres of natural gas.

In 2008, the state register in the Republic of Komi included 148 discovered hydrocarbon deposits, most of them are of oil. Small fields (with reserves up to 10 million tons of standard fuel) comprise more than 80% of the available reserves. 8 fields only have reserves of more than 30 million tons each. The major oil and gas fields are: Usinskoye with initial recoverable reserves of 226.3 million tons of oil, Yaregskoye with 131.8 million tons of oil, Verkhnevozeyskoye with 53.3 million tons of oil and Vozeyskoye with 135.7 million tons of oil and gas in oil equivalent.

About 95% of hydrocarbon reserves in the Republic are placed at the currently developed and prepared for development fields. The major part of the remaining oil reserves is located at the Vuktylskoye oil field, where production volumes are decreasing. Other hydrocarbon fields in Komi are either too low in reserves or too far from the major transportation routes.

Oil and gas are produced on 83 fields, among them 56 are in industrial production and 27 are in test production. Total oil reserves depletion for all discovered oil fields is at the level of 47%; gas reserves depletion is at the level of 73%.

The average rate of production of proven hydrocarbon reserves in the Republic is 27%.
Thus, the explored oil fields do not represent a considerable reserve for oil production. The expected recoverable oil reserves in the Republic of Komi are estimated to be 1.0 billion tons.

According to Rosnedra, new oil field Khudoyelskoye with significant reserves was discovered in Komi in 2007 and state registered in 2008. Geological reserves of Khudoyelskoye oil field are estimated to be 88.2 million tons of oil, and recoverable reserves are 17.6 million tons of oil. That was an exceptional finding for the recent years. A negative factor for this area is a low concentration of the resources. It is predicted that the overwhelming number of currently discovered hydrocarbon fields will be in the small size range.

Yamalo-Nenets Autonomous District
As we mentioned, Yamalo-Nenets Autonomous District is not a part of the Barents Euro-Arctic Region, but this area in the north of the Western Siberia with adjusted Kara Sea shelf will play an important role in future shipments of liquid hydrocarbon in the Barents Sea.

Yamalo-Nenets Autonomous District is unique with its gas resources. The region gives about 90% of natural gas production in Russia, or more than 20% in the world.

The pioneer well was drilled in Yamalo-Nenets region near the cape Kamenniy back in 1950, but 130 metres well was not deep enough to pass permafrost and get gas. In 1954, the 504 metres well drilled near Noviy Port reach natural gas, but the reserve did not have production value. The first in the Yamalo-Nenets region and the Russian Arctic gas flow came from 2200 metres deep well drilled in Taz area in 1962, and the gas deposit was called Tazovskoye.

In the period from 1964 to 1969, there were

Figure 3.8 Oil and gas fields and structures in Yamal and the Kara Sea shelf.
discovered the world largest gas fields: Urengoyskoye with gas reserves of 5.1 trillion cubic metres; Yamburgskoye - 3.7 trillion cubic metres; Zapolyarnoye - 3.1 trillion cubic metres; and Medvezhye - 0.7 trillion cubic metres.

Now, hydrocarbon resources potential of the region is estimated at 95 trillion cubic metres of gas, 5.8 billion tons of gas condensate, and 15.9 billion tons of oil.

According to the Administration of the Yamalo-Nenets Autonomous District, in 2006, discovered hydrocarbon reserves on the region’s territory totalled 34 trillion cubic metres of natural gas (about 71% of Russia’s gas reserves), 2.3 billion tons of oil, and 1.1 billion tons of gas condensate. 216 hydrocarbon deposits were discovered and a quarter of them put in industrial development.

Exploration rates of hydrocarbon resources in the region are: 49% for gas, 19% for oil, and 21% for gas condensate.

According to Rosnedra, in 2008, nine new hydrocarbon fields were discovered in Yamalo-Nenets Autonomous District, and 23 new deposits found on earlier opened fields, that gave additional recoverable hydrocarbon reserves for 630 million tons of standard fuel.

Yamal peninsula, at the northwest of the Autonomous District, is the main gas reserve of Russia. 26 gas deposits have already been discovered there. Total initial on place resources on the peninsula and adjusted sea shelf are estimated to be 51 trillion cubic metres of natural gas, and 7 billion tons of oil and gas condensate.

3.2 OIL AND GAS PRODUCTION

The annual oil production in Russia has been constantly growing for a decade. In 2003, the production level reached 408 million tons - first time exceeding the 1992 level. The year after, in 2004, the oil production was increased by 50 million tons and reached the level of 459 million tons. In 2007, oil production in Russia was on its maximum exceeding 490 million tons (62% more than ten years before), and in 2008 there was a small decline to 488 million tons, that was partly explained by drying out of Western Siberian fields and also by falling oil prices due to world economic crisis.

According to the Central Dispatch Control of the Fuel-and-Energy Complex, Rosneft was the leader in oil production in Russia in 2008, and the only one of top five Russian oil producers that upheld growth. In 2008, Rosneft extracted 113.85 million tons of oil (12% yearly growth). Lukoil was the second largest and produced 90.2 million tons (1.3% drop); TNK-BP - 68.8 million tons (0.9% drop); Surgutneftegaz - 61.7 million tons (4.6% drop); and Gazpromneft - 30.7 (5.9% drop).

Western Siberia is the major centre of Russia’s oil industry. More than 53% of the oil reserves are located in this region, and since the mid 1980s this region produced two third of the Russian oil. In 2008, more than 277 million tons of oil (57% of the Russian oil production) was extracted on the territory of Khanty-Mansiysk Autonomous District in the Western Siberia.

Figure 3.9 Total annual oil and gas condensate production in Russia, 1992-2008 (Source: CDC FEC, Rosstat).
Oil transport from the Russian part of the Barents Region. Status per January 2009

![Graph showing oil transport from the Russian part of the Barents Region from 1992 to 2008.](image)

**Figure 3.10** Total annual natural gas production in Russia (Source: CDC FEC, Gazprom).

Production of natural gas in Russia has been kept on a rather stable level for the last decade. In 1990s it decreased from 643 billion cubic metres in 1991 to 572 billion cubic metres in 1997, but since 2001 the natural gas production had steady growth and reached the level of 656 billion cubic metres in 2006. Gas production had a small drop to 653 billion cubic metres in 2007, and reached it maximum level for the last twenty years of 665 billion cubic metres in 2008. State owned Gazprom Company produces about 85% of Russia’s natural gas. In 2007, Gazprom extracted 549 billion cubic metres of natural gas (84%); and in 2008 – 551 billion cubic metres (83%). The second Russia’s largest gas producer Novatek Company produced almost 31 billion cubic metres of gas in 2008.

Ministry of Economic Development of Russia forecasts natural gas production at the level of 670 billion cubic metres in 2009.

Gazprom intends to keep the annual natural gas production level at 550-560 billion cubic metres in 2010; and increase it to 580-590 billion cubic metres in 2020. The Company plans to develop gas extraction in traditional gas production regions as well as in the new ones – Yamal peninsula and the Arctic seas shelf, where Shtokman is to be a pioneer; the Eastern Siberia and the Far East.

Most of the Russia’s natural gas is produced in the Western Siberia. In 2008, 576 billion cubic metres of gas (87% of the Russian gas production level) was extracted on the territory of Yamalo-Nenets Autonomous District.

3.2.1 OIL AND GAS PRODUCTION IN THE RUSSIAN PART OF THE BARENTS REGION

The oil production level in the Timano-Pechora province increased from 14.7 million tons in 2002 to 29.4 million tons in 2008. In the Republic of Komi 12.3 million tons of oil was produced in 2007; and 13.3 million tons in 2008. In the Nenets Autonomous District 13.5 million tons of oil was produced in 2007; and 16.1 million tons in 2008.

The yearly gas production on the territory of the Republic of Komi was kept on the level of 3.4 billion cubic metres for the recent five years.

In the Nenets Autonomous District, natural gas is produced in small quantities only for providing the local needs. However, there is a good potential for developing natural gas production in the region.

![Graph showing annual oil and gas condensate production in the Republic of Komi and the Nenets Autonomous Region.](image)

**Figure 3.11** Annual oil and gas condensate production in the Republic of Komi and the Nenets Autonomous Region (Source: Government of the Republic of Komi, Administration of the Nenets Autonomous District).
3.3 OIL AND GAS PRODUCTION PLANS

According to the “Energy Strategy of Russia for the period to the year 2020”, adopted by the Government of the Russian Federation in August 2003, the yearly oil production level should reach 445-490 million tons in 2010, and 450-520 million tons in 2020; the yearly natural gas production should be on the level of 635-665 billion cubic metres in 2010, and 680-730 billion cubic metres in 2020.

In 2008, the Ministry of Energy of Russia elaborated the new “Energy Strategy of Russia for the period to the year 2030” that is based on the previous 2020 strategy and takes into account new prospects and challenges, including the world economic crisis.

The Energy Strategy – 2030 does not fix concrete volumes of oil and gas production with the concrete years, but links strategic goals to stages of the strategy implementation with approximate years of fulfilment in 2012-2014, in 2020-2022, and in 2030 coming to the production levels of 530 million tons for oil and 706 billion cubic metres for gas.

New document draws the strategic initiatives of energy development in Russia, among them: building up oil-and-gas production complexes in eastern regions of the country; development of hydrocarbon resources of the Arctic shelf and northern areas of Russia; development and diversification of energy infrastructure; increasing energy efficiency and energy saving; development of non-fuel energy.

Figure 3.13 More than 29 million tons of oil was produced in the Republic of Komi and the Nenets Autonomous District in 2008. Timano-Pechora oil-and-gas bearing province can give the stable annual production of 35-45 million tons of oil in 2010-2020.

3.3.1 OIL PRODUCTION PLANS IN THE RUSSIAN PART OF THE BARENTS REGION

In 2010-2020, Timano-Pechora oil-and-gas province may give the annual production of 35-45 million tons of oil.

According to the estimates by the Government of the Republic of Komi, annual oil production in Timano-Pechora will reach its maximum level of 37 million tons in 2011 and stabilise on the level of about 35 million tons in 2015.

In the Republic of Komi insignificant oil and gas production change is expected for the period 2010-2020, with the annual volume of about 13 million tons in 2010 and, subsequently, a slight decrease to 11.5 million tons in 2020.

The further development of the Komi hydrocarbon fields will be accompanied by a structural decline of major reserves with an increasing number of hard-to-extract fields. This will be followed by increase of production costs as well as use of more advanced extraction technologies.

The estimates by the Administration of the Nenets Autonomous District forecast that the annual oil production on the territory of the Nenets region can reach the level of 25 million tons in 2010, and come to 30 million tons in 2015. The production growth will be provided by newly
developed and discovered fields. One of the biggest one in the the region, Yuzhno Khylchuyu field with proven reserves of 70 million tons of oil, started up commercial production in 2008. The oil production level is expected to reach its maximum of 7.5 million tons a year in 2009, and the field can produce oil for 30 years.

3.3.2 OIL PRODUCTION PROSPECTS FOR THE RUSSIAN WESTERN ARCTIC SHELF

The oil production on the shelf of the Barents Sea is to begin with the start of operations at Prirazlomnoye oil field.

Prirazlomnoye oil field is one of the largest among the proven oil reserves in the Russian western Arctic shelf. Discovered in 1989, the Prirazlomnoye field is located in the Pechora Sea, about 60 kilometres north of the Nenets Autonomous District coast, with the sea depth of 19 metres.

Initial geological oil reserves (C1+C2) of the field are estimated as 231.1 million tons, and cumulative production should amount 76 million tons for the planned operation period of 23 years.

Since 2002 the license for the development of Prirazlomnoye oil field belongs to the Sevmorneftegaz Company that was founded by Gazprom and Rosneft in 2002; and in 2005 became 100% subsidiary of Gazprom.

According to adjusted production plans by Gazprom, Prirazlomnoye oil field should be put in commercial production in 2011. The yearly production maximum of about 7 million tons of oil can be reached in the fifth year of development. Crude oil from Prirazlomnoye will be shipped to export, and in the future may also go to a prospected refinery in the Murmansk region.
3.3.3 GAS PRODUCTION PROSPECTS FOR THE RUSSIAN WESTERN ARCTIC SHELF

Huge hydrocarbon resources discovered and prospected in the Barents, Pechora and Kara seas are a driving force for future industrial development of the Russian Western Arctic regions. The Russian Arctic shelf biggest hope is the Shtokman gas field in the Barents Sea. And a high priority is also given to development of gas fields in Yamal peninsula and its adjusted offshore areas in the Kara Sea. Russian gas monopolist Gazprom is the owner of Shtokman and Yamal projects, and this article is based on information from the official Gazprom site.

Shtokman, the Barents Sea

The Shtokman project has been prioritised by the authorities and companies, discussed on the political arena and highlighted in media during the last seven years. The project development has several sides and challenges – economical, technological, environmental and political. Discussion on a high level during recent years

Figure 3.16 Prirazlomnoye and Dolginskoye are the largest discovered oil fields in the Pechora Sea. Prirazlomnoye will be the first Russian Arctic offshore oil field put in commercial production.

Figure 3.17 Arkticheskaya platform, that is built in Severodvinsk for Gasflot, should be completed in 2009 and start exploration drilling on Dolginskoye oil field in the Pechora Sea replacing leased Energy Exerter platform.

The major part in the future oil shipment in the Pechora Sea is also linked to the production at Dolginskoye oil field. The licence for oil exploration and production at this field was given to Gazprom in December 2005. Dolginskoye field with proven reserves of 235 million tons of oil is located north of Prirazlomnoye. It is the largest among discovered oil fields in the Pechora Sea. Up to 2010, Gazflot, subsidiary of Gazprom, plans to drill 7 new exploration wells at Dolginskoye, and get the first oil in 2015.

Oil production is planned on three more licensed sites in the Pechora Sea – Medynsko-Varandeyskiy area, Kolokolmorskiy and Pomorskiy blocks. The licenses are owned by Arktikshelfneftegaz, and the oil fields can be put in operation after 2010. The estimated recoverable hydrocarbon reserves of these three blocks may exceed 300 million tons of oil.

In 2008, Ministry of Economic Development of Russia elaborated the “Concept of the State programme for exploration and development of the continental shelf of Russia”. According to the “passive” scenario the maximum yearly oil production on the shelf will be 30 million tons in the period from 2010 to 2030; and by the “active” scenario oil production, with development of discovered and prospected oil fields on the shelf, may reach the level of 90 million tons a year in 2020.
resulted in 2007 with signing agreements and establishment cooperation between Russian Gazprom, French Total, and Norwegian StatoilHydro at the Phase 1 of the Shtokman field development. In February 2008, the Shtokman Development Company was established with 51% shares of Gazprom, 25% of Total, and 24% of StatoilHydro.

Shtokman gas and condensate field was discovered in 1988. This field is located in the central part of the Russian sector of the Barents Sea shelf, about 600 kilometres northeast of the city of Murmansk at local sea depths of 320-340 metres.

The proven reserves (C1+C2) of the field make up 3.8 trillion cubic metres of gas and over 37 million tons of gas condensate.

Sevmorneftegaz, a 100% subsidiary of Gazprom, holds the license to search for, explore, and produce gas and condensate from the Shtokman field. Shtokman Development AG, a joint venture of Gazprom, Total and StatoilHydro will be the owner of the phase 1 project infrastructure during 25 years, starting from the moment the field is put on stream.

Annual gas production during the phase 1 of the project should be on the level of 23.7 billion cubic metres of natural gas that will be split for producing 7.5 million tons of LNG, and piping 11 billion cubic metres southwards. The start up of gas supply via the pipeline is planned due 2013, and LNG supply – 2014. The pipeline from Shtokman field will go to Teriberka, and then to Volkhov to join Nord Stream Gas pipeline. The LNG plant will be built in Teriberka, about 100 kilometres east of Murmansk.

In 2008, Vyborg Shipbuilding Plant started construction of two semi-submersible drilling rigs for Gazflot, a subsidiary of Gazprom, to drill production wells on the Shtokman field. Samsung Heavy Industries, a South Korean company, was identified as a subcontractor to construct the topsides of the platforms. The platforms are intended for operation in a harsh natural and climatic environment and should be capable of performing exploration and production drilling of up to 7500 metres oil and gas wells at 70-500 metres water depth. The construction of the first drilling rig is due in the fall of 2010 and of the second – in 2011.

The Shtokman project will be developed in three phases – each for production of 23.7 billion cubic metres of natural gas a year. When the Shtokman project is developed on a full scale, the yearly production at the field will be on the level...
Oil transport from the Russian part of the Barents Region. Status per January 2009

Yamal, the Kara Sea
Even bigger perspectives comparing to Shtokman for future of Russia’s gas production are opened with Yamal peninsula and the Kara Sea shelf.

The Yamal Peninsula is a strategic oil-and-gas bearing region of Russia. Commercial development of fields onshore and offshore Yamal is crucial for securing Russia’s gas production build-up beyond 2010.

26 hydrocarbon fields – 11 of gas and 15 of oil, gas and condensate with about 16 trillion cubic metres of gas reserves (ABC1+C2), and 22 trillion cubic metres of gas resources (C3+D3) have been discovered on the Yamal Peninsula and its adjacent offshore areas. Reserves of condensate (ABC1) are estimated at 230.7 million tons and of oil ~ 291.8 million tons.

Gazprom Group holds the development licenses for the Bovanenkovskoye, Kharasaveyskoye, Novoportovskoye, Kruzenshternskoye, Severo-Tambeyskoye, Zapadno-Tambeyskoye, Tasiyskoye and Malyginskoye fields. The Bovanenkovskoye field is the biggest one in Yamal with gas reserves (ABC1+C2) of 4.9 trillion cubic metres. The initial gas reserves of the Kharasaveyskoye, Kruzenshternskoye and Yuzhno-Tambeyskoye fields amount to about 3.3 trillion cubic metres.

With implementation of Gazprom’s Yamal megaproject, the onshore fields are to be developed in three production zones – Bovanenkovo, Tambey and Southern. The Bovanenkovo production zone with three basic fields should give the total production up to 220 billion cubic metres of gas and up to 4 million tons of condensate per annum. The Tambey production zone with six fields is projected to produce up to 65 billion cubic metres of gas and up to 2.8 million tons of condensate per annum. And the Southern production zone with nine fields will produce up to 30 billion cubic metres of gas and up to 7 million tons of oil per annum.

According to gas production forecast of Gazprom, in 2011, gas production on Yamal Peninsula will reach 7.9 billion cubic metres per annum. The development of prospected areas offshore Yamal in the Kara Sea is to start after 2025, and in 2030, Gazprom’s annual gas production on Yamal and adjusted offshore areas will be on the level of 310-360 billion cubic metres.

over 70 billion cubic metres of natural gas and 0.6 million tons of gas condensate. Gazprom decided that pipeline gas deliveries from the Shtokman field to the European market would take priority over LNG shipments. Shtokman was identified as the resource base for Russian gas export to Europe via the Nord Stream Gas pipeline.
Thus, the maximum annual gas production on Yamal is comparable to the volume of Gazprom’s current gas supplies to the domestic market, and about a half of today’s total gas production in Russia.

Most of Yamal gas will be piped to the United Gas Supply System (UGSS). Gazprom is also exploring the possibilities for constructing an LNG plant on Yamal Peninsula.

According to the active scenario of the “Concept of the State programme for exploration and development of the continental shelf of Russia”, elaborated by the Russian Ministry of Economic Development in 2008, annual gas production with development of discovered and prospected fields on the shelf can reach the level of 150 billion cubic metres in 2020. The major part of these volumes should be given by the Russian western Arctic shelf – the Barents, Pechora and Kara seas.

Figure 3.21  The first drilling rig, that will start drilling wells in Bovanenkovskoye field, was manufactured by the leading Russian machine-building enterprise Uralmash – Drilling Equipment, and was named Yekaterina.
4 Oil and Gas Transport

The description of the transport system in Russia is based on the “Transport Strategy of the Russian Federation in the period to 2030”, the federal program “Development of the transportation complex of the Russian Federation in the period 2010-2015”, reports, documents and press-releases of the Ministry of Transport of Russia. The articles about railways were based on the information from the Russian Railways Company and its departments. Description of the sea and river transport was based on the information of the Federal Agency of Sea and River Transport; we also used news published by Portnews, Infoflot and Logistics information portals. The description of the oil and gas pipeline systems is based on our report from 2007 and updated with information and news published by trunk pipelines operators Transneft, Transnefteprodukt and Gazprom.

The descriptions of the oil loading terminals are based on our previous reports “Oil transport from the Russian part of the Barents Region” from 2003, 2005 and 2007, and updated using information from press-releases, reports and news of the companies-operators, port authorities, regional information agencies, and local newspapers.

We also include the article (chapter 4.3) prepared by Dr Mikhail Grigoriev for the present report on our request. He presents assessments and visions of the Northwest Russia oil transport system status and development prospects.

Russia transports oil and gas using pipelines, railways, and river and sea shipping routes. Trunk pipeline systems play the major role in delivering hydrocarbons for export.

In 2008, the Ministry of Energy of Russia elaborated the “Energy Strategy of Russia for the period to the year 2030” based on the 2020 strategy. According to the basic scenario of the new Energy Strategy, annual oil-and-gas production in 2030 should be on the levels of 530 million tons for oil (versus 488 in 2008), and 706 billion cubic metres for gas (versus 665 in 2008); and the export volumes will be on the levels of 240 million tons for oil (versus 243 in 2008) and 355 billion cubic metres for gas (versus 187 in 2008).

Figure 4.1 Prospects of annual oil and gas exports from Russia by basic scenario of the Energy Strategy - 2030.

4.1 TRANSPORT SYSTEM IN RUSSIA

Russia has its most advanced transportation infrastructure in the European part of the country. The total annual freight turnover in Russia, including pipelines, railway, automotive transport, inner waterways and sea shipping and aviation, had almost 60% growth for the last decade from 3.1 billion ton-kilometres in 1998 to more than 4.9 billion ton-kilometres in 2008. The freight turnover of public-use types of transport (except pipelines) in 2007 was almost 2.5 billion ton-kilometres, with 12 billion tons of cargo transported.

Figure 4.2 The total annual freight turnover in Russia, in billion ton-kilometres (Source: Rosstat, Prime-Tass).
The value of different transportation types is determined by their share in the total transportation flow. The major part of the cargo transport activity in Russia belongs traditionally to pipelines and railways that respectively share 50% and 43% in annual ton-kilometres freight turnover.

The yearly volume of export-import cargo in Russia is more than 600 million tons and the volume of export exceeded the import by almost 1.5 times. The majority of annual exports from Russia are comprised of fuel, including crude oil and oil products, natural gas, and coal. According to Rosstat, the annual crude oil exports had more than two times increase from 1997 to 2004, growing from the levels of 127 million tons in 1997 to 260 million tons in 2004.

In 2007, Russia exported 258 million tons of crude; 112 million tons of oil products; and 192 billion cubic metres of natural gas. In 2008, the export volumes were on the levels of 243 million tons of crude; 115 million tons of oil products; and 187 billion cubic metres of natural gas.

In 2008, the Government of the Russian Federation adopted the “Transport Strategy of the Russian Federation for the period to 2030” proposed by the Ministry of Transport, as well as the Federal Programme, “Development of the Transport System of Russia in the period 2010-2015”.

In the Transport Strategy – 2030, the Ministry of Transport gave three scenarios of the Russian transport system development: “inertial”, “energy-resource”, and “innovation”.

All three ways of the Russia’s transport system development include:

- implementation of large transport projects ensuring resources development and hydrocarbon extraction in new production regions, like oil in Eastern Siberia and gas on the Arctic Shelf; and construction of trunk pipelines;
- transport infrastructure development for realisation of transit potential of economics;
- reconstruction and building up transport infrastructure securing transportation safety, modernisation of transport means;
- development of export infrastructure with focus on sea ports.

The energy-resource scenario of the transport system development also adds on among other directions:

- diversification of export routes for Russian hydrocarbon deliveries;
- increase of deliveries of processed goods, including oil products;
- establishment of specialised sea ports with logistic complexes.

The Ministry of Transport prioritises the third, innovation way of the Russian transport systems
development that also includes:

- increased of high technological products exports;
- increased role of transport-logistic infrastructure in goods transportation;
- development of large transport-logistic and production junctions in Northwest region, Southern region and Far East;
- development of the Northern Sea Route.

According to the new Russian Transport Strategy, in 2030 the annual volume of cargo deliveries by all public-use types of transport (excluding pipelines) should be on the level from 18 to 20 billion tons, with annual freight turnover – from 3800 to 4500 billion ton-kilometres.

The Federal Program “Development of the Transport System of Russia in the period 2010-2015” consists of six sub-programmes:

- Development of export of transport services;
- Railway transport;
- Automotive transport;
- Sea transport;
- Inland waterway transport;
- Civil aviation.

Figure 4.6 Total annual freight turnover growth by the innovation scenario of the Russian Transport Strategy – 2030.

Figure 4.7 Total annual cargo volumes growth by the innovation scenario of the Russian Transport Strategy – 2030.

Figure 4.8 Transport infrastructure of Russia in 2010-2030 according to the Transport Strategy – 2030.
Each sub-program consists of a number of big prioritised projects and concrete parameters to reach on certain stages of implementation.

The main directions of the sub-programme, “Development of export transport services” are:

- complex development of transport corridor “West – East” on the direction Europe – the Russian Federation – Japan with branches to Kazakhstan, Mongolia and China;
- complex development of the transport corridor “North – South” on the direction Northern Europe – the Russian Federation – Iran – India with branches to Caucasus, Persian Gulf and Central Asia;
- development of transport route “Northern Europe – Asian Pacific” using the Northern Sea Route;
- development of international transport route “Europe – Asia – Northern America”.

The project of the complex infrastructure development of the Murmansk Transportation Junction is one of the prioritised investments projects within this sub-program.

With the Federal Program implementation, the annual transit cargo volume should grow from 30 million tons in 2009 to more than 42 million tons in 2015; and the annual cargo transhipment volumes in the Russian sea ports should rise from 515 million tons in 2009 to 774 million tons in 2015.

4.1.1 RAILWAYS

Railway transport is a main mean of commercial deliveries in Russia. Primarily, it can be explained by the country's geographical features. The length of railway tracks puts Russia on the second place in the world after the USA. Operational length of the public use railways in Russian is more than 85 thousand kilometres, and the industrial ones – 42 thousand kilometres.

Both Russian public-use and industrial railways transport more than 5 billion tons of cargo per year. Oil share in 1.3 billion tons delivered by public-use railways is about 18% or more than 200 million tons annually.

In Russia, 85% of the railways are located in the European part of the country. This is accounted for by historical reasons as the economy of Russia is mainly concentrated there. Both the major communications networks and freight traffic in Russia were built around the country's export-
The October railway
The October railway goes from Moscow through Tver, Pskov, Novgorod, Leningrad, Vologda and Murmansk regions and the Republic of Karelia. It has the operational length of 10 373 kilometres and carries more than 100 million tons of cargo a year (130 million tons in 2008).

The railway carries 75% of all cargo volumes transported in the Northwest Federal District of Russia. The October railway shares about 40% of all export-import transports of the Russian railways. It delivers export cargoes to the ports of Saint-Petersburg, Vyborg, Vysotsk and Ust-Luga in the Baltic Sea; Vitino and Kandalaksha in the White Sea; and Murmansk and Severomorsk in the Barents Sea.

Increasing export-import capacities of the Baltic Sea port terminals is of the strategic interest for Russia. And development of the Ust-Luga port terminal with the connected railway infrastructure has been one of the most prioritised investment projects of the Russian railways during the recent two years. The plan is to increase the annual cargo transports approaching Ust-Luga by railway from 6 million tons in 2007 to 36 million tons in 2010.

Another important export direction is northwards via the Barents Sea ports. At present, the major part of freight traffic going north along the October railway is connected to fossil fuels – oil products and coal going for export. Since 1995, the export oil was delivered to the Beloye More station (Vitino port); since 2004, the export oil products have been carried all the way to the port of Murmansk; and since 2006 also further north to Severomorsk (Mokhnatkina Pakhta). In 2003, the railway delivered to Vitino port almost 6 million tons of export oil (about 100 000 railway tank cars), and in 2008, about than 5 million tons of crude and oil products were sent to the terminals in the Murmansk Region for export.

In 2005, the electrification of the October railway was completed all the way to Murmansk. Electrical power has given the possibility to enlarge the carrying capacity of cargo trains by 1.5 times.

According to the October Railway Department, the expected growth of freight at the Murmansk railway junction for the period 2010-2015 may reach 40 million tons. The modernisation of the railway’s northern line (both tracks and service facilities) is carried out by the October Railway Department together with the interested parties of railway customers and carriers. By the year 2015, it is planned to develop and build new railway tracks to Kola and Murmansk on the eastern side of the Kola Bay; and to Lavna and Kulonga on its western side.
The Northern railway

In 2008, the Northern railway became 140 years old. The Northern railway goes along the oldest animal-drawn path from Moscow to Arkhangelsk, which connected the north of the country with its central provinces back in 1500s. Nowadays, the Northern railway runs in Northern and North-eastern Russia, through the territory of Yamalo-Nenets Autonomous District, the Republic of Komi, Arkhangelsk, Vologda, Kostroma, Ivanovo and Yaroslavl regions. The Northern railway has a favourable geographical position as it passes through the location of the major pipeline junction; the Ukhta-Yaroslavl-Kirishi pipeline joins the pipeline that goes through Surgut-Yaroslavl-Polotsk. The Baltic Pipeline System originates in Yaroslavl.

According to Russian Railways, the operational length of the road is 5961 kilometres and it carries about 70 million tons of cargo a year (69.2 million tons in 2008), where oil products shares are about 25% (16.6 million tons in 2008).

The Northern railway delivers 3-4 million tons of export crude oil from the terminal in Privodino in the south of Arkhangelsk region, and oil products from refineries in Yaroslavl to the port terminal in Talagi near Arkhangelsk on the White
Oil transport from the Russian part of the Barents Region. Status per January 2009

Figure 4.12 In May 2008, first 1500 tons of crude oil were offloaded from Ukhta-Yaroslavl trunk pipeline to rail tanks at Baklanka terminal in the Vologda Region. Crude from Baklanka is to be delivered by Northern railway and October railway to the port of Vitino in the White Sea and shipped for export.

Sea per annum. In 2008, new terminal for offloading crude from trunk pipeline to railway was put in operation at Baklanka station in the Vologda region. Crude oil is delivered by railway from Baklanka as to refineries in Leningrad and Pskov regions, as for export via Vitino port in the White Sea.

One of the most prospective project for the Northern railway is Belkomur, that combines construction of railway transport corridor from Ural to the White Sea via the Republic of Komi, and a new deep-sea port near Arkhangelsk. According to the “Strategy of development of railway transport in the Russian Federation to 2030”, construction of Belkomur railway should be realised in the period of 2016-2030.

By this strategy, also in the period from 2016 to 2030, a 612-kilometres long railway should be built from Sosnogorsk in the Republic of Komi to Indiga in the Nenets Autonomous District, and a new port on the Barents Sea coast. Another rail line will go from Vorkuta to Usť-Kara on the Kara Sea.

The Northern railway freight turnover will be significantly increased with development of Yamal oil-and-gas resources. Gazprom has started realisation of Yamal Megaproject that includes construction of 530-kilometres long Polar rail line Obskaya–Bovanenkovo to connect the Northern railway with Bovanenkovo – one of the largest oil and gas condensate field in the world. The rail line should be put in operation in the fall of 2009. The

rail line will go 130-kilometres further from Bovanenkovo to Kharasavey on the Kara Sea coast. A large multifunctional railway terminal will be built at Obskaya station of the Northern railway.

4.1.2 INLAND WATER-WAYS

The length of the rivers used in Russia for navigation on a regular basis totals more than 100 thousand kilometres. The freight ton-kilometres of the river transportation make about 2% of the total goods turnover in Russia.

The largest rivers of Siberia and the Far East are the Ob, the Irtysh, the Yenisey, the Lena, and the Amur rivers. All these rivers serve the oil-and-gas industrial complex. In the European part of Russia, the major navigable river is the Volga,
which incorporates other water routes: the Volga-Baltic and the Volga-Don canals. The total extent of the Volga-Kama basin is 3.5 thousand kilometres. The annual turnover of goods amounts to 50% of the total river transportation turnover of Russia.

In the Russian part of the Barents Region the main navigable river is the Northern Dvina that carries cargo to Arkhangelsk and Kotlas. The Pechora River freights goods to Naryan-Mar and the Nenets Autonomous District. The Ladoga and Onego lakes are also used for cargo transportation.

The White Sea-Baltic canal played an important role in freight transportation to the north during the Soviet time. The canal was opened for navigation in August 1933. The first delivery of oil by the White Sea-Baltic canal took place in August 1970, then the river-sea tanker Nefteraldovoz-3 of Volgotanker Company passed hundreds kilometres by Volga River, the White Sea-Baltic canal, and the White Sea and moored to the pier of Kandalaksha town in the Murmansk Region. In 1990s, The White Sea canal practically went out of use. During 2003, Volgotanker Company delivered the canal 220 thousand tons of fuel oil by the canal, which were loaded into sea tankers in the Onega Bay of the White Sea for export. The delivery of export oil through the White Sea canal was halted due to heavy fuel oil spill accident that happened during the transshipment operation in the Onega Bay in September 2003 (see the 2005 report).

In 2008, more than 5 million tons of cargo was transported by the White Sea – Baltic canal. A new impulse for the White Sea-Baltic canal may be given with reconstruction of a sea port in the town of Belomorsk on the White Sea coast. According to the Government of the Republic of Karelia, a deep-sea port in Belomorsk will be built in 2011, and the port capacity will reach 15 million tons a year.

According to the Russian Ministry of Transport, 153 million tons of cargo was transported by inland waterways in 2007; including 3.7 million tons of oil products. Rivers and canals were mostly used for delivering goods to the Russian northern regions. River ships in Siberia transported cargoes to Vankor oil field and the port of Yamburg in Yamalo-Nenets Autonomous District. Construction materials and pipes were delivered by Lena River for building Eastern Siberia – Pacific Ocean trunk oil pipeline in the Republic of Sakha.

The river fleet accounts more than 30 000 ships with the total deadweight over 12 million tonnes. The average age of Russian river-sea ships exceeds 25 years.

According to the innovation scenario of the Russian Transport Strategy – 2030, the annual cargo volume transports by the inland waterways should reach the levels of 203 million tons in 2020, and 262 million tons in 2030. And the Federal program of the transport development states that 97 new cargo ships should be delivered for the river fleet of Russia in the period of 2010-2015.

![In the European part of Russia, the navigable rivers and canals connect the Black, the Caspian, the Baltic and the White Seas.](image)

![Dynamics of cargo volumes transported by inland waterways of Russia. In 2007, the volume of transported cargo exceeded 150 million tons, including 26 million tons delivered to the Northern regions.](image)
4.1.3 SEA TRANSPORTATION

The first seaport of Russia, Arkhangelsk, has its 425th year anniversary in 2009. In 2008, the sea transportation system of Russia accounted 62 trade and specialised seaports.

The cargo turnover of the Russian seaports has grown steadily during the recent decade. According to the Federal Agency of Sea and River Transports of Russia (Rosmorrechflot), in 1999, the annual cargo turnover was 162 million tons; in 2003, it was 285 million tons; and in 2008 it reached the level of almost 455 million tons. Bulked cargo, most of all oil and petroleum products, form about 59% of the volumes shipped in the Russian ports (263 million tons in 2008). Export cargoes share about 75% of total annual turnover – 344 million tons in 2008. Today, Russian seaports handle 80% of Russian cargoes, and only 20% are transshipped in the ports of neighbouring countries (versus 50% in 1992).

The seaports of the Northwest region take the leading position in the ports cargo turnover. In 2008, the North-western seaports handled 215 million tons of cargo (or 47% of the Russian seaports freight turnover); the Southern basin ports shipped 159 million tons (35%); and the Far-East region ports – 80 million tons (18%).

In the “Transport Strategy of the Russian Federation for the period to 2030”, the great emphasis is given to the increase of seaports' capacities. According to the innovation scenario of the Transport Strategy - 2030, the volume of annual cargo turnover in the Russian seaports should reach the levels of 542 million tons in 2020, and 1025 million tons in 2030.
owned Sovcomflot is the largest Russian shipping company, and including Novoship it became the world’s second biggest operator of Aframax tankers, the fifth biggest operator of Suezmax, and the leader in Arctic shipping and ice-class LNG. By the fall of 2008, Sovcomflot had 132 ships with the total deadweight of 9.5 million tons and the average age of tankers less than 6 years. 30 more tankers with 2.6 million tons deadweight are under construction. Sovcomflot runs Far East and Arctic sea transportation of hydrocarbons serving such projects as Sakhalin-I, Sakhalin-II and Varandey.

According to CNIIMF, in 2008, the Russian icebreaking fleet consisted of 28 ice-breakers, including 7 nuclear ones working in the Arctic that were built in the period from 1974 to 2007 – Arktika, Rossiya, Taimyr, Sovetskiy Soyuz, Vaigach, Yamal, and the newest one 50 Let Pobedy.

In 2007, the construction of the biggest in the world nuclear icebreaker named 50 Let Pobedy (50 Year Anniversary of the Victory) was completed, and the icebreaker was delivered to its operator – Murmansk Shipping Company. Construction started in October 1989 at Baltic Works in St. Petersburg, was halted in 1993, and restarted in 2003. The icebreaker is an upgrade of the Arktika-class: the 159-meter long and 30-meter wide vessel, with a power of 55.2 MW and deadweight of 3,500 tons, is designed to break through ice up to 2.8 metres thick.

Arctic icebreaking fleet plays one of the most important role in operation and development of the Northern Sea Route and establishment of the transport corridor for international trade. According to estimations of Rosmorrechflot, the annual cargo turnover by the Northern Sea Route may grow from 1.5 million tons in 2002 to 50 million tons in 2020. Such grow concerns development of all elements of the Arctic sea transportation system, including fleet, seaports, communication and management means.

Development of port capacities in the Russian part of the Barents Region is directly connected to the increase of hydrocarbon exports. In 2008, the seaports of Varandey, Arkhangelsk, Vitino and Murmansk, directly or through the offshore terminals in the open areas of the Barents Sea, exported about 10 million tons of crude oil and petroleum products (in 2002 it was 4 million tons; and in 2004, the amount was almost 12 million tons). In 2009, the volume of oil exported to the western market through the Barents Sea can be on the level of 15 million tons, and in 2015, the Russian western Arctic ports may have capacities to tranship up to 100 million tons of liquid hydrocarbon products annually.

Figure 4.20  In 2008, the Russian icebreaking fleet consisted of 28 ice-breakers including 7 nuclear ones built working in the Arctic. In 2007, the biggest in the world nuclear icebreaker 50 Let Pobedy was delivered to its operator – Murmansk Shipping Company.

Figure 4.21  Sovcomflot is the largest Russian shipper and the world’s number one operator of the Arctic shuttle tankers. In 2008, the Admiralty Shipyards in St Petersburg launched their first 70 000 tons deadweight double acting ice-class tanker Mikhail Ulyanov for Sovcomflot that will serve Prirazlomnaya platform in the Pechora Sea. Photo: newly built Mikhail Ulyanov tanker staying behind the legendary icebreaker-museum, Krasin, former Seyatogor – the second Russian Arctic ice-breaker built back in 1916.
LNG export perspectives

In the coming future, transportation of liquefied natural gas (LNG) will have significant share in Arctic sea transportation of hydrocarbons. LNG is an alternative to pipeline gas transportation and is winning a growing share of the market. In 2006, it accounted for about 6% of the global consumption of natural gas. The International Energy Agency has calculated that LNG's share of the market will grow to 16% by 2030.

The main projects for the creation of LNG production facilities in Russia are connected with the possible deliveries of LNG to the USA and East Asia, where Russian natural gas could not be delivered by pipeline in the foreseeable future. Gazprom plans to produce LNG for future deliveries to the North American market at the Shtokman field in the Barents Sea and Kharasaveiyskoye field on the Kara Sea coast in Yamal. Russia’s LNG projects in the Far East are meant to provide fuel to the East Asian countries – Japan, South Korea and China, and also to the North America. The first LNG plant of two process trains with the throughput capacity of 4.8 million tons of LNG per annum each is being built on the Sakhalin Island under the Sakhalin-II project, and to be launched in February 2009. About 65% of the Sakhalin LNG will be delivered to Japan.

The first LNG plant in the Barents Region was built in northern Norway in Melkøya within Snohvit project. Snohvit, the first field put in production in the Barents Sea, and the LNG plant in Melkøya started to produce in 2007. The facilities will operate for 25 years. The production capacity of the new LNG single train facility is 4.3 million tons per annum.

Figure 4.22 The first LNG plant in Russia is launched on Sakhalin Island within Sakhalin-II project.

The first LNG plant in the Russian part of the Barents Region will be built within the Shtokman project. The Shtokman project will be developed in three phases – each for production of 23.7 cubic metres of natural gas a year. Annual gas production during the phase 1 of the project will be split for producing 7.5 million tons of LNG, and piping 11 billion cubic metres to Nord Stream pipeline. The start up of gas supply via the pipeline is planned due 2013, and LNG supply - 2014. The LNG plant will be built in Teriberka on the Barents Sea coast east of Murmansk.

In 2006, the Russian State Duma approved and the President signed a law “On Gas Export” which gave the exclusive right to export gas to an operator that owns the unified gas supply system or to its 100% subsidiary. The law formalised Gazprom's monopoly over pipeline gas exports and also extended the company's export monopoly to LNG, and liquefied petroleum gas (LPG). The sole exception to the new law allows non-Gazprom gas exports from companies that hold production sharing agreements (PSA) with the Russian Government.

4.1.4 TRUNK PIPELINES

Trunk pipelines form the main routes for transportation for Russian oil, oil products and gas.

The history of the pipeline transport in Russia (former USSR) is more than a century old, and started with the industrial development of Baku and Grozny oil fields in the south. The first Russian field pipeline Balakhany-Baku (10 kilometres long) was built back in 1878, and that pipeline became the ancestor of the giant network of trunk pipelines that are operating nowadays. By
the end of 1914, the total length of the Russian oil and oil product pipelines was 1279 kilometres. In comparison, at the same time the total length of the pipelines in the USA was 14,000 kilometres, including 7000 kilometres of trunk pipelines. Today, the length of Russian trunk pipelines for transportation of crude oil, oil products and gas makes 220,000 kilometres.

**Pipeline Transportation of Oil**

About 90% of oil produced in Russia is transported by trunk oil pipelines of state owned Transneft Company founded by the Government of the Russian Federation. In 2007, the Company piped 463.8 million tons of oil, among them 250.5 million tons for exports (228 million tons of Russian oil).

The system of pipeline transport includes about 350,000 kilometres of technological pipelines (oil collection, delivery of water to maintain pressure in the horizons and to transport finished oil), about 2500 kilometres of long-distance pipelines belonging to oil companies, including foreign ones (Usa-Ukhta, Sakhalin-Di-Castri, Caspian Pipeline Consortium), as well as about 50,000 kilometres of trunk pipelines belonging to Transneft Company. In 2008, the Transneft oil transportation system included 386 oil compressors and 833 oil storage reservoirs with a total capacity of about 15 million cubic metres. The Company’s pipelines pass through 65 regions of Russia.

In 2007, Transneft transported 250.5 million tons of oil for export, among them 34.2 million tons was delivered to refineries in CIS countries - Belarus, Ukraine and Kazakhstan; and 216.3 million tons were sent to “far abroad” countries via export terminals where the largest amount of 74.2 million tons was handled by Primorsk port terminal ending the Baltic Pipeline System.

Construction and development of the Baltic Pipeline System (BPS and BPS-II) in the west and East Siberia-Pacific Ocean (ESPO) pipeline in the east have been the main investment export oriented projects of Transneft during the recent years. In addition to these developments in the Northwest and Southeast, it is proposed to build Burgas-Alexandroupolis pipeline in the south, and Kharyaga-Indiga pipeline in the north.
Oil transport from the Russian part of the Barents Region. Status per January 2009

The major investment projects of Transneft are:

• **Eastern Siberia - Pacific Ocean pipeline system (ESPO)**
  The construction of ESPO is being implemented to deliver West- and East- Siberian oil to the Pacific oil terminal. The pipeline is 4770 kilometres long (2700 kilometres at the first stage: Taishet–Skovorodino), has a design capacity of 30 million tons at the first phase and 80 million tons on a full scale. In April 2006, construction began of the first start-up complex. The first phase of the ESPO project should be completed in December 2009.

• **Kharyaga-Indiga pipeline**
  The proposed pipeline is intended to deliver oil produced in Timano-Pechora to the oil terminal near Indiga settlement on the Barents Sea coast. The design capacity of the pipeline is 12 million tons and its length is 395 kilometres.

• **Burgas-Alexandroupolis pipeline**
  It is planned to build a pipeline from the Bulgarian port of Burgas to the Greek port of Alexandroupolis to transport oil bypassing the Bosporus and Dardanelles. The design capacity of the pipeline is 35 million tons with possible enlargement to 50 million tons, and the length is 287 kilometres.

• **Baltic Pipeline System II (BPS-II)**
  The capacity of the Baltic Pipeline System with the terminal in Primorsk was increased from 12 million tons in 2001 to 75 million tons in 2007. In November 2008, the Russian Government took a decision to construct 1016 kilometres long BPS-II from Unecha to Ust-Luga port with a branch (182 kilometres) to Kirishi refinery. The planned capacity of BPS-II is 50 million tons, and the first stage for 30 million tons should be completed in 2012.
Pipeline Transportation of Oil Products
The trunk oil products pipeline system of Russia is operated by Transnefteprodukt Company, subsidiary of Transneft since 2008. Trunk oil products pipeline network runs from the Kemerovo Region in the east to the western borders of the Republic of Ukraine with Hungary and the Latvian port of Ventspils in the west. The length of the pipeline system is 20 100 kilometres, of which 16 200 kilometres are trunk pipelines and 4 000 kilometres are branches. The pipelines carry light petroleum products (engine fuels) from 15 oil refineries in Russia and 2 refineries in Belarus.

For the year 2008, the annual capacity of the pipeline system receiving oil products from Russian refineries was on the level of 53 million tons.

In 2007, Transnefteprodukt transported 26.5 million tons of oil products, including 22.7 million tons of diesel. 15.8 million tons of oil products were exported and 10.7 delivered to home market.

The main goal of Transnefteprodukt for the coming years is to develop export directions bringing trunk pipelines to the coasts of the Baltic and Black seas. The priority number one is construction of the trunk oil products pipeline Kstovo–Yaroslavl–Kirishi–Primorsk (the North project) with a terminal in Primorsk. The design capacity of the pipeline is 24.6 million tons, of which the first start-up complex accounts for 8.4 million tons. When the North project is completed, Transnefteprodukt may deliver oil products from 12 Russian refineries to the Baltic deep-sea port.

In October 2007, Transnefteprodukt completed 1056 kilometres long Kstovo-Primorsk trunk pipeline filling it with diesel fuel. In May 2008, the first start-up complex of the North project for 8.4 million tons was put on stream and the first tanker received diesel in Primorsk port terminal. The North project should be completed in 2015.

The next step of Transnefteprodukt is the South project that includes construction of the 1550 kilometres long Syzran-Saratov-Volgograd-Zhelezny Rog trunk pipeline and the 8.1 million ton export terminal on the Black Sea coast. The South project should be realised in the period of 2013-2017.

Implementation of these projects will increase the annual capacity of the Transnefteprodukt pipeline system from 53 million tons in 2007 to 85 million tons in 2017.

Pipeline Transportation of Gas
All natural gas produced in Russia is piped by the Unified Gas Supply System of Russia operated and owned by Gazprom.

Russian United Gas Supply System (UGSS) is the world’s largest gas transportation system that comprises of gas extraction, processing, transmission, storage and distribution facilities. The UGSS infrastructure includes 156 900 kilometres of trunk and branch gas pipelines; 268 compressor stations and gas pumping units, 6 gas processing and gas condensate complexes; 24 underground gas storage facilities. The gas transportation system accounts for about 85% of the basic production assets of Gazprom Company and more than half of its length are large diameter gas pipelines of 1220 and 1420 mm. Russian national gas distribution system includes more than 640 000 kilometres of pipelines, and Gazprom Group of companies service 80% of them.

The average distance over which gas is delivered to Russian consumers is about 2400 kilometres and to foreign consumers, about 3400 kilometres. The distance of gas transportation from the northern fields in the Tyumen Region to the remotest importing countries such as France and Italy, is more than 5000 kilometres.

Implementing the plans to diversify export routes, in 2005, Gazprom brought to full capacity the Blue Stream gas pipeline going from Russia to Turkey by the Black Sea. Another Black Sea gas pipeline, South Stream, should be constructed to deliver Russian gas to Italy.

The construction of the Nord Stream gas pipeline, which will go across the Baltic Sea, was launched in 2005.
Oil transport from the Russian part of the Barents Region. Status per January 2009

Nord Stream is one of the most significant investment projects of Gazprom. The North European Gas Pipeline (with the length of 1220 kilometres, diameter of 1220 mm, operating pressure of 210 atmospheres, and design capacity of 27.5 billion cubic metres at the first stage and 55 billion cubic metres when completed) will go from Vyborg in Russia to Greifswald in Germany across the Baltic Sea. Gazprom is building 917 kilometres long pipeline to connect Nord Stream with UGSS. According to the first phase of the Shtokman project, the pipeline from Shtokman to Teriberka and Volkhov should be completed in 2013, and first gas produced at Shtokman field in the Barents Sea will be pumped to the Nord Stream pipeline.

Another Gazprom’s major project for supplying natural gas from the Arctic to central Russia and western Europe is realised within the Yamal Megaproject. In order to deliver gas from Bovanenkovo field in Yamal, Gazprom builds a multi-line gas transmission system on the route Bovanenkovo-Ukhta and Ukhta-Torzhok. The pipeline route will exceed 2400 kilometres, including new Bovanenkovo-Ukhta transmission corridor with the capacity of 140 billion cubic metres per year. This 1100 kilometres long pipeline will cross Baidarata Bay in the Kara Sea on its way. The first start-up complexes for 15 billion cubic metres of gas per year should be completed in 2011.

According to the Eastern Gas program, approved by the Russian Government in 2007, Gazprom realises the project of constructing the Sakhalin-Khabarovsk-Vladivostok gas trunk-line. The construction should be launched in 2009, and gas should be piped to Vladivostok in 2011. The Eastern Gas program was developed taking into account potential gas exports to China and other Asia-Pacific countries.

The Ministry of Energy of Russia elaborates the General Scheme of pipeline transport development in Russia to 2030. According to the 2008 draft, in 2030 annual gas production will be on the level of 876-981 billion cubic metres; gas exports (with LNG) may be on the level of 415-440 billion cubic metres, including 220-227 billion cubic metres pumped to western Europe, and 25-50 billion cubic metres – to Asia-Pacific countries.
4.2 OIL TRANSPORTATION ROUTES IN THE BARENTS REGION

In 2002, 4 million tons of Russian oil was transported for export along the Norwegian coastline, in 2003 the amount doubled to 8 million tons, in 2004 it almost reached 12 million tons, but the year after dropped and from 2005 to 2008 was on the levels between 9.5 and 11.5 tons per year. In 2009, thanks to new Varandey terminal that was put on stream, more than 15 million tons of oil can be delivered from Russia to the western market via the Barents Sea. And in five-ten years perspective, the total capacity of the Russian Arctic terminals shipping oil for export can reach the level of 100 million tons a year.

The coastal and offshore terminals listed in the table 4.1 below are receiving crude oil, oil products and gas condensate by pipelines, railways and river routes, and sending loads for export directly or via offshore transhipment terminals in Russian and Norwegian ice-free Barents Sea areas. These transhipment terminals do not add on volumes and are not listed in the table. The table 4.2 shows existing and projected capacities of the main Russian Arctic terminals.

Table 4.1. The annual volumes of crude oil and petroleum products shipped by Russian Arctic terminals for export via the Barents Sea in the period from 2002 to 2008.

<table>
<thead>
<tr>
<th>#</th>
<th>Locations</th>
<th>Oil shipped for export (per year in thousand tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2002</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Tiksi</td>
<td>60’</td>
</tr>
<tr>
<td>2.</td>
<td>Dudinka</td>
<td>20’</td>
</tr>
<tr>
<td>3.</td>
<td>Dikson</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Ob Bay</td>
<td>110’</td>
</tr>
<tr>
<td>5.</td>
<td>Varandey</td>
<td>200’</td>
</tr>
<tr>
<td>6.</td>
<td>Prirazlomnaye</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Kolguev</td>
<td>120’</td>
</tr>
<tr>
<td>8.</td>
<td>Indiga</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Arkhangelsk</td>
<td>1930’</td>
</tr>
<tr>
<td>10.</td>
<td>Severodvinsk</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Onega Bay</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>Vitino</td>
<td>2900’</td>
</tr>
<tr>
<td>13.</td>
<td>Teriberka</td>
<td>-</td>
</tr>
<tr>
<td>14.</td>
<td>Murmansk</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Mokhnatinka Pakhta</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Lavna</td>
<td>-</td>
</tr>
<tr>
<td>15.</td>
<td>Pechenga</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 4.2 Existing and projected capacities of main Russian Arctic terminals to ship oil and gas products for export via the Barents Sea, in thousand tons.

<table>
<thead>
<tr>
<th>Oil terminals</th>
<th>Capacity 2002</th>
<th>Capacity 2008</th>
<th>Capacity 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ob Bay</td>
<td>500'</td>
<td>600'</td>
<td>3,000'</td>
</tr>
<tr>
<td>Varandey</td>
<td>1500'</td>
<td>12,500'</td>
<td>12,500'</td>
</tr>
<tr>
<td>Prirazlomnoye</td>
<td>-</td>
<td>7,500'</td>
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It is not guaranteed that the above listed volumes will be shipped through the Barents Sea in six years perspective. But when the nearest plans of state and private companies to construct and expand pipelines, railways, ports, and terminals are implemented, Russia will have transportation facilities to export over 100 million tons of oil-and-gas by northern routes in 2015.

The private oil companies are motivated to export as much oil as possible. In 2002, the big oil companies proposed to build a trunk oil pipeline from the Western Siberia to Murmansk with the capacity of 120 million tons. Having the Baltic Pipeline System and Eastern Siberia-Pacific Ocean pipeline in the top of the priority list, the trunk oil pipeline monopolist Transneft have reconsidered the Murmansk pipeline proposal and elaborated the Northern project – building the Kharyaga-Indiga pipeline with the capacity of 12 million tons. In the meantime the oil companies, state and private, are going for oil transport by railway to the ports of the White and the Barents seas. With modernisation of the Russian railway system in the north, rail alone can bring up to 50 million tons of oil for export in 2010. Besides, up to 12 million tons of crude will come from onshore fields in the northern part of the Nenets Autonomous District via new built Varandey terminal in the Pechora Sea, and offshore Prirazlomnoye field may add on 7.5 million tons when put on stream. About 3 million tons of oil may be shipped via terminals in the Kara Sea to be transshipped in the ice-free area of the Barents Sea. By 2015, new terminals can be built in the Kola and the Pechenga bays of the Barents Sea. The Dikson port will be a suitable
transhipment site when new oil and gas fields in
Taymyr and the Kara Sea are developed. And
Gazprom intends to build LNG plants in Yamal
and the Kola Peninsula.

It is seen from the above mentioned plans that
even without the trunk pipeline to Murmansk the
shipments of oil and gas from Russia passing the
northern Norway will be significantly increased.
The pressure on the Barents Sea will increase with
development of oil and gas fields offshore, where
Snøhvit gas field in the Norwegian sector has
already started to ship products, and Goliat and
Shtokman will be put on stream in the near future.

In the following articles we describe oil and gas
loading terminals (from east to west) in the
Laptev, Kara, Pechora, White and Barents seas.
Most of the terminals are in operation, some have
been closed but represented significant interest
with unique transportation systems being
implemented there, some are projected and may
be realised with different levels of probability, but
all of them were and are aimed for shipping crude
oil, oil products, gas condensate or liquefied gas
for export via the Barents Sea.

4.2.1 THE LAPTEV SEA

Tiksi
The Tiksi port has not been shipping oil for export
along the Northern Sea Route since 2002. However,
we keep the Tiksi article in the report in
order to show one of the most complicated logistic
system established for delivering East Siberian oil
to the western market.

The commercial sea port in Tiksi, in the north of
the Republic of Sakha (Yakutia), was built in 1934,
first of all, for carrying commercial cargo and
essential supplies from the European part of
Russia to Yakutia, and exporting coal and wood
along the Northern Sea Route.

In 2001, the company Sakhaneftegaz in
cooperation with the Murmansk Shipping
Company started oil loading in Tiksi for shipping
it for export via the Northern Sea Route. The first
19 000 tons of crude from Talakanskoye oil field in
the Eastern Siberia were loaded to the tanker
Magas and sent to the western market.

The oil produced at Talakanskoye field was
delivered via 110 kilometre local oil pipeline to the
oil refinery and the terminal in Vitim on the Lena
River. From there, oil was transported down by
the Lena River with Lenaneft tankers of the Lena
River Shipping Company to oil storage facilities in
the port of Tiksi. In Tiksi oil was shipped to sea
tankers up to 20 000 tons deadweight and
delivered through 9 time zones to Rotterdam. The
capacity of this transportation scheme was about
100 000 tons per year.

Figure 4.36 Talakan oil will go eastwards by Eastern
Siberia – Pacific Ocean pipeline.
In the summer of 2001, the port of Tiksi loaded 38 000 tons of oil for export, and in 2002 – 58 000 tons.

Talakanskoie oil and gas field is the largest discovered in Yakutia with recoverable reserves of 124 million tons of oil and 47 billion cubic metres of gas. The maximum oil production level will be 6 million tons a year.

In 2007, construction of 540 kilometres pipeline from Ust-Kut to Talakanskoie field – the part of 4770 kilometres long East Siberia Pacific Ocean pipeline (ESPO) was launched. In 2008, oil from Talakanskoie field was piped in reverse mode by a launched 1100 kilometres long part of ESPO to Tayshet. When ESPO is completed, Talakan oil will be piped eastwards.

4.2.2 THE KARA SEA

Dikson and Dudinka
Rosneft had plans to construct an oil pipeline from Vankor group of oil fields northwards to Dikson, and a terminal in Dikson for shipping oil to the west by the Northern Sea Route. In 2006, the direction was changed. Vankor oil will be piped southwards to Transneft pipeline system and further to the east by the Eastern Siberia – Pacific Ocean pipeline.

Dikson with its unique location is seen as a perspective port and terminal for serving oil-and-gas industry developments in the north of Western Siberia and the Kara Sea. Dikson Island, a settlement and a port, is located in the northeastern part of the Yenisey Gulf of the Kara Sea on Taimyr Peninsula. By now, it has been the only sea port in the Kara Sea. The settlement on Dikson Island appeared in 1915. In 1934, the state started the construction of the Dikson seaport as a main port on the line of the Northern Sea Route for supplies of the passing ships. The fairway channels allow mooring ships of 50 000 tons deadweight.

Rosneft had plans to construct the oil pipeline Vankor-Dudinka-Dikson and an oil loading terminal in Dikson. The capacity of the proposed 710 kilometres long pipeline and the terminal was...
to be 18 million tons a year. Further, oil supposed to be delivered by shuttle tankers to transhipment terminal in the Barents Sea, and then by line tankers to the western market.

In 2006, the Vankor oil transportation scheme was changed. Oil extracted in Vankor group of oil fields will be transported by 550 kilometres Vankor–Pur Pe pipeline, which is to be completed in 2009. This pipeline will link the Vankor fields with the Transneft trunk oil pipeline system. And when East Siberia - Pacific Ocean pipeline is completed, Vankor oil can be transported by Transneft both to western and eastern directions.

The Vankor group of oil and gas field, located in the Turukhan District of the Krasnoyarsk Region and the Dudinsky District of the Taimyr Autonomous Region in Eastern Siberia. Vankor block consists of several oil and gas fields with estimated oil reserves of more than 600 million tons. Rosneft possess the licences for the biggest field of the group - Vankor oil and gas field with oil reserves over 500 million tons of oil. Rosneft planned to commence oil production at Vankor field in 2008, but postponed the plans. According to Rosneft, the Company can produce 23 million tons of oil at Vankor of oil and gas field a year.

When new oil and gas fields are developed in Taimyr and Kara Sea, the plans for constructing oil loading terminals in the ports of Dudinka and Dikson may come through. In 2002-2006, Dudinka port - the main transport facility of Norilsk Nickel, shipped 20-40 thousand tons of oil a year for export via the Barents Sea.

The Ob Bay
In 1999, the RITEK Company made the first shipment of oil in the Ob Bay, and introduced the northern scheme of delivering crude for export. The oil, produced at Sredne-Khulymskoye and Sandbinskoye oil fields in the Western Siberia, is delivered via local pipelines to the petroleum storage facilities in Andra and Numgi on the Ob River coast. There, oil is shipped to the river-sea tankers of Lena neft type (2100 tons deadweight) of Irtysh River Shipping Company and transported down by the river to the Ob Bay of the Kara Sea.

In 1999-2005, oil delivered to the Ob Bay was shipped directly to shuttle tankers of Astrakhan type (20 000) offshore in the area of Cape Kamennyi. In the navigation period of 2006, Severomorsk tanker (40 000) was moored near the Cape Kamennyi and used as Floating Storage and Offloading vessel (FSO). Sea shuttle tankers, such as Khatanga (23 000), Saratov (20 000) and Varzuga (16 400) transported oil from the Ob Bay by the Northern Sea Route via the Kara Gate to FSO Belokamenka in the Kola Bay of the Barents Sea. The operations in the Ob Bay were supported by the icebreaker Taimyr. In 2008, tankers Khatanga, Indiga and Aleksandr Sledzyuk of the Murmansk Shipping Company shuttled between Ob and Kola bays.

In 1999-2005, oil spill prevention and response services at the terminal were provided by Murmansk Basin Emergency and Salvage Department (MBESD), and since 2006, by the Regional Centre of Ecological-Emergency Operations that was established in Yamalo-Nenets Autonomous Region the same year.

In the period from 1999 to 2003, RITEK shipped in the Ob Bay and sent to export 470 000 tons of crude oil in total; in 2004 the amount was 240 000 tons; in 2005 – 357 000 tons; in 2006 – 454 500 tons. In 2007, the volumes dropped to 234 000 tons, as RITEK optimised their export schemes using railways; and in 2008, 238 000 tons of crude was sent westwards by the Northern Sea Route.

RITEK had plans to build a pipeline from the oil fields in the Western Siberia to the Ob Bay terminal with the capacity of 3 million tons a year. In 2008, RITEK produced 2.9 million tons of oil (the level of 2005) in Western Siberia and Tatarstan, and exported 1.4 million tons.

Figure 4.40 Since 1999, RITEK implements the scheme for crude oil export by the Northern Sea Route. Oil is delivered to the terminal in the Ob Bay by 2000 tons river-sea tankers and transhipped to 20 000 tons sea shuttle tankers that bring oil to FSO in the Kola Bay of the Barents Sea.
4.2.3 THE PECHORA SEA

Varandey
Opening a new Varandey terminal in 2008 was the most significant event happened during the recent years in the Russian Arctic oil shipment. The 12.5 million tons offshore terminal with related infrastructure can alone double the annual volumes of oil shipped for export through the Barents Sea.

The first oil loading terminal in Varandey was completed and put in operation in 2000. The construction and development of the first Varandey terminal was carried out in stages within a few years. In 2000, the first line of the terminal was completed and the first 10 000 tons of oil were shipped. In 2002, Murmansk Shipping Company built the second line of the Arctic offshore oil loading terminal in Varandey. The offshore installation consisted of an underwater solid steel structure, 12 metres in diameter, about 3 metres in height, and more than 100 tons of weight. The special mooring unit and the sub-sea pipeline (4.8 kilometres long, 270 mm in diameter and with the operating pressure of 30 atmospheres), supported an uploading rate of 5000 tons of oil per hour. The loading system was capable of operating steadily all-year-round.

The offshore terminal was connected to the onshore oil depot of Naryanmarneftegaz, that received oil from the northern oil fields of the Nenets Autonomous Region - Varandeyskoye, Toraveykskoye, Myadseyskoye, Toboyskoye via the local pipeline system. The terminal shipped crude to ice-reinforced tankers of Astrakhan type with 20 000 tons deadweight.

Oil spill prevention and response services at the first Varandey terminal were provided by the

Figure 4.42 The scheme of the first offshore terminal in Varandey that was in operation until March 2008.
Oil transport from the Russian part of the Barents Region. Status per January 2009

Murmansk Basin Emergency and Salvage Department (MBESD). In summer, the MBESD specialised vessel Agat was on watch during each oil shipment; in winter oil spill combat equipment was located on the icebreaker Kapitan Nikolaev that supported offshore operations.

In 2002, the Varandey terminal shipped 200 000 tons of oil; in 2003 – 400 000 tons; in 2004 – 560 000 tons; in 2005 – 600 000 tons; in 2006 – 500 000 tons; and in 2007 – 660 000 tons. In 2002-2005, oil was exported via FSO Trader (RPK-1) in the Kola Bay; and since 2006 via FSO Belokamenka (RPK-3). According to Murmansk Shipping Company, in March 2008 their terminal in Varandey loaded the last tanker and was closed, since the new Varandey terminal of Lukoil was to be opened.

In 2004, Lukoil Company presented a new project for construction of 12.5 million ton terminal in Varandey to ship oil from the oil fields of the northern Timano-Pechora province, first of all, of the joint Lukoil and ConocoPhillips Northern Territories project. The Northern Territories project includes Khylchuyu, Yuzhno Khylchuyu, Yareygyskoye and Inzyreyskoye fields, prospects in the northern part of Kolvinskiy megaswell and Khoreyverskaya hollow with estimated oil reserves (C1+C2) about 584 million tons. Naryanmarneftegaz, joint venture of Lukoil and ConocoPhillips, intends to produce up to 10 million tons of oil a year from the Northern Territories fields in 2009.

Oil from these fields will be piped to the new Varandey terminal. A 150 kilometres long pipeline from one of the largest in Timano-Pechora Yuzhno Khylchuyu field to Varandey oil depot was completed in 2008. The first production line at Yuzhno Khylchuyu was put on stream in June 2008, and the second one – in December that put the oil production at the field on its projected level of 7.5 million tons a year.

Lukoil has built the specialised oil loading seaport of Varandey to export oil produced in the northern fields of the Timano-Pechora province. Varandey oil terminal includes onshore oil depot with the total capacity of 325 000 cubic metres (with newly constructed storages for 260 000 cubic metres); 22.6 kilometres sub-sea oil pipeline (two lines with diameter of 820 mm); and the Fixed Offshore Ice-Resistant Offloading Terminal (FOIROT).

FOIROT is designed in octagonal shape. The
Oil transport from the Russian part of the Barents Region. Status per January 2009

construction is 43 metres wide in its base structure, and 55 metres high. The base structure supports topsides consisting of turret, helicopter deck, and offloading boom. Weight of the construction is about 13 000 tons. FOIROT has been installed 20 kilometres off the shore with the sea depths of 17 metres to receive 70 000 tons deadweight tankers. Crude comes to the offshore terminal from the onshore oil depot by sub-sea pipeline in heated condition. The system is looped with the shore – when oil is not loaded to a tanker it circulates around to maintain required temperature in the pipeline. No special cargo pumps are provided at FOIROT – necessary pressure is created at the onshore facility. The offloading speed of the new Varandey terminal is 8000 tons per hour. Lukoil-Kaliningradmorneft launched construction of FOIROT at its Steel Fabrication Yard in March 2006. Construction works were completed in 2007, and the same year FOIROT was installed on its place in the Pechora Sea. And the year after Lukoil started large-tonnage oil export from Timano-Pechora oil-and-gas province.

In June 2008, the new Varandey terminal loaded crude to the first 70 000 tons ice-class tanker Vasily Dinkov of Sovcomflot that delivered oil to Canadian port of Come by Chance in Newfoundland.

Sovcomflot signed a long-term contract with Naryanmarneftegaz for transporting oil from new Varandey terminal in 2005. The same year, Korean Samsung Heavy Industries got the contract for construction of three ice-class double action tankers for operations in Varandey. The first

70 000 deadweight, conventional ice-breaking tanker Vasily Dinkov was delivered to Sovcomflot in January 2008, the second – Kapitan Gotsky came in May the same year, and the third tanker Timofey Guzhenko should be launched in February 2009.

In addition to new ice-class tankers, in 2008, two ice-breaking ships were completed by Singaporean Keppel Singmarine for Lukoil to support Varandey operations. The multi-purpose icebreaking supply vessels Toboy was delivered to Lukoil in August and the multi-purpose icebreaker Varandey came in November.

According to Lukoil, the environmental safety system at Varandey has three levels of security and is fully automated.

In October 2008, the Varandey terminal hosted international integrated training exercises aimed at tanker accident and oil spill management.

Figure 4.47  Construction of FOIROT for Varandey was completed in 2007 and the same year it was installed 20 kilometres offshore in the Pechora Sea.

Figure 4.46  In 2008, two ice-breaking ships came into the Lukoil Arctic fleet. Toboy and Varandey were built for Lukoil to support all-year-round oil shipment operation at new Varandey terminal.

Figure 4.48  In October 2008, the Varandey terminal hosted international integrated training exercises on oil spill combat. The exercises were arranged jointly by Emercom and Lukoil.
The new 12.5 million tons Varandey terminal, that was put on stream in 2008, will soon double the annual volumes of oil that were shipped for export through the Barents Sea during the recent five years. Already in 2009, about 8 million tons of crude oil from Timano-Pechora can be sent for export via Varandey.

In 2008, the Varandey terminal sent 1.9 million tons of crude oil for export; most of it (1.6 million tons) was transhipped at FSO Belokamenka in the Kola Bay. And for one month of January 2009, the new terminal offloaded 550 000 tons of oil.

Already in 2009, new Varandey seaport and the export oil terminal operating all-year-round can ship 8 million tons of crude for export; most of it will come from Yuzhno Khylchuyu oil field recently put in full-scale commercial production. Crude from Varandey will be delivered by three 70 000 tons ice-class shuttle tankers to FSO Belokamenka or directly to the western market. According to Lukoil, in the future, the terminal capacity can be increased to 25 million tons a year.

Kolguev Island
The Peschanozyorskoye oil and gas condensate field in Kolguev Island was discovered back in 1982 and put on stream in 1987 by Arktikmorneftegazrazvedka (AMNGR). That year the first oil from the island was shipped to a tanker.

Oil production at Peschanozyorskoye field is carried out by AMNGR (central block) and Arktikneft Company (western and eastern blocks), former subsidiary of Lukoil that was bought by Urals Energy Holdings in 2005. By 2004, the recoverable oil reserves of Peschanozyorskoye field were estimated to 7.4 million tons of oil and 1.3 billion cubic metres of gas; and proven resources to 4.3 million tons of oil and 0.8 billion cubic metres of gas. In 2006, Urals Energy was awarded a new licence for oil and gas exploration in Kolguev.

All oil produced in Kolguev, some 50-100 thousand tons a year, is delivered by local pipelines up to 5 kilometres long to the oil processing facilities located in the centre of the field. Further, the crude is piped 12 kilometres north and either stored in the export tank farm or sent to one of two Crude Oil Topping Units (COTU) and refined into oil products. The export storage tank farm has a capacity of 75 000 cubic metres. Two COTUs have a maximum capacity of approximately 200 tons per day and produce gasoline, diesel and fuel oil for local needs.

Crude is exported via Arktikneft’s marine loading terminal located offshore and adjacent to the oil tank farm and COTUs. Offshore oil terminal allows shipping tankers with maximum 40 000 tons deadweight and 10.5 metres draft. Tankers are moored to buoys, and a rubber loading pipeline to get crude from the shore. Oil from Kolguev is delivered to Murmansk either for transshipment or customs clearance before going westwards. Crude oil exports from the island are limited as by oil reserves, as by a short navigation summer season that may last from two to six months.

In 2002-2008, oil from Kolguev was shipped to 20 000 tons deadweight tankers and delivered to export either via transhipment terminal in the Kola Bay or directly to Rotterdam. Annual oil
export volumes were decreased from 120 000 tons in 2002 to 80 000 tons in the years from 2004 to 2006. In 2007, the shipment dropped to 70 000 tons, and in 2007, to 50 000 tons.

Murmansk Basin Emergency and Salvage Department (MBESD) is responsible for oil spill prevention and response during oil shipment operations at the terminal.

**Prirazlomnoye**

Prirazlomnoye is one of the largest oil fields opened in the Pechora Sea shelf. It was discovered in 1989. The field is located at the distance of about 60 kilometres from the shore, with the sea depth of 20 metres, the winter temperatures down to minus 50°C and ice thickness up to 1.6 metres.

Initial geological oil reserves of the field are estimated as 231.1 million tons. The cumulative oil production for the operation period of 23 years should amount to 76 million tons with the maximum annual production of 7.5 million tons.

The license for development of Prirazlomnoye oil field belongs to the Sevmorneftegaz Company, a subsidiary of Gazprom.

The marine ice resistant fixed platform Prirazlomnaya is the central unit of the field. The platform is constructed at Sevmash enterprise in Severodvinsk, Arkhangelsk Region since 2002. Prirazlomnaya is intended for the whole-year exploitation drilling by the vertical and horizontal methods. The platform consists of gravity type caisson and topsides. Caisson is a steel base, which serves as support for topsides, incorporating equipment and facilities for oil production and processing. Caisson has a square configuration – 126 metres wide in the bottom side and 102 metres wide in the upper part. The wall along the perimeter of caisson top serves as ice and wave deflector. Topsides have facilities for well drilling and production, produced oil treatment and shipment, power supply of all kinds of production, personnel placing. Platform topside facilities mainly consist of rebuilt topsides of the Hutton platform (that was bought in Norway in 2002, previously operated in the Northern Sea), supplemented with intermediate deck. Intermediate deck is the additional level between caisson and Hutton deck. Tanks for potable water, diesel oil, and different drilling liquids are built in it. The platform is equipped with drill derrick, two cranes, flare tower, winter operation containers, oil shipment units, evacuation ground and helicopter landing site. The total weight of the platform is about 110 000 tons, its flare tower raises above the water surface over 120 metres. The crude oil storage capacity is 108 800 cubic metres, and maximum oil production output – 20 700 cubic metres per day.

The initial plan was to complete the construction and install the platform in the Pechora Sea in 2004, but the project was delayed. In 2006, Prirazlomnaya was assembled in the united structure – the topside units were installed on the caisson. According to the current production plans of Gazprom, Prirazlomnoye oil field should be put in commercial production in 2011. The yearly production maximum of 7.5 million tons of oil can be reached in the fifth year.
of production. Crude oil from Prirazlomnoye will be shipped to export, and in the future may also go to a prospected refinery in the Murmansk region.

In 2005, Gazprom, Sevmorneftegaz and Sovcomflot reached an agreement upon development and implementation of the oil transportation scheme for Prirazlomnoye oil field. The oil transport scheme, developed by Sovcomflot and Gazflot, includes two ice-reinforced shuttle tankers of 70 000 tons deadweight; 1-2 ice-reinforced shuttle tankers of 20 000 tons deadweight; FSO not less than 220 000 tons deadweight; four tankers of about 150 000 tons deadweight; icebreakers; tugboats; oil spill response vessel; service and supply vessels.

Admiralty Shipyards in St. Petersburg got the contract for construction of two 70 000 tons ice-class tankers for Sovcomflot operations at Prirazlomnoye. The first tanker Mikhail Ulyanov, the largest tanker ever built at Russian shipyards, was launched in October 2008, and the second one – Kiril Lavrov will be completed in 2009.

Two icebreaking supply vessels Vladislav Strizhev and Yurii Topchev were built at Hayvard in Norway and delivered to Sovcomflot in 2006.

Oil from Prirazlomnoye can be exported with transshipment in the ice-free are of the Barents Sea (FSO Belokamenka or other terminal) or delivered to a refinery that can be constructed in the Murmansk Region according to Gazprom’s proposal.

**Indiga**

Indiga is a small remote village located in the western non-industrial part of the Nenets Autonomous District. For the recent years, it is also a perspective area for building seaport with oil terminal ending Transneft’s pipeline, or stretching the Northern railway to the Barents Sea coast.

The Kharyaga-Indiga oil pipeline project was developed as a result of the Western Siberia-Murmansk pipeline proposal. Back in 2002, the five largest Russian oil companies Yukos, Lukoil, Sibneft, TNK and Surgutneftegaz proposed to construct an oil pipeline from Western Siberia to Murmansk with the capacity of up to 120 million
4.2.4 THE WHITE SEA

Arkhangelsk and Privodino

Arkhangelsk was founded in 1584, and historically it was built and developed as a Russian port on the White Sea. Here the Northern Sea Route was started. Arkhangelsk has an advanced transport infrastructure and plays the important role in “the Northern goods delivery”, that is, fuel and supplies for the remote regions of the Russian Arctic.

The oil depot in Talagi, 16 kilometres from the town of Arkhangelsk, is the largest one in the Arkhangelsk Region. The owner of the petroleum depot is Rosneft-Arkhangelsknefteprodukt. The company was founded on the basis of the Arkhangelsknefteprodukt, the state enterprise established in 1966 for supplying the Arkhangelsk Region with oil products. Rosneft-Arkhangelsknefteprodukt incorporates 11 oil depots with total capacity about 230 400 cubic metres, and 54 gasoline stations.

Since 2002, Rosneft-Arkhangelsknefteprodukt has been involved in the oil shipment for export. The crude oil produced in Timano-Pechora province, most of all by Severnaya Neft Company, is piped via the Transneft trunk pipeline Usa-Ukhta-Yaroslavl to the Privodino rail station where it is loaded to rail tank cars and transported further on by the Northern railway to the oil depot in Talagi. Oil is shipped to shuttle tankers in Talagi, then delivered to transshipment terminal in the Kola Bay – FSO Belokamenka, and further to the western market by line tankers.
The oil loading station Privodino of the Northern railway was built in 1974. The station is in the south of the Arkhangelsk Region, 40 kilometres from Kotlas and 790 kilometres from Arkhangelsk by railway. In 2003, Rosneft started building a rail oil terminal in Privodino station with the capacity of 4.5 million tons of oil per year. The first line of the terminal in Privodino was put in operation in 2004, and in 2006, the terminal was completed. During reconstruction, there were built 2 new rail lines; 3 oil tanks for 20 000 cubic metres each; developed operational and security infrastructure. The terminal can fill in 5 rail tank-car trains per day loading crude directly from the pipeline or from the oil storage.

The rail oil transport operation is managed by Transoil Company that uses about 900 tank-cars on the Privodino-Talagi line.

From Privodino, oil comes to sea oil terminal in Talagi located on the bank of the Kuznechikha armlet of the Northern Dvina River delta.

Since 2003, the Rosneft-Arkhangelsknefteprodukt has been conducting a large-scale reconstruction of the export terminal in Talagi. After the first phase of the reconstruction completed in 2003, Talagi export terminal could handle gas condensate deliveries from Rosneft-Purneftegaz in Western Siberia and also crude oil from other companies. The export terminal capacity in 2003 was about 2.5 million tons a year. Another reconstruction step was completed in 2005. After that modernisation, the terminal could unload simultaneously: 54 tank-cars with crude oil; 30 tank-cars with light oil products; and 15 tank-cars with fuel oil. The unloading speed is 800 cubic metres per hour for crude oil (400 in winter time) and 1000 cubic metres per hour for light oil products. 4 railroad side tracks could receive trains with 67-85 tank-cars each. The oil storage of the export terminal had a capacity of 190 000 tons. Two piers of the terminal, 150 metres long each, with the depth of 10.5 metres could receive tankers of 22 000 tons deadweight. In 2005, the capacity of the export oil terminal in Talagi was 4.5 million tons per year, including 3 million tons of crude oil and 1.5 million tons of light oil products.

In 2006, Rosneft started the second phase of the Talagi export terminal reconstruction with the focus on railroad side tracks. The reconstruction was completed in the fall of the same year, and the terminal’s total capacity is amounted to 6 million tons of oil and oil products per year, including 4.2 million tons of crude oil. The bottleneck of the terminal real capacity is the route out to the sea.

Figure 4.59 The White Sea ports and terminals: (A) terminal in Talagi near Arkhangelsk, (B) the port of Severodvinsk, (C) the terminal location in the Onega Bay, (D) Vitino port. The terminals in Talagi and Vitino are in operation. Both work by the similar transportation scheme. Oil is delivered to these two terminals by railway, there it is offloaded to oil depot and further shipped for exported by sea tankers either directly or with one more transhipment in the ice-free areas of the Barents Sea. Since 2003, each year the White Sea terminals handle about 7 million tons of export oil.
The 46 kilometres way from the Talagi terminal to the receiving buoy of the Arkhangelsk seaport by Kuznechikha armlet allows maximum 9.2 metres draft of the vessels and works one-way when the loaded tanker goes out. That limits the maximum deadweight and load of the shuttle tankers serving the terminal. During winter navigation, tankers receive icebreaking assistance, provided by the Arkhangelsk seaport.

Oil transportation to FSO Belokamenka and oil products export from Talagi is managed by Rosneft jointly with Sovcomflot. In 2006, Rosneft ordered three 30 000 deadweight double-hull ice-reinforced tankers to be built at Factorias Vulcano Shipyards in Spain. The first tanker RN Arkhangelsk was delivered to Rosneft in 2008, and in December it came to Arkhangelsk, received the first load of Timano-Pechora crude oil and delivered it to FSO Belokamenka. The tanker should deliver 1.2 million tons of export crude oil to FSO Belokamenka a year. Two more tankers of this kind, RN Murmansk and RN Privodino, will be launched in 2009.

Oil spill prevention and response is managed by the specialised unit of the Rosneft-Arkhangelskneftprodukt.

In 2002, the Rosneft-Arkhangelskneftprodukt terminal in Talagi shipped 1.9 million tons of oil and oil products for export; in 2003 the volume was 1.5 million tons; in 2004 – 3.4 million tons (2.2 million tons via Belokamenka); in 2005 – 4.2 million tons; and in 2006 – 3.1 million tons (in 2006, Talagi terminal was not shipping gas condensate). In 2007, Talagi sent 3.2 million tons of crude and petroleum products for export (2.4 million tons of crude via Belokamenka), and in 2008 the volumes dropped to 2.1 million tons (Belokamenka received 1.5 million tons of oil from Talagi).

Rosneft intend to increase the capacity of the Talagi export oil terminal to 12 million tons a year.

New deep-sea port in Arkhangelsk
Administration of the Arkhangelsk regions proposes to build a new deep-sea port of Arkhangelsk in the Sukhoye more Bay of the Dvina Gulf of the White Sea. Construction of the new port is discussed in connection with building up Belkomur railway that should connect the Perm Region, the Republic of Komi and the Arkhangelsk Region.

Severodvinsk
Severodvinsk, the second largest city in the Arkhangelsk Region, was built in 1936. The city is located 30 kilometres to the West of Arkhangelsk. Severodvinsk is the centre of submarine shipbuilding, and the main enterprises of the city are machine-building factories Sevmash and Zvezdochka.

Today Severodvinsk is also an important industrial and production base for the development of the hydrocarbon fields in the Russian Arctic continental shelf, and may seem as a suitable location for construction of the sea terminal. The town is situated on the White Sea coast. The navigation channel to Zvyozdocha factory has a strong water current, and it was built for the large size submarines. The sea depths in the area allow receiving 40 000 tons deadweight tankers.
In 2003, Tatneft and ARM-Nefteservice companies stated their intentions of building an export oil terminal in Severodvinsk with the capacity up to 5 million tons. The plan was to deliver oil by the Northern railway and use the similar transportation scheme that is implemented in Talagi. But later both companies notified that they changed their plans and started investigate other possible location. Tatneft went to Kaliningrad Region on the Baltic Sea, and ARM-Nefteservice looked at the Onega Bay of the White Sea.

The Onega Bay

The Onega Bay of the White Sea was used for export oil transhipment operations during some months of the summer navigation in 2003 only. But the terminal story was very good demonstration of the possibilities and challenges of ship-to-ship transfer operations in remote areas.

Volgotanker Company started implementation of the project called “The White Sea” in 2003. The original plan was to anchor an 80 000 deadweight tanker in the vicinity of Osinki islands (sea depths about 18 metres) using it as FSO, and tranship up to 1.5 million tons of heavy fuel oil a year. FSO was not put on place. The fuel oil was delivered by 2700 deadweight Nefterudovoz river tankers shuttling through the White Sea–Baltic canal. The Nefterudovoz tankers shuttled through 19 waterlocks of the canal to the Onega Bay and shipped fuel oil to 28 000 tons deadweight carrier tankers Zoja-I and Zoja-II of the Latvian Shipping Company that delivered the load to Rotterdam. In 2003, Volgotanker transhipped 220 000 tons of heavy fuel oil in the Onega Bay. Apart from that, 100 000 tons of crude oil was carried from Vitino port and shipped to 127 000 deadweight tanker Trader.

Morskaya Liga Company from Kronstadt town on the Baltic Sea coast was to provide oil spill prevention and response services at the terminal.

In September 2003, Nefterudovoz-57M while moored to the tanker Zoja-I leaned over to the left shipboard, was dented and spilled heavy fuel oil into the sea. A number of lawsuits followed the oil spill case, and in the end, the court ruled that Volgotanker was to pay the Onega municipality about 12.5 million roubles as compensation for the environmental damage caused by oil pollution. In 2004, Volgotanker applied for but did not get the permit from the environmental authorities to resume the oil transhipment operations in the Onega Bay.

Since 2003 the state taxe authorities have presented a number of taxation claims to Volgotanker. Lawsuits were run against the Company and its top-managers. Finally, in 2008, Volgotanker being one of the largest river shipping companies in Europe with 353 ships of the total deadweight over 1.2 million tons was officially declared a bankrupt.
The year after Volgotanker’s operations in the Onega Bay, ARM-Nefteservice Company proposed to construct the sea oil transhipment complex near Onega building onshore facilities in Shendunets station on the White Sea coast (40 kilometres from Onega town) and offshore facilities in the vicinity of the Osinki islands. The oil terminal included: two rail racks; oil storage for 180,000 cubic metres; 40 kilometres pipeline (9 kilometres onshore and 30 kilometres sub-sea); the offshore caisson type mooring installation; and 100,000 tons deadweight FSO. The plan was to deliver oil by Northern railway to Shendunets and tranship oil to tankers via onshore oil storage and FSO. The terminal capacity was estimated to 5 million tons with all-year-round operations. The project has been frozen since 2004, as ARM-Nefteservice did not secure oil deliveries.

Vitino
The seaport of Vitino is the first private seaport in Russia, and it has been the major contributor to oil exports through the Barents Sea during the recent seven years. The terminal was constructed using the capacities of the Belomorskaya Neftebaza (the White Sea oil depot) located on the southwest coast of the Kandalaksha Bay of the White Sea.

Belomorskaya Neftebaza was built during the years from 1972 to 1975 as a main storage facility for distribution of oil products throughout the Murmansk Region. With the private investors came in 1993, the port was modernised and rebuilt to ship crude oil from rail tank-cars to sea tankers. Back in 1995, Vitino carried out the first export oil operation shipping crude to 31,000 tons tanker *Probitas* under the Maltese flag. That year, the port loaded 9 tankers with 250,000 tons of oil in total. Every year in from 1996 to 1999, Vitino sent from 500,000 to 1 million tons of oil for export although operating only during the summer navigation.

Since 2001, Vitino has been continuously carrying out modernisation of the oil terminal. In 2002, the port started to operate all-year-round. During winter navigation, oil is shipped to 20,000 tons ice-class tankers, with the assistance of icebreakers of the Murmansk Shipping Company.

In 2004, the port of Vitino could load tankers with 60,000 tons deadweight. The 18 nautical miles (33 kilometres) fairway was dredged to the depth of 12.5 metres. Four mooring lines could serve one sea tanker and two river tankers simultaneously. The capacity of pumping equipment reached the level of 3000 cubic metres per hour (versus 500 cubic metres per hour in 1996). The oil storage of the Belomorskaya Neftebaza had a capacity of 230,000 cubic metres. The terminal had two rail trestles to offload 82 tank-cars simultaneously. The terminal capacity was about 8 million tons a year.

In 2004, a big part of the crude oil flow went by rail to the port of Murmansk, and Vitino terminal was focused on increasing the capacity for shipping other products and improving the logistic system. In 2005, the capacity of the oil terminal was increased to 11 million tons. The fairway was dredged and piers modernised to receive 80,000 tons deadweight tankers. Four rail
trestles had the capacity to offload 168 tank-cars (with crude oil, fuel oil, gas condensate and diesel fuel) simultaneously. The railroad side tracks could receive up to 7 trains. Vitino seaport was capable to ship 900 000 tons a month.

In 2005, Novatek together with Belomorskaya Neftebaza expanded the gas condensate capacities in the port of Vitino. Novaek constructed their own storage reservoirs of 30 000 cubic metres each and the gas condensate shipping facilities.

Also in 2005, Ros-oil Company, subsidiary of OBL Nefteprodukt, started building an oil terminal similar to Privodino in Baklanka, the Northern railway station in the Vologda Region. According to the plan, crude oil transported by Transneft's Ukhta-Yaroslavl trunk pipeline is to be piped to oil storage of Baklanka terminal, loaded to rail tank-cars and carried by Northern and October railways to the port of Vitino. The construction of the oil terminal with the capacity of 3.8 million tons was completed in 2008, and in May Baklanka offloaded its first 1500 tons of oil.

Vitino receives crude oil and petroleum products by rail. Crude transported from the terminals in Yaroslavl and Moscow regions where it arrives by trunk pipelines of Transneft. Gas condensate produced at Purovsky processing plant of Novatek in Yamalo-Nenets Autonomous District goes all the way by rail. In Vitino crude and oil products are shipped to sea tankers then delivered to the western ports directly or via offshore transhipment terminals in the Barents Sea. In 2002-2004, tankers of 20 000 deadweight shuttled between Vitino and the Kola Bay; and in 2005-2008 offshore transhipment operation were carried out in Bøkfjord and Sarnesfjord in the Northern Norway.

In 2002, Vitino shipped 2.9 million tons of crude oil and oil products for export; in 2003 - 5.7 million tons; the volumes dropped to 3.7 million tons in 2004, and in 2005 - to 1.6 million tons, including 830 000 tons of gas condensate. In 2006, Vitino shipment volumes increased to more than 4.7 million tons with about 50% share of gas condensate. In 2007, Vitino exported 3.9 million tons of condensate and light oil products. And in 2008, 4.4 million tons (including 0.7 million tons of crude) were sent to big European ports directly or with STS transhipments in Norwegian Sarnesfjord near the North Cape in the Barents Sea.
Figure 4.69  FSO Belokamenka is the key unit in the northern oil export channel. The 360 000 tons deadweight former Berge Pioneer was chartered by Rosneft for 20 years and put in operation in 2004. Belokamenka receives crude oil from the terminals in the Ob Bay in the Kara Sea, Varandey in the Pechora Sea and Arkhangelsk in the White Sea. It can also handle oil from Prirazlomnoye platform when it starts to produce. In 2008, new built 70 000 tons Vassily Dinkov delivered its first load of crude oil from 12 million tons Varandey terminal.

4.2.5 THE BARENTS SEA, RUSSIA

Teriberka
Gas transport with condensate, LNG and LPG has got a significant share in cargo volumes shipped for export through the Barents Sea, and it plays an important role in infrastructure developments along the Barents Sea coast.

The first gas production on the Barents Sea shelf came from the Norwegian field Snøhvit that started to ship condensate, LNG and LPG from facilities on Melkøya in 2007. The first Russian Arctic offshore field to be in commercial production, Shtokman, should start exporting gas within five years perspective.

Teriberka, a small settlement on the Barents Sea coast 120 kilometres east of Murmansk, has been chosen by Gazprom with its partners in Shtokman’s phase 1 – Total and StatoilHydro, as a location for routing gas pipeline from Shtokman field to Volkhov, building LNG plant and an export harbour. Gazprom is also considering Teriberka as a place for construction of a refinery for oil from Prirazlomnoye and Dolginskoye, and condensate from Shtokman offshore fields. The capacity of the refinery can be on the level of 5 million tons a year.

The proven reserves of the Shtokman field make up 3.8 trillion cubic metres of natural gas and over 37 million tons of gas condensate. According to the Shtokman project development plan, the annual gas production during the phase 1 of the project should be on the level of 23.7 billion cubic metres of natural gas that will be split for producing 7.5 million tons of LNG, and pumping 11 billion cubic metres by Shtoman-Teriberka-Volkhov pipeline to the Nord Stream. The start up of gas supply via the pipeline is planned due 2013, and LNG supply – 2014.

When all three phases of the Shtokman project are completed, the field will produce over 70 billion cubic metres of natural gas and 0.6 million tons of gas condensate annually.

Figure 4.70  The overall scheme of offshore installations of the Shtokman project. The start up of gas production and supply by Shtokman-Volkhov pipeline is planned due 2013, and LNG supply the year after. When Shtokman is put in full operation in can produce over 70 billion cubic metres of gas.
Murmansk and the Kola Bay
The port of Murmansk located on the eastern coast of the Kola Bay is the only ice-free seaport in the Russian Arctic. The Murmansk seaport was constructed during the First World War in 1915, and in 20th century became one of the largest seaports in Russia and the World’s largest seaport above the Polar Circle.

The Murmansk seaport today is a huge transportation unit that integrates motor, rail and sea transportation of the region. The fairway depths of the mooring lines in the port of Murmansk allow shipping vessels with 15.5 metres draught. The annual freight turnover of the Murmansk seaport in 2002 and 2003 amounted to 10 million tons; in 2005 it reached almost 17 million tons, and in 2008 exceeded 25 million tons (all operators). According to October Railway Department, the freight turnover of the Murmansk seaport may increase to 40 million tons in 2015. And according to the general scheme of the Murmansk Port Transportation Junction development, the annual freight turnover may be increased up to 80 million tons in 2015.

In 2003 and 2004, two new coastal export oil terminals for unloading rail tank cars and shipping sea tankers were put in operation in the port of Murmansk. Tangra Oil developed the facilities of the Murmansk Sea Fishing Port for shipping export oil and oil products, and set in operation a terminal at Shipyard #35 for the same purpose. In the end of 2005, Commandit Service put on stream the terminal in the Cape Mokhnatkinska Pakhta north of Murmansk. In the period from 2002 to 2004, three offshore oil transhipment terminals (hereafter RPK) were installed in the Kola Bay – RPK-1 of the Murmansk Shipping Company, RPK-2 of the White Sea Service Company, and RPK-3 (FSO Belokamenka) of Rosnefteflot and Bergesen companies. Today, only FSO Belokamenka among these three offshore terminals is in full operation, and RPK-1 is used for single transhipments. The Russian Ministry of Transport and the Murmansk Regional Administration proposes to develop Murmansk seaport as the multi-modal transportation complex building the infrastructure both on the eastern and western coasts of the Kola Bay and increasing the port’s oil shipment capacity.

Coastal oil terminals
The first coastal oil export terminal, which now has the symbolic name – The First Murmansk Terminal, was set in operation based on the oil depot facilities of the Murmansk Sea Fishing Port.

Construction of the fishing port in Murmansk started back in 1925, and the first section was ready in 1927. Murmansk Sea Fishing Port was built as an up-to-date automated enterprise of the Murmansk Region specialised on handling fishing fleet. The total extent of mooring front of the sea fishing port now exceeds 4 kilometres. The port has its own storage tanks for oil products. In the end of 1990s, the oil depot handled about 500 000 tons of oil products annually. The operations on shipping oil from rail tank-cars to sea tankers for export were started in Murmansk Sea Fishing Port in 2003.

In 2003, the port terminal handled 1.6 million tons of oil products (all kinds of operations), and in 2004 – 2 million tons, including 1 million tons of crude oil for export. The export oil was shipped from rail tank-cars to 15 000 tons deadweight tankers of the Murmansk Shipping Company that
Murmansk Sea Fishing Port has been rented and operated by the First Murmansk Terminal. The terminal is specialised on exporting light oil products.

In 2006, the First Murmansk Terminal shipped 300 000 tons of oil products for export, and tripled the volumes in 2007 exporting 900 000 tons. In 2008, the volumes dropped back to 340 000 tons.

The second oil loading terminal in Murmansk was constructed at the Shipyard #35, former Sevmorput, in the northern part of Murmansk city. The Sevmorput factory was founded in 1932 as a maintenance factory for the merchant fleet. The factory building began in 1936 and was completed in 1938. In 1943, the factory was a part of the Northern Navy Fleet of the USSR. In 2003, Sevmorput changed the owner and was renamed into the Federal State Unitary Enterprise Shipyard #35 of the Ministry of Defence of Russia. Now, the enterprise is a part of the state founded Russian United Shipbuilding Corporation.

In 2003, Tangra Oil Company in cooperation with the Shipyard #35 constructed a port oil terminal on the territory of the factory. The 10 kilometres pipeline from the rail trestle leading to the mooring line was constructed. Oil from rail tank-cars was shipped by a pipeline straight to shuttle tankers Cheguesvara (45 500) and Severomorsk (40 000) of Severnaya Stvidorskaya Company, a subsidiary of Tangra Oil, that carried oil to 127 000 deadweight FSO Trader moored at RPK-1 in the Kola Bay. The first section of the terminal with the capacity of 3.5 million tons a year was commissioned in 2004. Gidrotekhservis Company was responsible for oil spill prevention and response services at the terminal.

Since 2006, the oil depot facilities of the

Oil transport from the Russian part of the Barents Region. Status per January 2009
Modernisation of the oil terminal at Shipyard #35 was continued the following years. In 2004, new rail trestle was constructed and the terminal could offload 74 rail tank-cars with crude and oil products simultaneously. The modernisation also included dredging works; building new T-type pier stretching 280 metres out from the coastline; construction of oil storage reservoirs for 135 000 cubic metres onshore. The terminal capacity after reconstruction was estimated to 7.5 million tons.

In 2005, Trader was moved from RPK-1 and berthed at the Shipyard #35 terminal as FSO. Crude and oil products were shipped from rail tank-cars to FSO Trader then to 100 000 tons carrier tankers that delivered export load to the customers. In 2006, the terminal was reoriented from crude to heavy fuel oil. Tangra Oil shipped 1.2 million tons of fuel oil for export that year. In 2007, the volumes dropped to 320 000 tons. The oil export terminal at Shipyard #35 shipped 60 000 tons of fuel oil in the beginning of 2008 and has not been in operation since February.

In 2003, Commandit Service Company, subsidiary of Progetra Group, and Sudkomgrupp Company started construction of the terminal for shipping heavy fuel oil using the facilities of the Northern Navy on Mokhnatkina Pakha. In 2004 and 2005, the first stage of the project was implemented including dredging works, reconstruction of oil reservoirs, rail side tracks and infrastructure, building rail trestle for 23 rail tankers; construction of floating dock structure, building 1 kilometre long pipeline (two lines of 426 mm diameter) from the rail trestle to floating dock structure. And 68 000 tons deadweight tanker Marshal Vasilevskiy was moored as FSO. The oil terminal with the annual capacity of 2.5 million tons was set in operation in December 2005. In 2008, 61 000 tons deadweight tanker Kola Bay replaced Marshal Vasilevskiy as FSO at the terminal.

Oil is transported by rail to a new Mokhnatkina Pakha station and a terminal, piped to FSO, and shipped to 50-60 000 tons deadweight tankers that carry oil to the western customers. In 2006, Commandit Service shipped 730 000 tons of heavy fuel oil for export, and in 2007 – 980 000 tons. In 2008, the terminal was not in operation from April to November, and that year shipped 360 000 tons.

Murmansk Basing Emergency and Salvage Department (MBESD) is responsible for oil spill prevention and response at the terminal.

Progetra Group intends to upgrade the facilities in Mokhnatkina Pakha for crude oil transhipment operations, and increase the terminal capacity to 5 million tons a year. Commandit Service of Progetra and Sudkomgrupp had also plans to build another oil terminal in Safonovo settlement near Severomorsk with the capacity of 15 million tons a year, but those plans did not move during the recent years.

The third terminal on the eastern coast of the Kola Bay was constructed north of Murmansk on the Mokhnatkina Pakha Cape near Severomorsk.

The terminal for shipping heavy fuel oil was built on the basis of the Northern Navy fuel storage. The facilities of the Northern Navy on Mokhnatkina Pakha were used for shipping export oil before. Lukoil reconstructed one of the piers and transhipped crude from Kolguev Island. Back in 1999, Lukoil proposed to build an oil refinery and a terminal with the capacity of 7 million tons a year on the Mokhnatkina Pakha Cape, but this proposal was not adopted by the Northern Navy. Rosneft and Tatneft also had plans upon this site, but those plans were not realised.

**Figure 4.75** The oil terminal in Mokhnatkina Pakha with 68 000 tons FSO Marshal Vasilevskiy.

**Figure 4.76** In 2008, 61 000 tons Kola Bay was moored at Mokhnatkina Pakha as FSO.

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Offshore oil transhipment terminals in the Kola Bay

The first offshore oil transhipment terminal (RPK-1) in the Kola bay was constructed by the Murmansk Shipping Company nearby the Cape Mishukovo. In October 2002, RPK-1 transhipped its first crude oil, then 106 000 tons deadweight tanker Moscow River of Novoship was loaded with crude delivered from the port of Vitino by tankers Burgas (54 500) and Geroi Sevastopolya (55 800).

The terminal had eight anchorage-mooring systems (anchors, briddles, flanks) capable to serve sea tankers of up to 150 000 tons deadweight in heavy weather conditions with a wind of up to 20 metres per second. From 15 000 to 60 000 tons deadweight shuttle tankers were moored directly to line tankers for shipping oil. The terminal operated all-year-round. The projected capacity of RPK-1 is 5.4 million tons of oil a year. Oil spill prevention and response services for the terminal RPK-1 are provided by the Murmansk Basin Emergency and Salvage Department (MBESD).

From 2002 to 2004, RPK-1 was operating as a Ship-to-Ship transfer (STS) terminal. In August 2004, the Trader (127 000) tanker was anchored at the RPK-1. For one year Trader was used as Floating Storage and Offloading vessel (FSO) at RPK-1. In 2005, Trader was moved to Shipyards #35 export oil terminal and RPK-1 stopped regular transhipments.

Oil was delivered to RPK-1 from terminals in

Figure 4.77 In October 2002, the first ship-to-ship transfer operation was run in the Kola Bay, then 106 000 tons deadweight tanker Moscow River of Novoship was loaded at RPK-1 with crude oil delivered from the port of Vitino by 54 500 ton Burgas and 55 800 ton Geroi Sevastopolya.

Figure 4.78 December 2003, 106 000 tons Kuban was anchored at RPK-1 and 127 000 tons Trader at RPK-2.

Varandey, Vitino, Murmansk Sea Fishing Port and Shipyards #35 by shuttle tankers. Further, oil was shipped for export to line tankers with about 100 000 tons deadweight.

In 2003, RPK-1 transhipped 3.7 million tons of oil for export; in 2004 – 4.3 million tons; and in 2005 – 3.4 million tons. In 2008, RPK-1 handled two STS operations and transhipped 50 000 tons of crude and gas condensate for export.

The second offshore oil transhipment terminal (RPK-2) in the Kola Bay was built by the White Sea Service Company, and put in operation in December 2003, but it worked for 3 months only as a STS facility.

Figure 4.79 In August 2004, 127 000 tons Trader was anchored at RPK-1 and was used for one year as FSO at the terminal. For the year of 2004, RPK-1 transhipped more than 4 million tons of oil. In 2005, Trader was moved to Shipyards #35 export oil terminal, and RPK-1 stopped regular operations.
The third and the largest terminal (RPK-3) Belokamenka was set in operation as a FSO facility in March 2004. RPK-3 Belokamenka is the key unit in the northern oil export channel developed by Rosneft.

RPK-3 terminal is based on an oil storage tanker Belokamenka (built in 1980), the largest tanker in Russia of 360 000 tons deadweight. The tanker is 340 metres long and 65 metres wide. Belokamenka, former Berge Pioneer, was chartered by Rosneft for 20 years with the right of the subsequent buy-out from the Norwegian company Bergesen. The tanker came in the Kola Bay and was moored near Belokamenka settlement. The terminal operator, Belokamenka Company, was founded in 2004 as a joint venture of Bergesen and Far-East Marine Company (FEMCO), now Rosneftefлот.

After FSO Belokamenka was established, Rosneft put on stream a new oil delivery route “from the oil well to the consumer”. The oil extracted by Rosneft subsidiaries in Timano-Pechora oil-and-gas province is delivered to the terminal in Arkhangelsk, and further carried by shuttle tankers to the storage tanker in the Kola Bay, from where it is exported by line tankers with up to 150 000 tons deadweight.

In February 2004, the storage tanker Belokamenka received the first crude delivered from Arkhangelsk by shuttle tankers Volgograd (16 000), Rundale (17 000) and Samburga (17 100). In March, RPK-3 shipped the first oil for export into the line tanker Moscow River (106 000). And in August the same year, throughput of Belokamenka reached one million ton.

The documented operational capacity of RPK-3 Belokamenka today is 5 million tons a year. In the future it can be increased to 20 million tons. According to Belokamenka Company, today the terminal can transship 12 million tons of oil, and when new oil fields are developed in the Russian Arctic, the terminal can handle 20 million tons of oil per year.

FSO Belokamenka receives crude oil delivered to the Kola Bay by shuttle tankers from the terminals in the Ob Bay, Varandey and Arkhangelsk. In the future, Belokamenka will also handle crude from Prirazlomnoye oil field. In January 2007, Rosneft and Sovcomflot reached an agreement on the formation of a joint company on the basis of Rosnefteflot. Sovcomflot operates oil transportation schemes for the Varandey terminal and Prirazlomnoye oil field.

The oil spill prevention and response services at the terminal Belokamenka are provided by MBESD. The Company runs regular oil spill response exercises. The first one of full scale was arranged in 2004 with simulation of an accidental 500 tons oil spill at the terminal. MBESD, the Arctic Specialised Marine Inspection, Masko Company, the Department on Emergencies and the RPK-3 terminal take part in the exercises.

In 2004, RPK-3 Belokamenka transhipped 2.5 million tons of crude oil for export, in 2005 – 3.3 million tons, in 2006 – 4 million tons, and in 2007 – 3.3 million tons. In 2008, Belokamenka exported 3.7 million tons of crude oil, almost half of it came from the new Varandey terminal.

Figure 4.80 In February 2004, FSO Belokamenka received the first load of crude oil from Arkhangelsk. Photo: 17 100 tons deadweight tanker Samburga delivered crude to Belokamenka, November 2005.

Figure 4.81 Regular oil spill response exercises are arranged at FSO Belokamenka, the first one of full scale was arranged in 2004 with simulation of an accidental 500 tons oil spill at the terminal.
Development of the Murmansk Multi-Modal Port Complex

Ministry of Transport of Russia and the Administration of the Murmansk Region propose to build up the Murmansk multi-modal port complex using both eastern and western coasts of the Kola Bay.

According to the Master Growth Plan for the Murmansk Transportation Junction elaborated by LenmorNIiproekt, the Kola Bay’s east coast will boast: the special complexes for bulked freight with the capacity of 8.3 million tons; the coal complex using existing piers #13-14 and a new pier #22 (330 metres); the complex for mixed freight with 2 million tons capacity, located in I and II regions of the port; the special oil products terminal complex at the Shipyard #35 with the capacity of up to 10 million tons a year; the complex for oil products at the pier #20 with up to 8 million tons shipping capacity.

Oil products will be delivered to the terminals in the eastern coast by rail and shipped to tankers.

The Kola Bay’s west coast in the area of Lavna and Kulonga rivers will house new complexes consisting of: oil terminal with shipping capacity of 4.5 million tons a year, including 470 metres long pier to moor tankers from 120 000 to 300 000 tons deadweight, oil storage for 400 000 cubic metres, and rail trestles; coal transshipment terminal with 15 million tons capacity; mixed freight and containers transshipment terminal with capacity of up to 3 million tons a year; supply depot and an oil terminal complex at the mouth of the Lavna River with the capacity of up to 25 million tons of crude oil and one million tons of other cargo a year.

The construction of the port base in Lavna started in 1980s but stopped with the collapse of the Soviet Union. According to the new development plan, oil should be delivered to Lavna terminal by new constructed railway from Murmashi-II station, and shipped to line tankers of up to 250 000 tons deadweight. The annual capacity of the oil terminal in Lavna should reach 25 million tons when completed.

It is estimated that after the program of modernisation and construction of Murmansk Transportation Junction is completed, the port annual freight turnover will be on the level of 80 million tons with approximately equal shares of bulked and dry cargoes.

The project of the construction and modernisation of the Murmansk Transportation Junction was included into the Federal programme “Development of the Transport System of Russia in the period 2010-2015” as one of the prioritised investments projects within the export transport services sub-programme.

The Pechenga Bay

In 2006, Severneft Company proposed to build a Severniy (Northern) Port – Oil Complex and Dry-cargo Northern Sea Port in the Pechenga Bay of the Murmansk Region.

The planned total freight turnover was set as 65 million tons a year, with the perspective to increase the capacity up to 200 million tons. According to the technical project description, the port should consist of four shipping regions – oil and oil processing terminal; coal terminal; wood terminal; and general and container cargo terminal. The oil terminal should have shipping capacity of 30 million tons of oil and oil products a year, include an oil storage for 450 000 cubic metres; three double side rail trestles to handle 120 rail tank cars; and piers to ship four tankers of 150 000 tons deadweight. Oil should be transported to the port by rail, loaded to the oil storages and further shipped to tankers. Severneft planned to start the construction in 2008, so the port could start operating in full scale in 2015. But since 2006 the project has not moved any further.
4.2.6 THE BARENTS SEA, NORWAY

Since the oil transportation from the Russian Barents Region started growing in 2002, there were visions and suggestions about the establishment of transhipment terminals for Russian oil in Northern Norway. There were proposals to build terminals in small and big fjords from Kirkenes in the east to Tromsø in the west. The formal requests for getting permits to establish oil transhipment terminals near Kirkenes were sent by ShipCargo Ltd and Bergesen d.y. ASA. The work to obtain the necessary permissions for the projected terminal went on from 2002 to 2007. The ship owner Bergesen d.y. ASA planned to anchor the old Berge Enterprise super tanker and use it as a Floating Storage and Offloading vessel (FSO) oil transfer terminal. This is a similar solution that Bergesen Company has with the ship Belokamenka (before Berge Pioneer) in the Kola Bay near the town of Murmansk.

An anchored storage ship in Bøkfjord was considered as a permanent installation. The prospects to establish a terminal in Bøkfjord were based on the possible increase of oil cargo volumes to be shipped from the Russian part of the Barents Region ports, and on the belief that the Russian side had not enough oil loading facilities or reloading operations could be done in a more efficient way in Norway.

In May 2002, there was an oil transhipment operation in Bøkfjord run by ShipCargo. Three Lukoil tankers of Astrakhan type completed ship-to-ship (STS) offloading 15 000 tons of crude oil each into a 46 500 tons deadweight Greek tanker Shinoussa of Eletson Corporation. This operation started the entire process of transhipments in Northern Norway. In 2005, ShipCargo received a permit for STS from the Norwegian Coastal Administration, and in 2007 got necessary permissions from other governmental institutions to start operations.

In 2005, a temporary permission for oil loading in the Bøkfjord near Kirkenes was given to Kirkenes Transit AS, and was annulled in 2006 when the authorities banned oil shipping activities in a salmon protected area. The company Kirkenes Transit got a permit to carry out oil loading in the
Oil transport from the Russian part of the Barents Region. Status per January 2009

Sarnesfjord, further west and close to the North Cape. The company accomplished nine loadings in the winter of 2005-2006 in Bøkfjord, 55 000 tons of gas condensate each.

The Bøkfjord near Kirkenes and the Sarnesfjord near the North Cape are the first locations that obtained permissions for transhipping oil delivered from Russia. They started the process that motivated other Norwegian municipalities and companies to develop proposals for building up transhipment terminals for Russian oil.

The first petroleum production on the Barents Sea shelf came from the Norwegian gas field Snohvit in 2007. The Goliat oil field will get on stream within a five years perspective. We pay attention to these two fields and their plans for production and transportation of oil and gas through the Barents Sea.

**Bøkfjord**

In 2005, ShipCargo and Kirkenes Transit companies obtained official permission to carry out ship-to-ship (STS) oil transfer operations in Bøkfjord near Kirkenes. Kirkenes Transit ran operations with gas condensate that was loaded from an inbound ship into tankers of up to 75 000 tons deadweight anchored near Reinøy in the Bøkfjord. Gas condensate was transported by rail from Siberia to the White Sea, from where it was transported further by tankers to Kirkenes. Fewer tankers came from Vitino port in the Kandalaksha Bay of the White Sea.

![Figure 4.84 Bøkfjord - location of the first Norwegian terminal for Russian oil. The permit for oil transhipment in the fjord was given in 2005 and annulled in 2006, when the authorities banned oil shipping activities in a salmon protected area. The the permit was given again for 2007-2009.](image)

Figure 4.85 In winter 2005-2006, nine STS transfer operations of gas condensate were managed by Kirkenes Transit in Bøkfjord. The load came from Vitino port in the White Sea and after transhipment went to USA and Europe.

In a statement by Norwegian authorities it is pointed out that the chosen oil loading sites are situated in the national salmon protected areas of Neiden, the Korsfjord and the Bøkfjord, where “an activity that represents a risk of emissions that damage salmon is forbidden”.

In 2005-2006 there were totally 11 STS operations in Bøkfjord. In 2005, there were 2 STS operations sending 103 995 tons of condensate and in 2006 – 9 STS operations sending 478 678 tons to the markets in Europe and USA. These operations are only taking place during winter. In the summer condensate is shipped directly to the market from Vitino port.

Two companies, ShipCargo and Kirkenes Transit, have applied for permission to do STS and FSO operations in Bøkfjord and Korsfjord near Kirkenes in 2007-2009. They have both received permits including strong regulations to do maximum 40 transhipments per season and the establishment of a FSO (October-May for condensate, and October-April for heavy fuel oil). The FSO is allowed to tranship 11 million tons of oil products and the STS operations 3 million tons of condensate. Both companies claim that the regulations are too strong and complicated to do any commercial business and have filed a complaint to the Ministry of environment.

Because of high nature values in the fjord system, there is reason to believe that future permits still will have many and strong regulations. In this situation, Kirkenes Transit has moved their operation to Sarnesfjord, close to the North Cape.

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Vadsø

In 2004 and 2005, there were talks about establishing an oil terminal on the northern side of the Varanger fjord, by the province capital of Finnmark, Vadsø. The consideration about the terminal was to get a location for transshipment of Russian oil. The initial point of the plans was to transport oil with smaller shuttle tankers from Northwest Russia to Vadsø. The project is still at this planning stage.

The Canadian company Sannex Incorporation was mentioned as the initiator that wished to establish a land-based oil loading terminal in Paddeby to the west of Vadsø. The port of Vadsø confirmed that there were plans for an oil terminal in Vadsø municipality. According to the plan, smaller ships should shuttle between the port in the White Sea and Vadsø and ship the oil into the tanker with 300 000 tons deadweight.

A pier can be constructed right in the fjord. Shuttle tankers from the White Sea will berth on one side of the pier. They will offload the oil into larger vessels on the other side of the pier. From there the line tankers will go to Rotterdam and other large Western oil ports.

The research institute SINTEF in Trondheim has carried out a technical evaluation that showed that wind and wave conditions are considerably better in Paddeby that a few kilometres further out in the fjord. Depths are also favourable for industrial establishment in Paddeby. In case long-term contracts for transshipment operations are signed, oil will be also loaded onshore. The plan is to implement a capacity for storing 500 000 tons of oil either in underground tanks or in the reservoirs on the ground.

Sarnesfjord

The oil transshipment in Sarnesfjord near the North Cape is the continuation of the activities that were carried out in Bøkfjord near Kirkenes when the authorities did not allow any further operations. In December 2006, the Norwegian Pollution Control Authority (SFT) sent Kirkenes Transit a letter granting the company permission to ship oil in accordance with the pollution law. In the 2007 report, we included excerpts from the permits that SFT issued for terminals in Bøkfjord and Sarnesfjord giving an example of environmental requirements for carrying out oil transshipment operations in northern Norwegian fjords.

The operations in Sarnesfjord are conducted by 75 000 tons deadweight tankers. Each vessel has a capacity of carrying about 55 000 tons of gas condensate. The plans were to handle 2.2 million tons of gas condensate a season. The application for transshipment operations covered both gas condensate and other oil products. In 2007 they loaded gas condensate only. In cooperation with the port authorities in the North Cape, in 2006 Kirkenes Transit selected three locations they intended to use for STS operations. They primarily planned to use the two located in the Sarnesfjord; the third one – in the Kåfjord was considered as a reserved position. STS operations are carried out between anchored ships.

Kirkenes Transit is so far the only operator in Honningsvåg Porsanger harbour area. Kirkenes Transit started their operations of reloading Russian oil products in Bøkfjord, Ser-Varanger, but moved the operation to Sarnesfjord when the SFT first closed Bøkfjord for operations, then gave a permit that was difficult to use.

All the reloaded petroleum in 2007-2008 has been condensate owned by Novatek, shipped from Vitino, Kandalaksha Bay in the White Sea. In 2007, there were 8 STS operations that gave 424 782 tons of condensate. In 2008 there were 9 STS operations that gave 501 319 tons of condensate.

In 2009, the reloading operations of gas condensate coming from Vitino will be continued and increased in volume. Kirkenes Transit is hoping to attract crude oil from Varandey in

![Figure 4.86 All cargo transhipped in 2007-2008 at Sarnesfjord terminal was gas condensate owned by Novatek shipped from Vitino port in Kandalaksha Bay of the White Sea. Photo: port of North Cape.](image)
Nenets Autonomous District for transhipment. An application for a permission to handle crude was sent to SFT in June 2008. In the new application Kirkenes Transit wants to carry out operations all year round and also to continue transhipments of petroleum products.

A world leading company within transhipment of oil products, FenderCare Marine (FCM) together with other companies, are looking at the possibilities of starting loading operations in Honningsvåg Porsanger harbour area. FCM are seeking the possibility to ship cargo from smaller tankers arriving from Russia to Panamax size tankers.

Kvalsund
The Kvalsund Municipality in the West Finnmark together with Kvalsund Næringspark, Polar Gjenvinning and Arctic Terminal Operating Company (ATOC) in the summer and the autumn of 2006 were in contact with Norwegian authorities trying to establish a port for oil loading operations and a service port for the oil-and-gas industry.

The Kvalsund Municipality allocated an area of 45 hectares for commercial use. The municipality is motivated to have an oil terminal, which can cover the needs that will arise both in the Norwegian and Russian sectors of the Barents Sea. The goal is to build rock caverns for oil storage, in which oil could be delivered before being transported further to the world’s market by super-tankers (VLCC).

To ensure an efficient transportation of oil along the coast it is desirable to carry oil by large modern super-tankers. Smaller ships bring the oil to Russian or Norwegian sector of the Barents Sea, deliver the oil to a storage in the mountain in Kvalsund, and when the tanks in the mountain are full, the oil is transported further by a super-tanker (VLCC) to the western markets.

The Kvalsund Municipality visualises a gradual development of loading facilities in this sequence: ship-to-ship loading in the Repparfjord; loading at the existing quay for smaller ship; construction of deepwater for super-tankers at Markopnnes; transfer from smaller to larger vessels via rock caverns.

The following elements of the business can be arranged at Markopnnes: waste management facilities; services for vessel traffic; services for oil and gas industry in the Barents Sea; industrial activities aimed at oil and gas production; onshore terminal for oil from the Barents Sea.

A new company, Polar Gjenvinning, was established to handle waste at the terminal. Polar Gjenvinning is jointly owned by Wergeland Holding and Franzefoss. ATOC applied to the Norwegian Pollution Control Authority (SFT) for permission to load oil ship-to-ship. ATOC is a company under the foundation that consists of five companies including the biggest partner – FenderCare Marine.
Sørøya
Nordoil Caverns Company together with Hammerfest and Hasvik municipalities are developing the proposal for building an oil terminal in one of two alternate locations at Sørøya – in Slettnes, Hammerfest municipality or in Dønnesfjord, Hasvik municipality. Nordoil propose to build a storage for crude oil and oil products in rock caverns and a terminal for transhipping oil from Goliat field in the Barents Sea and from the Russian Barents Region. Nordoil Caverns AS was established in 2006 and owned by Baroil AS, Hammerfest Harbour KF and Hasvik Municipality.

Snøhvit and Melkøya
Snøhvit is the first major development on the Norwegian continental shelf with no surface installations.

The seabed facilities are designed to be overtrawlable, so that neither they nor fishing equipment will suffer any damage from coming into contact. No fixed or floating units are positioned in the Barents Sea. Instead, the subsea production facilities stand on the seabed, in water depths of 250-345 metres. A total of 20 wells are due to produce gas from the Snøhvit, Askeladd and Albatross fields. This output is transported to land through a 143-kilometre pipeline. A total of nine wells are planned on Snøhvit, including eight for production and one for injecting carbon dioxide back below ground. Six of the producers and the carbon dioxide injector were drilled during 2004-05, with the remaining two following in 2011. In addition, the production wells were drilled on Albatross in 2005-06. This field also forms part of the Snøhvit development. The Snøhvit and Albatross wells came on stream in 2007. The Askeladd part of the development is not due to come on stream until 2014-15.

The production period is estimated for 2007-2035. Reserves are estimated to 193 billion cubic metres of natural gas and 113 million barrels of condensate.

The facility is a remotely-operated sub-sea installation on 250-345 metres depth and a 143 kilometres long pipeline transport gas to the land facility in Melkøya, Hammerfest from where the liquefied products are exported to the markets in Europe, North America and Asia.
Production of gas condensate started in 3rd quarter of 2007. That year, there were exported 91,044 cubic metres or 67,190 tons of condensate on two ships. In 2008, 351,828 tons were exported on 13 vessels to ports in Europe (10) and USA (3).

In 2007 there were exported 293,726 cubic metres of LNG on 4 vessels, and in 2008 – 3,443,522 cubic metres on 25 vessels to ports in Europe, North America and Asia.

In 2008, 90,558 tons of LPG and LPG-mix were shipped to Rafnes, Norway on 6 vessels.

The export prognoses for 2009-2013 are to ship annually 4.3 million tons of LNG, 460,000 tons of LPG and 220,000 tons of gas condensate.

**Goliat**

The Goliat field is located in Production Licence 229 which was awarded in the Barents Sea Round in 1997. The licensing round was initiated by the authorities in order to increase interest in the Barents Sea as an oil and gas region. The discovery was made by the first exploration well in 2000. Eni Norge, the Goliat license operator, expect the first gas and oil to be produced in 2013 and shipped from a Floating, Production, Storage and Offloading (FPSO) facility to the markets.

The Goliat field has two separate main reservoirs Kobbe and Realgrunnen. Both contain oil with an overlying gas cap. Additional, minor oil discoveries were found in the Snadd and Klappmyss formations.

Gas produced at Goliat will be re-injected into the Kobbe reservoir or transported to Melkøya.
4.3 DYNAMICS AND PROSPECTS OF OIL EXPORT THROUGH NORTHWEST RUSSIAN PORTS*

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Foreword
The article describes the goals and functions of oil transport system in Northwest Russia when transporting Russian oil via port terminals in the Baltic and Arctic seas. It defines potential world markets for oil deliveries and gives detailed structure of oil supply to port terminals in 2007. Based on the analysis of port terminals development for 2001-2008 and establishment of ensuring infrastructure, the forecast of oil traffic development in the areas of Northwest Russian seas is given.

THE GOALS OF OIL TRANSPORT SYSTEM IN NORTHWEST RUSSIA

The Northwest Russia, which provides oil supply to port terminals of the Baltic and Arctic seas (the Barents, White and Pechora seas), plays a major role in shaping the Russian oil sea transportation system.

In 2007, the port terminals in Russia accounted for exporting 129 million tons of Russian oil, 75 million, or 58%, of which were exported through Northwest: Baltic – 55.7% and Arctic – 2.6%; the Black sea - 32% and Far East – 10%.

Regional Oil Transport System (ROTS) includes pipeline, railway and sea transport which make up for the common fundamental transport network providing for both direct and multimodal shipments.

As to ensuring oil export by sea, the ROTS is presently providing for the following goals:

- Oil gathering and export from export-oriented oil-producing centres (OPC) located in the Northwest. The oil produced at such centres can not be supplied to refineries within Russia. Such centres are Varandey and Kolguev OPC onshore and offshore in the Pechora Sea, Kaliningrad OPC located onshore Kaliningrad Region and Kravtsovsky field located on the Baltic Sea shelf.
- Oil export from export-oriented OPCs in northern West Siberia (Sandibinsk oil field).
- Alternative scheme for transporting the oil extracted in Timano-Pechora province via Arctic ports.
- Alternative scheme for exporting high-quality oil from West Siberia by sea (Sredne-Khulymsk oilfield).
- Supply to export Primorsk port terminal of the oil produced in Timano-Pechora, Volga-Ural and West Siberian oil-and-gas bearing provinces by oil-trunk pipeline system.
- Transit of Kazakhstan oil to Primorsk terminal by oil-trunk pipeline system.
- Transit of Kazakhstan oil by rail to Izhevsk terminal in Kaliningrad region.

Baltic Sea terminals provide practically all supplies to Baltic Sea ports, as well as North Sea ports (Rotterdam and others). Transatlantic carriages development is being inhibited by restricted navigation in Denmark Straits.

The size of tankers operating in the Baltic Sea is basically restricted by navigating conditions in the Denmark Straits. Restrictions for deep-draft vessels navigation in Denmark Straits are regulated by resolution of the International Maritime Organisation (IMO) MSC.138.(76) on navigation through the entrances to the Baltic Sea (Recommendation on navigation through the entrances to the Baltic Sea), which came into force on 1st of December, 2003. It stipulates the rules for navigating vessels from strait Skaggerak – from strait Skagen (Skaw) to the area north-east from Gedser through Kattegat, Storebelt straits (The Great Belt), Langelandsbelt, Kadetrenden along Route T with minimum depths of 17 metres.

The document specifies that when navigating vessels of over 40 thousand ton deadweight, it should be noted that 17 metres is the maximum

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* This article (chapter 4.3) was prepared by Mikhail Grigoriev for the present report on the request of the authors. Dr Grigoriev is a member of the expert committees established under the Russian authorities dealing with fuel-and-energy issues, and director of the geological consulting company. He presents his assessments and visions of the Northwest Russia oil transport system status and development perspectives. The article is published without changes.
depth permissible for navigation without additional dredging in the area north-east from Gedser, and correction should be made for real depth possibly being 2 metres less than specified for that reason. The fact that specified depths could change due to meteorological or other effects should also be considered. The vessels with 11-meter (or more) draught must be operated by pilots.

Thus, the controlling depth of Denmark Straits is restricted by 15 metres. Considering the minimum navigational depth allowance under hull being 0.05 from vessel draught when navigating in channels or shallow waters, the calculated draught restriction equals 14.2 metres. This value applies to tankers with approximately 100 000 ton deadweight (Aframax-type).

Tankers of larger deadweight are not fully taking into account the vessel draught allowed, which results in Suezmax-type tankers, like PRISCO MIZAR or Alexey Kosygin of 166 000 ton deadweight that are used in the Baltic Sea, being able to carry maximum 137 thousand tons of oil, with restricted 14.2 metres draught. Although, their full deadweight is used when supplying to Baltic Sea ports with allowed depths.

Offshore transhipping complex (OTC) Belokamenka, which is the main Barents Sea traffic-integrating terminal, has no such restrictions for serviced vessels deadweight and is able to support schemes of supply both to North Atlantic ports in Europe and America, and to other regions.

PORT TERMINALS DYNAMICS IN 2007

Oil Export through the Baltic Sea Ports

In 2007, oil was exported through Russian ports – the Big Port of Saint-Petersburg, Primorsk terminal Spetsmornefteport (special sea oil harbour), and Kaliningrad; as well as Estonian port Tallinn. Total exports amounted to 76 275 thousand tons, including the Russian ports’ share being 75 635 thousand tons, or 99.2 % of the total freight flow.

Primorsk specialised seaport

In 2007, the volume of exported oil supplied by Baltic Pipeline System (BPS), through Primorsk port amounted to 74 223 thousand tons. Export of the Russian oil itself made up 70 602 thousand tons, with Kazakhstan oil transit accounting for the rest 3 621 thousand tons.

According to the port administration, the existing terminals are designed for mooring tankers of up to 150 000 tons deadweight, which is not the common practice. The port handled 1481 vessels, with 740 tankers came for loading and 741 sent for export. Thus, the average tanker shipments made up 100 200 tons, which corresponds to Aframax-type tankers.

Kaliningrad port

Total volume of export transshipments amounted to 1 412 thousand tons. The bulk volume of 1 350 thousand tons was shipped from Izhevsk terminal in Svetly town, to which oil was delivered by railway and directly from Kravtsovsky offshore field (also known as D6) by pipeline via Romanovo. It was mainly the oil produced in Kaliningrad region and adjacent offshore area that was exported – 1 281 thousand tons, or 95% of freight flow (both supplied from Znamensk station to Baltic Les by railroad – 420 thousand tons, and by pipeline from Kravtsovsk deposit – 862 thousand tons with production of 877 thousand tons). Export of the Russian oil from other Russian regions by railroad (from Sergino station in Khanty-Mansiysk Autonomous District), as well as transit of Kazakhstan oil were minor – 51 and 18 thousand tons respectively.

After dredging operations were completed in Kaliningrad maritime canal in January 2005, the terminal is suitable for accepting tankers of up to 20 000 tons, while before tanker deadweight was limited to 12 000 tons.

Only 61 thousand tons of oil was exported through the port of Kaliningrad (Kaliningrad sea fishing port terminal) that came by railroad to Kaliningrad-Railway Yard from Povolzhye Region.

Tallinn port

Oil was supplied by railroad to Maardu station from Kirishy station which serves Kirishynfteorgsintéz refinery in the Leningrad Region. Supplies were short-term: 200 thousand tons were transported in January and March; in April the supplies were minor (18 thousand tons)
and stopped completely. 640 thousand tons of oil was delivered in total.

**Oil Export through the Arctic Ports**

Shipment volume exported through Arctic sea terminals made up 3 335 thousand tons. Export oil was shipped from two terminals in the Barents Sea: from Kolguev Island and offshore transhipping complex (OTC) Belokamenka in the Kola Bay.

**Kolguev Island**

Small quantity of oil produced on Kolguev Island was shipped directly for export, what can be explained by the fact that oil-producing companies were eager to gain from realising light and sweet crude (785 kg/m³ density or 48 degrees API and 0.17% sulphur content).

In 2007, according to statistical data, the shipped oil amounted to 111 thousand tons, which significantly exceeds the real oil production on the island in 2007 – 72 thousand tons. It should be noted that the data for previous year 2006 are more realistic: shipment of 77.7 thousand tons, with production of 81 thousand tons. This reflects the correct ratio between production and potential shipment, as small oil volumes are being processed at mini-refineries for companies’ needs.

In 2007, Arktikmorneftegazrazvedka (AMNGR) produced 32 and exported 35 thousand tons of oil. Such over shipment can be accounted for by the remains accumulated in oil storage complex by the beginning of the year. While Arktikneft Company produced 40 and exported 76 thousand tons, which is hardly realistic.

In order to determine the real values of export shipment, based on land register, let us consider the producing companies infrastructure on the island. AMNGR disposes of producing wells, infield oil pipeline and stock-tank oil reserve. Arktikneft disposes of producing wells, infield oil pipelines and, oil gathering and loading station. According to Murmansk Basin Emergency and Salvage Department (MBESD), the company is Kolguev terminal operator.

Therefore, to determine the total amount shipped from Kolguev Island in 2007 one should proceed from volumes given for Arktikneft, which owns a shipping terminal, i.e. 76 thousand tons, as AMNGR volumes are most likely to have been included into this number.

**Belokamenka OTC**

Offshore transhipment complex Belokamenka (with a Floating Storage and Offloading vessel Belokamenka as a main unit) has been carrying out storage and export shipment of oil coming from three directions:

- from Arkhangelsk port, all-year round: supplies of oil produced in Timano-Pechora oil-and-gas province by JSC NK Rosneft’s daughter company Severnaya Neft and transported by pipeline from Usinsk to Privodino station from where it is further transported by railroad and transhipped in the port of Arkhangelsk (Talagi terminal) into Samotlor-type shuttle tankers of reinforced ice class and 17 600 thousand tons deadweight for further delivery to the Kola Bay;
- from Varandey port, all-year round: supplies of oil produced by Naryanmarneftegaz, a joint venture of JSC NK Lukoil and ConocoPhillips, by shuttle tankers of less than 20 thousand tons;
- from the Ob Bay, seasonally (from June 25 to September 28): supplies from oil fields of JSC NK Lukoil’s daughter company RITEK. Shipments in coating from all the three directions amounted to 3 209 thousand tons, including 2 363 tons from Arkhangelsk, 612 thousand tons from Varandey, 234 thousand tons from the Ob Bay. The cross transhipment in coating at OTC made up 3 215 thousand tons for this period, which proves quite reliable data fit.

In 2007, the OTC offloaded 3 259 thousand tons of oil for export, which evidences that minor quantities of oil were additionally shipped from Belokamenka cargo tanks. At the same time, JSC NK Rosneft exported 2 363 thousand tons, which is somewhat lower than the volume officially declared by the company (2.42 million tons, with NK Lukoil’s figure being 846 thousand tons.

*Belokamenka* tanker design enables to process all the supplied oil sorts without their mixing (with annual transhipment volume of 12 million tons, it is technically possible to process 4 sorts of oil separately).
DYNAMICS OF OIL SUPPLIES TO PORT TERMINALS IN 2001-2008

For the general characteristics of export oil flows development in 2001-2008 (through port terminals), let us consider each of the transportation routes: the Baltic and Barents (Arctic seas) separately.

Baltic Sea

The development dynamics of pipeline and railroad oil supplies to Baltic ports appears more explicit if both types of transportation are spotted on the axes. The diagram (figure 4.94) defines monthly supplies from January 2001 to September 2008. To mitigate the effect of reporting periods varying duration, the supply volumes have been recalculated on the basis of annual designed capacity by dividing monthly traffic volume by number of days in a month and further multiplying by the number of days in the reporting year. Such index is, in essence, close to the normally used index of volumes per day, and easier comparable to annual traffic volumes. The red line defines the generally achieved annual design capacity of oil transportation system.

![Figure 4.94 Dynamics of oil supply to port terminals of the Baltic Sea in 2001-2008. Pipeline traffic: Lithuania (in general), Mazeikiu Refinery, Butinge, Ventspils, Primorsk. Rail traffic: Vysotsk, Ventspils, Muuga, Kaliningrad.](image)

To sum up:

1. Today’s system for supplying port terminals of the Baltic Sea has essentially been shaped in the second half of 2006, with vast majority of supplies being procured by the Primorsk terminal.

2. Maximum capacity of the Baltic ports oil supply system was reached in spring 2005 and exceeded 90 million tons a year. Subsequently, due to abandonment of railroad transportation, it decreased even with Primorsk terminal capacity growing.

3. Baltic Pipeline System development enabled both increased volumes of supplies to Baltic terminals and, eventually, abandon supplies to port terminals of Latvia and Lithuania.

4. Railroad freight flow was on its maximum level in 2004-2005. Introduction of new export duty in August 2004 decreased demands in pipeline transportation schemes. The peak level was reached in early 2005, when the increased oil price enabled to export oil at lower duties with 2-3 months deferred payment.

5. Presently, railroad transport practically provides only for export of the oil produced within Kaliningrad Region, with part of it being supplied to terminal in Izhevsk, as well as for minor transit of Kazakhstan oil.

6. Supplies to Muuga port are occasional and to other terminals – irregular and insignificant. Relatively small volumes of oil (under 0.9 million tons annually) are supplied directly from offshore field Kvartsovskoye (D-6) by sub-sea oil pipeline to Izhevsk terminal in Svetly of Kaliningrad Region and shipped there onto tankers of small deadweight.

Realisation of second stage of the Baltic Pipeline System (BPS-2) project only may change the scheme for transportation of oil to Northwest Russia and the Baltic Sea region.

Directive N 1754-p dated 26th of November 2008 of the Government of the Russian Federation on construction of the Baltic Pipeline System – 2 by the route: Unecha (Bryansk Region) – Ust-Luga (Leningrad Region) with the total capacity of up to 50 million tons of oil products a year, provides the project implementation in two phases: construction of the first complex with the capacity of up to 30 million tons of oil a year (with oil transportation to be started in the 3rd quarter 2012); and construction of the second complex increasing the capacity up to 50 million tons of oil a year, as well as construction of a branch to oil refinery in Kirishy (Leningrad Region).

Thus, based on previously declared volumes supplied to Kirishy refinery (12 million tons), we can speak about new additional oil volumes in the
ports of the Leningrad Region (38 million tons) and potential growth in oil traffic in the eastern part of the Gulf of Finland (with Primorsk terminal throughput remaining on the current level) up to 106 million tons in the second half 2012 and up to 112 million tons subsequently.

Decreased load on the Baltic Sea system can be facilitated due 2012 with construction and introduction by Sovcomflot and Stena Bulk of B-Max type tankers - VLCC broad-hull constructions of 200-240 thousand tons deadweight and draught lowered to 15 metres for free navigation in Denmark Straits. This may enable to decrease calls frequency in two times compared to that using traditional tankers. Introduction of such vessels will result in possibility of direct oil supplies to Atlantic Coast of North America.

**Arctic seas**

Oil is delivered to Arctic sea ports of Arkhangelsk, Vitino and Murmansk by railroad.

Oil is shipped onto sea transport directly in oil production regions - from the Pechora Sea coast and offshore area, as well as from the north of Western Siberia. As noted above, such transportation scheme is only possible for Varandey, Kolguev and Sandibinsky oil production centres (OPC), while oil transportation from Sredne-Khulymsk oil field in Western Siberia is provided by alternate schemes (specified in the legend of the figure 4.95 as “Alternate WS”).

The analysis of supplies dynamics gives the following summary of oil traffic:

1. Railroad crude oil deliveries to ports of Vitino and Murmansk have been stopped.
2. Presently, there is only one alternative route functioning for supply of Timano-Pechora oil by railroad through the port of Arkhangelsk by NK Rosneft, which owns the whole infrastructure chain - from railroad overpass in Privodino and Talagi terminal in Arkhangelsk Region to OTC Belokamenka. The acquisition by company of double-hulled arctic shuttle tankers of about 30 000 tons deadweight for oil supply from Arkhangelsk to Belokamenka (the first tanker RN Arkhangelsk started operations in December 2008, and in 2009 the company is planning to set in operation two more sister tankers – RN Privodino and RN Murmansk) speaks of good future for the project.
3. The volumes of oil supplies by alternate transport marine scheme from Sredne-Khulymsky deposit are decreasing, as high-quality oil is more profitable to be supplied for refining by railroad.
4. Volumes of oil produced at Kolguyev Island are steadily going down and at present dropped to 80 thousand tons a year.
5. The transhipment volume minimum for OTC Belokamenka to provide its profitable functioning is 2.5 million tons of oil annually. It is evident that as oil shipment from Varandey terminal increases, Rosneft is most likely to start decreasing its own oil transhipment volumes from Arkhangelsk.
6. The prospects of Prirazlomnnoye field development, the tankers for which are being constructed at Admiralty Shipyards in Saint-Petersburg (Mikhail Ulyanov and Kirill Lavrov identical to Varandey project tankers) are not defined. Low quality of oil supplied directly to world market, even compared to Urals, greatly decreases project profitability. And in October 2008, Gaspromneft expressed its doubt as to expediency of Prirazlomnnoye and a major Dolginskoye fields development.
7. It is very unlikely to start construction of Kharyaga-Indiga oil trunk pipeline as the existing transport infrastructure can fairly provide exports of new oil volumes at a short-term production peaks, and project really lack oil resources needed.
8. The completion in May 2008 of NK Ros-Oil construction of railroad terminal at Baklanka station at Vologda branch of the Northern Railway, which would be enable, according to the data presented, railroad transshipment of up to 4 million tons of oil annually, did not result in expected growth of traffic to the Arctic ports: the real shipment volumes do not exceed 15 thousand tons a month and oil is supplied to mini-refineries within Russia. The main thing is not clear – which company will ensure the declared oil supply volumes.

9. The real potential of oil transportation in the Arctic sea waters depends on development of Varandey terminal, which is mainly designed for transportation of oil from Yuzhno Khylchuyu field. The terminal of 12 million tons capacity was launched in summer 2008, much later than planned. The dynamics of this field development is unstable, but it is expected that annual production volume at Yuzhno Khylchuyu field will reach 7.5 million tons by 2009, which (considering production at other fields of Varandey OPC) may enable terminal shipment volumes to be on the level of 8 million tons. When double-hull Arctic shuttle tankers of about 70 000 tons deadweight (Vasily Dinkov and Kapitan Gotsky in 2008, and Timofey Guzenko in spring 2009) are put in operation, oil can be supplied for export as through OTC Belokamenka, as directly (which took place at first oil delivery to Canada in June 2008).

10. As to oil resource base for Varandey terminal operation, the unlicensed fields named after Titov, Trebs, Naulskoye and Labogansk (located close to the terminal) with oil production totaling about 0.25 billion tons, seem rather promising. The term of tender is presently not defined and depends on oil price dynamics.

Thus, based on the existing structure and dynamics of oil transportation volumes in Arctic seas, an assumption can be made that in the nearest future (by 2012-2015) annual oil volumes to be exported westwards from Murmansk will not exceed 12 million tons.

**SPATIAL PRESENTATION OF TRANSPORT SCHEME DEVELOPMENT**

The development, that is to say the “atrophy”, of oil transportation system is clearly illustrated on the map (figure 4.96) showing the supply of oil produced in Timano-Pechora province in 2001-2008. For the purpose 3D-modelling of transport system development, we have structured the objectives of oil transportation system based on defining the role of its transport infrastructure and its functional elements, modelled the main transport network.

In essence, Timano-Pechora oil was supplied to the same terminals as the oil from other regions of Russia, which enables rather detailed description of general development of transport schemes.

**CONCLUSION**

The analysis of real oil transportation schemes in Northwest Russia allows concluding that multiple declared projects for construction of new port oil transshipment terminals, potential to increase traffic in the offshore areas (Onega, Indiga, Prirazlomnoye, Severodvinsk, Vitino, Dudinka, Dikson, Gulf of Finland and Kaliningrad Region) are hardly going to be implemented in the foreseeable future. They have been abandoned long before the landslide of world oil prices.

Note: this article (chapter 4.3) was prepared by Mikhail Grigoriev for the present report and published without changes.
5 Environmental Safety

In the previous reports issued in 2005 and 2007, we published articles about environmental national policies in Russia and Norway based on the official documents of the Russian and Norwegian environmental authorities; examples of environmental policy documents of Russian and Norwegian oil companies; and brief description of oil pollution prevention systems in both countries. In the 2007 report, we included a concrete example of the Norwegian Pollution Control Authority (SFT) requirements for oil transshipment operations in Bøkfjord and Sarnesfjord.

In this report we give an updated status of the vessel traffic monitoring and control system developed in Norway since 2002 with a description of the Norwegian coast emergency response system that the Norwegian Armed Forces implemented in cooperation with the Norwegian Coastal Administration to monitor oil-and-gas transportation.

In January 2007, a new vessel traffic service of the Norwegian Coastal Administration was set in operation in Vardø. In the present report, we give a description of the Vardo Vessel Traffic Services and its area of responsibility. We also write about the status of the Norwegian-Russian cooperation in oil pollution abatement.

In the previous reports, we paid attention to environmental problems caused by oil spills in the sea in Norway and Russia. In 2005 report, we gave descriptions of accidents with Rocknes near Bergen in Norway, and with Nefterudovoz in the White Sea and Cristoforo Colombo in Sakhalin in Russia. In 2007 report, we wrote about the accident with Server near Bergen and a clean-up operation.

Here, we provide some information about the big accident happened in the Kerch Strait between the Azov and the Black seas in November 2007. The article is based on clippings from news agencies and reports made by WWF and UNEP. We also give some of media records related to oil pollution and response in the Russian and Norwegian parts of the Barents Region that were published during recent two years.

5.1 VESSEL TRAFFIC MONITORING AND EMERGENCY RESPONSE SYSTEM

5.1.1 OIL TRANSPORTATION FROM NORTHWEST RUSSIA AND NORWEGIAN COAST EMERGENCY RESPONSE SYSTEM

The article describing the Norwegian coast emergency response system was prepared in consultations with the Norwegian Coastal Administration and Armed Forces, and using monthly statistics data of the Regional Headquarters North Norway.

Introduction

The transit line from Northwest Russia to West European harbours along the Norwegian coast became busy due to the large-scale oil transportation started in 2001-2002. This brought a potential environmental threat to the vulnerable coastal areas. The Norwegian Coastal Administration and the Defence Department were the authorities that had to handle the situation on behalf of the state. Well-founded resources along the coast, especially in the Northern Norway, including control over the necessary supplies and monitoring system, made the Armed Forces the key player in the area.

The Norwegian Coastal Administration is the main responsible authority in the emergency response system. By the emergency response system, we mean plans and measures that are or have to be carried out in order to prevent or reduce the threat to the marine environment.

The Navy was the only state authority that had a permanent presence in the sea areas until the tug readiness system was established. On these grounds, the Navy is a contributor to sea safety and to the emergency response system. Other divisions of the Armed Forces also take part, especially maritime patrol aircraft and rescue helicopters. The Armed Forces participation from
Oil transport from the Russian part of the Barents Region. Status per January 2009

its different divisions is coordinated by the operative headquarters in Stavanger (Norwegian National Joint Headquarters – NO NJHQ) and in Bodø (Regional Headquarters North Norway - RHQNN). The contribution of the Armed Forces is rendered as support to the Norwegian Coastal Administration.

Two cases at sea with an accident and a near accident that occurred in 2000 and 2001 demonstrated the importance of establishing an adequate emergency response system in connection to the growing oil traffic.

At the fall of 2000, the freighter John R ran ashore in the Northern Troms. The vessel was completely wrecked and broke in two. In July 2001, the newly built and fully loaded Russian oil tanker Kaliningrad had a main engine failure almost in the same area. The vessel was nearly driven ashore when it finally managed to start the machine and was again underway.

These two incidents made the state authorities that are in charge of maritime safety and coastal emergency response system focus more on the oil transports from the Northwest Russia.

This part of the report gives an account of the way the Norwegian Coastal Administration and the Norwegian Armed Forces follow up oil transportation from Northwest Russia. In addition, the report provides data about the traffic dynamics since 2002.

Daily tracking of the traffic by 2007
Practice up till 2003
The 2001 incident and the engine stoppage of the fully loaded 100 000 tons deadweight tanker Moscow outside the North Cape in 2003 demonstrated the drawbacks of the emergency response system on day-to-day basis. The Armed Forces had all the resources and monitoring capabilities, by that reason this authority eventually got a leading supervising position in respect of monitoring and control over the oil traffic. At first, the control was limited to monitoring tankers by the radar operators at Regional Headquarters North Norway in Bodø (RHQNN). There was little communication with the tankers and there was no system for notification of approaching oil transports. The tankers were kept in view and reported to superior and subordinate units as well as to the Norwegian Coastal Administration.

In 2003, the following-up oil transports process came into more structured forms. The main emphasis was given to routines for informing the tankers about the required route 12 nautical miles from the shore and the coastal emergency response regulations in Norway. Also, a database was established for keeping register of the traffic. This information has later been used for dimensioning the tugboat readiness system in the area Røst-Varangerfjord and for the planning and implementation of mandatory traffic lanes inside Norwegian territorial waters between Varde and the North Cape. The general routine that was used by 2007 was presented in detail in our 2007 report.

The important changes from the beginning of the monitoring the vessels carrying dangerous goods in 2002-2003, to what was implemented by 2007, were introduction of the following elements: emergency towing vessels (ETVs) that were put in operation between Røst and Varangerfjord; a traffic separation system (TSS), automatic identification system (AIS); and a new traffic vessel service centre in the north – Varde Vessel Traffic Services (VTS). These changes made the process of monitoring the traffic of dangerous goods more efficient. In “The routines of Today” we quote the message that all tankers receive entering the Norwegian Economic Zone (NEZ).

Figure 5.1 In July 2001, the newly built and fully loaded Russian oil tanker Kaliningrad had a main engine failure. The vessel was 200 metres from underwater rock when managed to start the machine and make its way.
The Routines of Today
In January 2007, Norwegian Coastal Administration opened a new Vardø Vessel Traffic Services (VTS) that got the responsibility to monitor and coordinate oil tankers and other vessels sailing into Norwegian Economic Zone.

Vardø VTS establish information exchange with all tankers and other vessels larger than 5 000 gross tons and ocean towages in transit outside the Norwegian territorial waters (12 nautical miles off the baseline). The main objectives for establishing information exchange are to improve sea safety and protect the marine environment from acute pollution.

Vessels entering the coverage area
The VTS forward information of relevance for a safe transit through the coverage area. Vessels which have or get damages that can influence on a safe transit, have to report this to Vardø VTS immediately.

Reporting
All tankers, vessels larger than 5 000 gross tons and ocean towages entering NEZ are requested to report to Vardø VTS, stating the following information:
- Ship name
- IMO number
- Primary telephone number
- Primary fax number
- Primary Inmarsat-C number
- E-mail address
- Cargo UN reference(s) (IMDG-Code)
- Amount of cargo (metric tons)
- Amount of bunker oil (metric tons)
- Bunker oil UN reference(s)
- Number of crew
- Number of passengers
- Port of departure
- Time of departure
- Port of arrival
- Estimated time of arrival.

Mandatory Traffic Separation Scheme and Recommended Routes
Vessels are requested to carefully consider transit routes along the Norwegian coast. A regulation on traffic separation system (Regulation of 29th of June 2007 no 734 on traffic separation system in NEZ between Vardø and Røst) entered into force on 1st of July 2007 (see chapter 5.1.3).

Tankers of all sizes, including gas and chemical tankers, and all other cargo ships of 5000 gross ton and upwards engaged in international voyage shall follow the mandatory traffic separation schemes as pointed out in the regulation”.

Other actions carried out by the Norwegian Coastal Authorities in response to the threat
In addition to the above described actions, two measures have been implemented in order to reduce the chances or limit the effects of a possible environmental disaster connected with the oil traffic. Both are responsibilities of the Norwegian Coastal Administration.

The first thing eventually carried out was the establishment of the state tugboat readiness service in the area of Røst-Varanger. This was done in fall of 2003 by positioning three tugs in three zones. The coast guards placed vessels in two zones while the Norwegian Coastal Administration positioned the Skandi Beta to attend to the third zone.

The other measure was the establishment of traffic separation zones in the area of Vardø-North Cape. (see chapter 5.1.3) The zones were allocated in January 2004, together with the expansion of the territorial waters to 12 nautical miles. The regulations oblige vessels according to the defined criteria, including tankers, to follow the traffic separation zones if they want to sail in Norwegian territorial waters. The purpose of the traffic zones is to reduce danger of vessel collision.

The Norwegian Coastal Administration has opened a vessel traffic services in Vardø, which in the long run takes over the functions as oil traffic monitoring and tracking carried out by the Norwegian Armed Forces.

Monitoring system experiences
The Norwegian authorities wish that the majority of the vessels passing along the coast comply with the requests imposed on sailing routes and preliminary notification procedures.

So far there has not been any incident with a tanker from Northwest Russia that has led to environmental damage. In two cases, Kaliningrad and Moscow, certain measures were taken to prevent the possible accident. In both cases, the vessels managed to make way themselves.
Traffic and cargo volume growth

The Norwegian Defence Department, as mentioned before, has been monitoring the oil traffic from 2003 to 2008. The monitoring activities have generated a large amount of data about traffic numbers, cargo volumes and vessels participating in transports. These data are systematised so they can be used to assess, for example, needs for salvage services and traffic zoning. The data for 2002 are also available. Together with the available data, it has given a good perspective of oil traffic trends from the point of view of coastal emergency response system.

Cargo volumes

The monthly cargo volumes changed as it is shown in the diagram (see figure 5.2). According to RHQNN records, the total amount transported in 2002 was 4 266 700 tons of oil and oil products, in 2003 – 8 084 500 tons, in 2004 – 11 751 900 tons, in 2005 – 9 577 600 tons, in 2006 the amount was 10 579 080 tons, in 2007 – 9 792 364 tons, and in 2008 – 10 753 401 tons.

In 2004, the total number of vessels with cargo over 100 000 tons doubled in comparison to the previous year, as it proved to be cost effective to use larger vessels. In 2004, the average tanker deadweight was 40 thousand tons, in 2006 – 51.4 thousand tons and in 2008 – 59.4 thousand tons.

The use of the Floating Storage and Offloading vessels (FSO) Belokamenka has increased the uploading efficiency and intensified the use of both the shuttle tankers that operate along the coast and line tankers that come from Europe for oil cargo. In 2006, most of them carried crude oil, next in volume was fuel oil followed by gas condensate. In 2008, crude oil made 3.48 million tons, gas condensate 2.47 million tons and fuel oil 1.52 million tons.
Number of vessels
In 2002, 166 tankers with cargo from the Russian Barents Region passed along the North Norway coast; in 2003 there were 250 tankers; in 2004 – 295; in 2005 – 278; and in 2006 the amount dropped to 206 vessels, including 8 vessels transhipped in Bøkfjorden, while the cargo volume increased in 2006 versus 2005. In 2007, there were 212 transits along the coast of North Norway. In 2008, there were 237 passages, 44 of them from Melkøya.

Originating ports
In 2004, we have noticed direct shipments to the continent from Murmansk, Arkhangelsk, Vitino, Varandey, the Ob Bay and Dudinka. In 2006-2008, the overwhelming majority of cargo went from the Murmansk Region.

Destinations
Rotterdam is dominating among the destination ports. Most of the tankers go to European harbours. But in 2006, the Norwegian Armed Forces registered more than 30 vessels heading for USA ports, like Houston, New York, Portland, and Port Arthur. In 2008, Rotterdam was still the most important destination with 66 of a total of 237 transits. 60 vessels headed for North America to 12 different harbours, where New York, Houston, Philadelphia and Paulsboro had most calls.

Vessels-specific countries of origin
In 2006, we have registered 132 different tankers in the oil traffic (versus 101 in 2004). They were under 23 different state flags with the greatest number being of Liberian registry – 25 (versus 23 in 2004). 5 vessels under the Russian flag also appeared in the traffic (versus 12 in 2004). Norway was represented by 6 vessels – all Norwegian International Ship (NIS) registered. In 2008, there were 169 different tankers under 21 different flag states. Liberian had 49 ships, Russia – 3 and Norway – 0.

Vessel standards
The fleet of ships carrying oil from the Northwest Russia is new. 100 out of 132 vessels passed in 2006 were built in the years 2000-2006. Almost all vessels carrying oil have a double hull. In 2006, there was one ship registered with a single hull. Six vessels were listed as vessels with an unspecified hull type.

In 2008, 169 ships carried oil and gas products (23 from Melkøya). 89 of them or 53% were 4 years old or younger, 49 or 29% were 9 years old or younger. Only 2 vessels did not have double hull.

Summary and conclusions
Oil traffic from Northwest Russia has been stable in 2004-2008. With the opening of the new Varandey terminal in 2008 and a general upgrade of transport infrastructure in Russia, there is expected to be an increase in the exports. There has been steady growing number of deliveries to North America, but Europe is still the most important destination for the tankers. The vessels used in the traffic are mostly new and generally advanced in shipping technology. Various sea accidents in the last few years have resulted in revision of international requirements for sea vessel standards, and these regulations seem to have been implemented by major actors in oil transportation from Northwest Russia.

Figure 5.4 The year of build of different vessels in the oil traffic. In 2008, there we registered 169 tankers (237 passages). Most of the ships carrying oil through the north NEZ are newly built. The data are collected and processed by RHQNN.

Figure 5.5 The hull types of the ships carried oil through north NEZ in 2008. The data were collected and processed by RHQNN.
D – double hull; DIR – double hull, ice-reinforced; IR – ice-reinforced; Ord. – ordinary; Unk. – unknown.
5.1.2 VARDØ VESSEL TRAFFIC SERVICES

Vardø Vessel Traffic Services (VTS), the Norwegian Coastal Administration’s new vessel traffic service for Northern Norway, opened in January 2007. Vardø VTS from 2008 also covers the whole coast of mainland Norway and Svalbard. Due to the increased area that Vardø VTS is covering, it will in 2009 change the call signal to NOR VTS.

Vardø VTS monitors and coordinates oil tankers and other vessels carrying dangerous or polluting goods along the coast from the border to Sweden in south to the border between the Norwegian and Russian Economic Zones in the north. The VTS provides, on behalf of the Norwegian authorities, vessel traffic services conforming national and international regulations.

Vardø VTS was established on commission from the Ministry of Fisheries and Coastal Affairs to improve safety at sea and protection of the marine environment from acute pollution. The budget limit for the project was 134 million Norwegian crowns and annual operating costs are close to 20 million Norwegian crowns.

Vardø VTS has a permanent staff of 13 people. The Norwegian Coastal Administration is the national agency for coastal management, maritime traffic safety and preparedness against acute pollution. The establishment of Vardø VTS has strengthened the ability of the Norwegian Coastal Administration to exercise its responsibility within traffic monitoring and coordination. Vardø VTS is also coordinating the emergency towing vessels in Northern Norway in close cooperation with the Regional Headquarters North Norway.

Vardø VTS shall alert key emergency personnel and emergency towing vessels in critical situations. Vardø VTS is a part of the Norwegian emergency response capability in cooperation with the Coastal Administration’s Department of Emergency Response and the Joint Rescue Coordination Centre North Norway.

The system for monitoring, communications and crisis management used by Vardø VTS is based on novel technology. Automatic Identification System (AIS) is the main sensor for traffic monitoring providing dynamic, static and voyage related information as transmitted by vessels.

Another important sensor for traffic monitoring is the Norwegian Defence Coastal Radar Network. Static and voyage related information relies on the Coastal Administration’s ship reporting system, SafeSeaNet. Recently a new generation software for monitoring, C-Scope, has been introduced. In combination, these novel technological systems
provide Vardø VTS with an early warning capability enabling preventive measures to be taken in order to avoid critical situations. Vardø VTS has the capability to monitor the traffic within a 50 nautical miles zone from the coast.

Procedures for communication and reporting between ships and Vardø VTS have been established to contribute to the safety of life at sea, safety of navigation and protection of the marine environment. The Norwegian Coastal Administration requests all tankers, all vessels larger than 5000 gross tonnage and ocean towages to report to Vardø VTS upon entering the area within the Norwegian Economic Zone (NEZ) to the Norwegian-Russian Economic Zones border.

Vardø VTS provides detailed information on navigation routes, fishery activity, emergency towing vessels and traffic, and weather conditions to vessels within its area of responsibility.

Communication with shipping is based on VHF, e-mail and telephony. Vardø VTS is co-located and has close cooperation with Vardø coast radio station.

5.1.3 NEW ROUTING FOR TANKERS IN NORWAY

In 2006, Norway developed a new mandatory traffic separation scheme. According to the scheme, the loaded tankers had to follow the new route between Vardø and Røst 30 nautical miles outside the Norwegian coast. International Maritime Organisation (IMO) rarely accepts routes for such connected areas as Vardø-Røst. The Norwegian Ministry of Fisheries and Coastal Affairs’ dialog with delegations of other countries prior to the approval, especially with Russia, was very important for getting support to the proposal.

The United Nations (UN) maritime organisation, IMO gave the green light to the new regulations in December 2006, but it took six months to spread information along all the official channels as required by the UN. The regulation came in force and the new routing has been obligatory for tankers since July 2007.

The goal is that the super-tankers, which can be particularly dangerous for environment, will keep far away from the coastline so Norway will have enough time to get the towing gear on board and stop them when the technical failure occurs. The regulation is applicable to all ships over 5 000 tons deadweight. The new regulation for the stretch of Vardo-Røst implies that vessels shall follow the separation routes, almost as exactly as cars follow the motorway, both northward and southward.

The Norwegian Coastal Administration says that before 2010 Norway will have a rule that would require that all utility traffic along the coast not only should sail in the international waters minimum 30 nautical miles from the shore, but will also be continuously monitored.
5.1.4 NORWEGIAN-RUSSIAN COOPERATION IN OIL POLLUTION ABATEMENT AND MARITIME SAFETY

The cooperation in the field of protection against oil pollution between Russian and Norway has been going on for more than 10 years.

This cooperation is built on the basis of an agreement on maritime safety and environmental protection against oil pollution from 1994 defined by the Memorandum of Understanding from 2006. The cooperation has had the character of practical joint activities, in which the oil pollution protection authorities from the two countries have obtained experience and have had joint exercises both in Norway and in Russia. Earlier the joint training was organised every other year; in the last few years the exercises are held at least once a year.

The Norwegian Ministry of Fisheries and Coastal Affairs with The Norwegian Pollution Control Authority (SFT), the Norwegian Coastal Administration and the Ministry of Transport of the Russian Federation represented by its oil pollution protection unit, Murmansk Basing Emergency and Salvage Department (MBESD), have been the most important players in this cooperation. The Ministry of Nature Resources and Ecology of the Murmansk Regional Administration is also very active in this work. We see that the Murmansk regional Department of Emergencies participates, and the Norwegian oil company StatoilHydro contributes with providing equipment for this work. Norway continues to be the driving force in this cooperation. The attitude to necessities and priorities in oil pollution protection are quite different in Norway and Russia. One example: MBESD with its limited resources is responsible for salvage and oil pollution abatement operations in the sea areas from the Norwegian border in the west to the areas eight time zones to the east, by the Lena River delta.

In 2007 and 2008, Norway and Russia continued the stable cooperation that consists of a meeting in spring, where the activities are coordinated, and a joint exercise in the autumn. The joint exercise in 2007 was arranged in the Varangerfjord in Norway. The 2008 exercise on Russian territory was delayed several times and in the end have not taken place.

The exercises include both Search and Rescue and fighting oil spills. From 2008, this has been split in two different exercises after a wish from the Russian side. The Search and Rescue exercise took place in 2008. In 2009, there will be a big Barents Rescue exercise with Murmansk as a base where fighting oil spills will be a minor part.

In 2007 and 2008, WWF by their offices in Oslo and Murmansk were included in the oil spill response. WWF train volunteers in cleaning oil spilled beaches and cooperate with staff that trains specialists in cleaning seabirds covered with oil.

In November 2007, there were arranged a seminar in Murmansk on “First responder – what to do” between the Norwegian Coastal Administration office in Tromso and MBESD.

In November 2007, NATO-Russia 4th workshop on oil spill response was held in Tromsø. 50 experts from Canada, Denmark, Norway, Russia,
Turkey, UK and USA participated in the workshop. A series of workshops have been held on the subject Oil Spill Response (OSR) since April 2004, when Norway hosted the first Nato-Russia Council (NRC), Committee on the Challenges of Modern Society (CCMS) workshop entitled “Equipment for Oil Spill Response Operations in the Barents Sea”. Russia hosted the second workshop in Moscow in October 2005, which focused on the legal frameworks in the field of prevention, localisation and response to oil spill. The third workshop, organised and sponsored by Canada, took place at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia in October 2006.

The main objective of the 4th NATO-Russia workshop was to evaluate the possible foundations of a joint NRC Science for Peace and Security (SPS) development project for oil spill response related to:
- International co-operation during oil spill operations;
- Development and use of oil spill equipment in ice and ice infested areas;
- Logistic challenges in oil spill operations in the Arctic.

Conclusion and recommendations of the workshop included the following points:
The NATO SPS workshop on Oil Spill Response is considered as a useful and important forum for sharing experience. The different presentations gave the participants a broad overview of the challenges related to oil spill response within the three topics selected by the workshop. The following recommendations were made:

a) An expected increased traffic of vessels in the Arctic may result in an increased risk of oil spills. Based on this fact there is a possible need for new international agreements to prevent accidents and to harmonize oil spill operations in the Arctic or to improve this work within the existing organisations such as the Arctic Council or others.
b) Large oil spills worldwide have shown that joint efforts and international assistance are important for a successful result.
c) Generic Contingency plans for Oil Spill Operations at sea and on the beaches and in ice in the Arctic region should be prepared.
d) Tactical and technical guidelines related to oil spill response in the Arctic should be developed.
e) There is a need for Joint Oil Spill Response Exercises in the Arctic.
f) Oil Spill Response in ice or ice infested areas is a challenge and there is a need for continuous improvements related to technique and tactics.
g) The countries should pool knowledge to improve the equipment designed for operations in this area and examine alternative methods.

It is recommended that NATO and Russian experts who have been working on this Oil Spill Response issue continue their efforts to solve this very important trans-boundary environmental problem. A way ahead could be to propose a concrete project to address this problem within the framework of the NRC SPS Action Plan. This project should take into account both NATO missions and other ongoing international activities in this field, e.g. through the Arctic Council.

Figure 5.12 Norwegian-Russian Joint Planning Group at their annual meeting at MBESD office in Murmansk in 2008.

Figure 5.13 Participants of the WWF joint Norwegian-Russian practical workshop and training of volunteers in Vardsø in 2006.
5.2 ACCIDENTAL OIL POLLUTION

In the previous reports, published in 2005 and 2007, we described several incidents that occurred during the oil transportation in Norway and Russia in the years from 2003 to 2006. We aimed to highlight the possible environmental effects of such operations. Seen in a European perspective, the volumes of oil transported along the Russian and Norwegian Arctic coast are not significant yet. Nevertheless, in the near-term perspective, this situation is likely to have considerable changes. Statistics show that accidents rarely occur during the transportation of oil. However, since the total volume of oil transported by sea worldwide is formidable, accidents still happen all over the world. And when they do happen, the effects are often wide-ranging, both to the environment and to the human beings that are dependent on the areas impacted. The transportation of oil in the Arctic waters may present challenges that are greater and of a different nature than in warmer climates. This is partly due to the fact that the sea areas are covered by ice during winter season, which is a challenge to the recovery of oil spills, partly because the slow dissolving oil in cold temperatures is an additional threat to the environment, and to a big extend caused to features of Arctic ecosystems as such and their pollution response abilities.

In the report published in 2005, we gave a special attention to an oil spill caused by a collision between two tankers in the Onega Bay in the White Sea in September 2003. We also focused in more detail on two ship accidents, namely the Cristoforo Colombo accident at Sakhalin in Russian Far East in September 2004, and the Rocknes disaster in the vicinity of Bergen which happened in January 2004 - one of the most costly environmental operations in the shipping industry in Norway. The experience Russian and Norwegian environmental authorities and the institutes gained after the accidents in the Onega Bay and Bergen stimulated bilateral cooperation for developing the joint methods for environmental risk analyses, impact and damage assessments, and monitoring during oil shipment in the Barents Region.

In 2007 report, we made a detail description of the Severer incident, which happened near Bergen in January 2007, and wrote about the followed clean-up operations.

In the present report, we give some information about a big accident that happened in Kerch Strait between the Azov and Black seas in November 2007. The article is based on clippings from the news agencies RIA Novosti, Russia Today, AP, Interfax, Kommersant and reports made by WWF Russia and UNEP.

5.2.1 THE KERCH STRAIT ACCIDENT

On 11th of November 2007, a heavy storm hit the Kerch Strait in the Sea of Azov and killed at least six sailors, sank four ships, split open an oil tanker and eight ships ran aground.

The tanker Volgoneft-139 broke apart and spilled most of the fuel oil into the sea, some of it went to the bottom, some to the Russian coastline and some to the Ukraine coastline.

**Sunday, 11th of November 2007**

Severe weather conditions caused a series of incidents in the Sea of Azov in Russia's south during just 24 hours. Strong wind up to 20-35 metres per second and 4-6 metres high waves created massive problems for ship traffic in the Kerch Strait. At least seven vessels were battered by the storm. At 04:45 a.m. Moscow time (01:45 a.m. GMT) on Sunday, 11th of November 2007, the tanker Volgoneft-139 loaded with 4 000 tons of fuel oil broke apart during a storm to the south of the port of Kavkaz, with more than 3 000 tons of fuel oil spilling into the sea. Both parts of the Volgoneft-139 tanker were afloat several kilometres from each other. The thirteen crew members were in the stern for hours using the engines to keep their part of the vessel on the water and awaiting rescue.

The dry cargo ship Volnogorsk carrying 2 600 tons of sulphur sank 10:25 off the port of Kavkaz in the Kerch Strait on 11th of November, the sulphur did not reach water, as all cargo had been pressure-sealed. The crew escaped in a raft and safely sailed to the same Tuzla bar. A second cargo ship loaded with sulphur sank during a storm that day at the Kavkaz port with the crew unhurt in the incident.

The dry cargo ship Nakhichevan sank in the Kerch Strait and eight crew members were missing. All crew members of the other sulphur-containing vessel were rescued.
Two crewmembers died and one was missing after a Russian cargo ship sank off the Black Sea port of Sevastopol in Ukraine. The cargo ship loaded with metal sank on the night. Fourteen crewmembers were rescued.

Two cargo ships each containing over 2,000 tons of sulphur sank. The fourth victim was _Kovel_ freighter (sulphur again) that crashed into the sunk _Volnogorsk_, got the hole and sank itself. The crew safely changed _Kovel_ for a tow boat. _Dika_ barge with 4,149 tons of fuel oil was washed to Tuzla bar, and the storm carried another barge, _Demetra_ with 3,757 tons of fuel oil towards Tuzla bar as well.

At the same time, Turkish _Ziya Kos_ and the Georgian ship _Khun Ismail_ with 800 tons of metal aboard ran aground close to Novorossiysk port. Fortunately, there were no victims that time. A second tanker, _Volgoneft-123_, was hit by storm in the Kerch Strait the. _Volgoneft-123_ was later towed to Temryuk port.

**Authorities**

Russian President Vladimir Putin ordered Prime Minister Viktor Zubkov to fly to the region to assess the disaster and clean-up efforts.

Oleg Mitvol, Deputy Head of the Federal Supervisory Natural Resource Management Service of Russia (Rospryrodnadzor) and a member of the UN International Panel for Sustainable Resource Management, believes the fuel oil spill could lead to long-term contamination. “The eco-system of the Black Sea and the Azov Sea is very sensitive and the amount of oil in the water now is very great. There is a lot of work to be done to minimise the consequences of this serious ecological disaster,” he said.

“The most important thing at the moment is to save the crews, to clean up the aftermath of the disaster and to prevent any further incidents,” said Elena Velikova, senior assistant of the Southern Transport Prosecutor.

“Some 30,000 birds have died and it is not possible to count how many fish. The damages are so great that it is hard to assess. It can be equated with an ecological catastrophe,” said Alexander Tkachev, the Governor of the Krasnodar Region.

On 11th of November, officials said the weather forecast for the next 24 hours were not favourable for the rescue efforts. Around 50 vessels were being relocated from the port of Kavkaz to safer areas as the weather in the region continues to worsen.

Experts say that black oil in water becomes heavier in cold temperatures and that was the reason why most of it was at the sea bottom after the accident. The spill from a tanker that split apart on 11th of November in the strait connecting the Black and Azov Seas was seen as potentially the worst environmental disaster in the region in recent years. It prompted criticism that many Russian tankers were not seaworthy.

Russia and Ukraine set up headquarters at the level of deputy transport ministers to manage the shipwrecks in the Sea of Azov, the Russian Transport Ministry said.

**Monday, 12th November 2007**

The storm was still strong and the forecast expected the storm to continue into Tuesday, 13th. Seamen were still missing and three found dead. The coastline was heavily polluted and rescue workers had started to clean up.

The bodies of three sailors from the _Nakhichevan_ washed up on shore and rescuers were looking for five missing crewmen. Russian officials said the captains of several vessels had put to sea despite storm warnings. The tanker that was the source of the spill was built in the 1970s, and was not designed for heavy seas, officials said. At Novorossiysk, Russia’s number two port for exports of oil and oil products, officials had ordered tankers not to dock because a new storm was on its way. According to the Russian Ministry of Transport, the worsening weather, forecast to last until Tuesday evening, was hampering rescue operations.
Rescue and clean up
According to regional coast guard, workers should have begun pumping oil from the tanker once the weather would improve, then tow the ship to port. But the weather appeared to have been worse than the forecast.

At the coastal settlement of Ilyich, halfway between Kavkaz and Novorossiysk, about 100 workers were on the beach using shovels and a bulldozer to scrape globules of oil off the sand. The oil stretched for 13 kilometres along the shore.

According to Russian Ministry of Emergencies, on 12th of November more than 160 tons of oil-contaminated waste were collected in the area of the Kerch Strait where a number of vessels sank. The oil-contaminated waste collected was kept on a special site in the village of Sennoy. The main source of contamination remained the bow and the stern of the sunken tanker *Volgoneft-139*.

A mobile detachment of the 495th Rescue Centre of the Ministry Emergencies was scheduled to leave to collect oil-contaminated waste. 488 people, 94 units of machinery including 17 ships, six amphibian aircrafts, and 71 units of machinery were battling results of the storm on 12th of November. The Ministry Emergencies of Russia was working with the Russian Ministry of Transport, units of North Caucasus Military District, FSB South Regional Border Department and the units of the Ukrainian Ministry of Emergencies.

Ukrainian Government urged a review of environmental safety in the Kerch Strait, a busy waterway which separates Ukraine’s Crimea peninsula and southern Russia. According to the Government, currents were taking the slick away from Ukraine’s coastline.

A week later
The Southern Regional Centre of the Ministry of Emergencies of Russia had cleaned over 42 kilometres of the coastline. According to the Southern Regional Centre, a total of 15 392 tons of solid petroleum waste had been collected on the Strait coastline.

The coastline was polluted again with drifting petroleum products. More than 8 000 tons of a mixture of petroleum products, silt, sand and water had been collected earlier. An absorbent was used in the spill collection. More than 327 tons of oil-water emulsion was collected from the sea.

Some 4 620 dead birds had been collected and disposed. About 1 600 people and 244 pieces of machinery were engaged in the cleanup.

Environmental problems
According to WWF-Russia, most of the fuel oil would settle on the bottom and would be thrown ashore gradually. The seabed’s fauna and flora would suffer the most. The Institute of Global Climate and Ecology stated that oil products could stay in the water for no more than six months.

The Environmental Watch on North Caucasus reported the accident was particularly devastating for the environment in the area as the Kerch Strait is the passage route for fish migration between the Black Sea and the Sea of Azov, including for many endangered fish species.

Russian environmental officials stated the sulphur spilled from the freighters did not appear to pose any environmental danger.

According to the Administration of the Krasnodar Region, 30 000 birds died, and it was impossible to count the loss of fish. A flock of about 1 000 rails, a species of wetland bird, were huddled on the
Oil transport from the Russian part of the Barents Region. Status per January 2009

beach, unable to fly because their feathers were coated with oil. Some were unable to stand.

The Russian Bird Conservation Union reported that in the region around the Chushka Promontory, out of every 30-40 dead birds only one could be found alive, although without any chance of surviving. The conservation organisation stated the disaster-stricken area includes an important zone for 50 000 migrating birds and that up to 10 species of endangered birds can be spotted there at different times of the year. Birds were dying of dehydration, hypothermia and starvation. Birds stained with fuel oil should be washed with cleaning agents and kept warm.

Tests of water samples showed that the contamination by oil products was 2.5 milligrams per liter, 50 times above acceptable levels.

Economical damage
According to the Russian Federal Service for Veterinary and Phitosanitary Surveillance (Rosselkhoznadzor), fishing losses from a fuel oil spill in a strait between the Black and Azov seas are estimated to 3.96 billion roubles (over 160 million US dollars). Hunting losses would amount to 6.084 million rubles (about 250 000 US dollars).

The Azov-Black Sea department of the Russian Fishery Agency has estimated the fishing industry losses from the Kerch Strait gale at 300 billion rubles.

Fish-processing plants have also sustained losses: they will be idle as long as the fishing ban remains in effect in the Kerch Strait. Fishermen may fail to make up for loss when the ban is lifted. The catch may seriously reduce, as the disaster occurred amid the yearly migration of anchovy and mugil soiyu to the Black Sea via the Kerch Strait. It is also unclear if fish caught in the Kerch Strait is edible. The annual amount of fishing in the Azov-Black Sea basin stands at 30 000 tons.

Russian and Ukrainian authorities argue on who should be responsible for shipwrecks in the Kerch Strait, and environmental damages and economical losses occurred. It was not easy to implement the polluter-pays-principle on practice with the huge Kerch Strait accident. According to the Ministry of Nature Resources of Russia, Rosprirodnadzor estimated the environmental damage caused by the Volgoneft-139 tanker disaster at 6 billion roubles. A lawsuit filed against the tanker owner Volgotanker Company has been filed.

Authorities action
Ministry of Transport of Russia reported that river-to-sea vessels were temporarily banned from high seas after the Kerch Strait accident. The ban may be lifted upon the end of investigation. The Kerch environmental prosecutor’s office opened a criminal case over the disaster.

New collision 6 days later
Two vessels, the Nika ship under the Cambodian flag and the Russian vessel Volgodon-5076 collided on 17th of November 2007.
Later actions
The European Commission has sent experts to Ukraine to assess the after effects of the fuel oil spill in the Black Sea and a report was presented in 2008 by EC and UNDP.

A Russian research vessel, Professor Shtokman, is to depart Russia’s Baltic Sea exclave of Kaliningrad in February 2009 for the Black Sea to probe into the long-term consequences of the 2007 oil spill in the Kerch Strait. According to the Shirshov Institute of Oceanology of the Russian Academy of Sciences, it will be Russia’s largest expedition in the Black Sea for a decade. The month-long expedition on board the Professor Shtokman vessel will involve over 80 people.

5.2.2 OIL POLLUTION AND RESPONSE IN THE RUSSIAN BARENTS REGION

Oil spills occur all the time and everywhere - in Russia, in Norway, and in the rest of the world. Below, we have selected clippings directly from Russian and international newspapers and news portals related to oil spills and response system in the Russian Barents Region. Our intention has been not to list every oil spill, but to focus on the fact that oil spills happen during the transportation, and to motivate the industry to prevent the oil spills and reduce oil pollution as good as possible.

January 11, 2007. Arkhangelsk Region
The NGO Aetas claims that lack of environmental control threatens petroleum safety.

The development of oil and gas industry in Northwest Russia threatens environmental safety, environmental organisation Aetas stresses. The organisation says that it is especially worried about the state’s insufficient control of oil and gas field operators. The environmentalists now call for stricter control of field operators and more funding for technical control equipment. The majority of the industrial oil and gas companies strongly promote the excellence of their environmental policies. Still, oil transshipments can hardly take place without regular micro spills, the Aetas environmental organisation claims. The organisation, made up of young people from Arkhangelsk, believes that the amount of spilled oil in Russia today accounts to several hundred tons per year. Oil patches several places stretch over hundreds of square kilometres. Aetas believes current methods for oil clean-up are insufficient.

The organisation maintains that Russian state environmental control of oil field operators is insufficient. “The environmental control is usually exercised by federal authorities and only seldom by public and private interests. According to today’s legislation, each project has to undergo environmental expertise, but this is not observed in practical life”, Ms. Sgibneva says.

By strengthening cooperation between the state and the public organisations we can move forward in solving many of the environmental safety problems in our country, underlined the activists. (Barents Observer)

January 16, 2007. Pechora, the Republic of Komi
Head of public relations in the Lukoil-Komi company, Feliks Gelman, says every oil company has to expect periodical oil spill. “The most important thing is how the oil companies deal with them and their consequences,” he adds.

The Lukoil-Komi representative last week commented on the recent spill of oil to the Pechora River, the Republic of Komi from one of the company’s pipelines. A regional expert commission now state that the on December 23 oil spill from the Pashnya pipeline happened because of corrugation.

The pipeline is more than 30 years of age. The commission also concludes that Lukoil-Komi after the spill burned oil wastes on the Pechora River
bank. Environments claim that oil spilled into the river. Lukoil-Komi however maintains that no oil spilled into the Pechora. Environmentalists from the Committee Save Pechora independently inspected the area after the spill. They claim that Lukoil-Komi tried to conceal the fact of the spill and the official amount of spilled oil is too low.

Lukoil-Komi has now been requested to take measures on the clean-up of the area and protection by February 1. (KomiOnline, RosbaltNord)

**January 24, 2007. Murmansk**

Statoil gives the Administration of Murmansk oil spill recovery equipment of a value of NOK 12 millions. This was stated by Statoil during the inauguration of Vardo VTS.

**January 26, 2007. Naryan-Mar, Nenents Autonomous District**

Development of Kumzha gas condensate field, situated partially on the territory of the Nenets State Nature reserve, will inevitably cause pollution of the Pechora River delta with oil products and can provoke an ecological catastrophe in the region. This is stated by the management of Nenetsky zapovednik in a letter to several Federal institutions.

The field was discovered in 1974, before the territory was included into the nature reserve. The gas reserves of Kumzha are estimated at about 10 billion cubic metres. (Pravda Severa)

**January 31, 2007. Coast of West-Finnmark**

The 50 000 deadweight Italian tanker *East point* has engine problems outside Sørøya. *East point* was on her way from Russia to Amsterdam when engine problems appeared. She is closely followed by the Norwegian tug *Chieflain*. (NRK)

**February 3, 2007. Port of Arkhangelsk**

The Arkhangelsk Sea Port is under threat from oil wastes, a regional representative of the Federal Service on Control of Natural Resources Exploitation (Rosprirodnadzor) reported. He fears that the White Sea could be affected by the oil pollution. Alexander Popov, regional head of sea and shelf control at Rosprirodnadzor says continued discharges of oil substances into the Arkhangelsk port zone could affect the White Sea environment. “If the problem of oily waters in Arkhangelsk port is not solved, we have to organise the pumping out of this water into forbidden places. This process can pollute the water in the White Sea basin,” Mr. Popov explains. Previously a special ship has handled oil wastes in the Arkhangelsk port. Due to bankruptcy of the “Krasnaya Kuznitsa” shipyard, however, the special vessel has been sold. (Bizness Klass)

**March 12, 2007. Kola Bay, Murmansk Region**

Four tons of mazut (heavy fuel oil) spilled into the Kola Bay, which appeared during oil transfer on the Turkish motor ship *Nazli G*.

Two specialised organisations are busy with breakdown elimination. Just after the spill, a special slick bar was arranged around the ship in order to prevent the oil spreading. Investigation of the accident is carried through. (RIA Novosti, Murmansk Vestnik, B-port.com)

**March 29, 2007. Kola Bay, Murmansk Region**

The Kola Bay remains one of the environmentally most dangerous areas in the High North. More than 115 dumped vessels threaten navigation and pollute the sea water. The concentration of heavy metals in parts of the bay exceeds the norm with several thousand percents. The Committee of Natural Resources under the regional administration recently discussed the problem together with representatives of environmental organisation, port interests and private companies.

The environmental situation remains serious, despite efforts to clean parts of the bay. Several international donor organisations, among them the Norwegian Barents Secretariat, have the last ten years contributed with funding to clean about 2/3 of the sunken ships in the Lavna area. Still, according to the Harmonic Development Foundation, as many as 117 ships today remain on the bottom of the bay. Foundation representatives say that up to 2 billion roubles of investments will be needed for the removal of the vessels, and another 2 billion roubles for the cleaning of the sea water. (Murman.ru)

**March 30, 2007 Nenets Autonomous District**

French oil major Total has received a fine of 30 000 roubles (1 150 US dollars) for ignoring safety violations at its Kharyaga project.

Environmental regulators are seeking to revoke its license in a separate audit. Total’s Russian unit
failed to plan how to use petroleum gas pumped from the oil field, gain permits to work with explosive substances or provide proof of two managers’ qualifications, the industrial safety agency said in a statement Thursday. The fine was the maximum possible. (Bloomberg)

**May 10, 2007. Pechora, the Republic of Komi**

Environmentalists from the Save Pechora Committee accuse Lukoil of having concealing an oil spill from the Peshnya-Zapadny Tebuk pipeline in the Komi Republic.

While the environmentalists claim that oil has spilled into the Pechora River, Lukoil maintains that the spill was minor and far from reaching the river shores.

Representatives of the Lukoil-Ukhtaneftegaz, a regional subsidiary of Lukoil, say that the ruptured oil pipeline is located more than 400 meters from the river and that the oil has not reached the river. Still, as the case is attracting more attention, Lukoil appears to have started a massive clean-up operation on the site of spill.

The spill is reported to have happened in December last year on the Pashnya-Zapadny Tebuk pipeline in the Komi Republic. The representatives of Save the Pechora Committee say Lukoil has tried to downplay the serious character of the spill. On May 1 the environmentalists discovered polluted river ice in a 200 meter long belt along the river, which they see as another evidence of the spill.

They also say that regional environmental control authorities have failed to follow up the case, despite repeated warnings from the environmentalists. No independent testing of the water and soil on the site were initiated by regional authorities. The Save the Pechora Committee addressed both the regional Emergency Situations Department, the State Nature Control Service (Rosprirodnadzor), as well as regional prosecutors, but the case was still not followed up. Only after the committee sent telegrams to the leaders of the federal Emergency Situations Ministry Sergey Shoigu, leader of the State Nature Control Service, Oleg Mitvol and General Prosecutor Yuri Chaika, the authorities took action and initiated an inspection. Before the inspection, Lukoil started up a major clean-up operation on the site of the spill. (Bnkomi.ru)

**September 9, 2007. Russia**

The number of Russian navy ships either sunken outside navy bases or abandoned along the shores pose a major threat to environment and to shipping, retired Admiral Gennadii Revin says. About 120 of the vessels are located outside the Northern Fleet’s bases.

Mr. Revin, currently working as head of the Northwest Shipbuilding Company, says the wrecks contain oil substances which can harm the environment. In addition, they hamper shipping. About 400 Russian navy vessels are carelessly left by the militaries. In addition, an unknown number of civil vessels come. Mr. Revin says the new United Shipbuilding Company could and should take on the responsibility for coordination of the removal of the vessels. He also believes that all abandoned vessels and other equipment located on the navy bases have a value of about 1 billion USD if sold as scrap metal. (Rossiyskaya Gazeta)

**October 19, 2007. The Republic of Komi**

Over the last nine months more than ten oil spills have been registered in the northwest Russian Komi Republic. One of the spills is characterized as “extraordinary”. According to regional emergency situations authorities, a total of 12 spills have been registered in the oil-rich region over the last nine month. The number of spills so far this year is the same as for all of 2006, regional emergency situations chief Sergey Tishkin said at a seminar this week. The biggest of the spills came when an oil truck came off the road not far from the Kharyaga oil field. The spill totalled at least 28 cubic meters of oil. (Regnum)

**November 6, 2007. Onega Lake, the Republic of Karelia**

An oil tanker on Saturday grounded in the lake Onega, the second biggest lake in Europe. According to emergency service authorities in the Republic of Karelia, 10 tons of oil has leaked in the waters. The accident took place 50 kilometres from the village of Golyashin. The tanker was heading from Yaroslavl to Sankt Petersburg when it grounded in bad weather.

10 tons of oil has leaked from the vessel. 146 men are working to clean up the oil. About 4 tons are now reported to have been removed. A 1.5 kilometres long oil slick stretches along the shore.
The Lake Onega is considered the second biggest lake in Europe. It covers an area of 9894 square kilometers and has 1369 islands. A total of 59 rivers run into the lake. Petrozavodsk, the capital of the Republic of Karelia, is located on the western shore of the lake. (Rosbaltnord.ru)

**December 20, 2007. Rybachiy Island, Murmansk Region**

Sailors on board the *Viktor Koryakin*, say that oil leaked into the sea when the freight ship wrecked outside the Rybachiy Island this week. Russian emergency authorities however claim that no fuel whatsoever spilled from the ship.

According to the Murmansk department of the Ministry of Emergency Situation, the ship has been pumped empty of fuel. Representatives of the department say no oil leaked into the sea.

Sailors who experienced the dramatic situation say however that oil did leak into the sea outside the Fisherman peninsula, just few kilometres from the border to Norway. The *Viktor Koryakin* this week ran ashore outside the Rybachiy Peninsula when a storm raged in the area. (Rosbaltnord.ru)

**February 11, 2008. Nenets Autonomous District**

An uncontrolled outburst of oil and drilling chemicals last week took place at the Yuzhno Khylchuyu field in the Nenets Autonomous Distruct. The spill from the oil field – one of the biggest currently under development in Russia – could have serious consequences for the tundra in the area.

The spill, which took place on February 5, is reported to cover at least 800 square meters around the drilling installations. Nobody is reported to have got hurt in the accident.

The accident took place during drilling, and about 35 tons of oil spilled into the tundra, head of the regional Nature Control Authority (Rosprirodnadzor) confirms to Rossiiskaya Gazeta. According to Regnum, 80 people are now working to clean up the spill. A commission, with representatives from both regional and federal environmental authorities, has been set to sort out the reasons behind the incident.

The Yuzhno Khylchuyu field, which is under development by the Naryanmarneftegaz Company, is one of the biggest currently under development in Russia. A total of 3.5 billion US dollars will be invested in the field by the Russian-US joint venture. Production is due to start in late 2008. A total of 7.5 million tons of oil will be produced annually from the field. (Rossiiskaya Gazeta, Regnum)

**June 23, 2008. Sosnogorsk, the Republic of Komi**

About four tons of oil has spilled from an underground pipeline in the Republic of Komi.

The regional centre on emergency situations informs to that the spill comes from a rupture in a 500 mm pipeline in the Sosnogorsk region. The pipeline belongs to Lukoil-Komi. The spill has been stopped and oil transport resumed, the regional authorities report. (RIA Novosti)

**June 26, 2008. Kola Bay, Murmansk Region**

The Northern Fleet believes it has found a way to handle the problem with oil spills from its many vessels. In a couple of years, the Northern Fleet’s oil problems will be controlled with the help of a specialized motorboat.

Approximately 50 million roubles from the federal budget will be used to launch the project. A motor boat type PSK-1412 will be equipped with modern facilities. The crew will control and monitor the ecological situation around dangerous objects, including the areas with dumped waste and places of accidents with vessels.

The areas around the Northern Fleet headquarters of Severomorsk and the Kola Bay have long been troubled by oil spills from navy vessels. A major number of vessels have also been sunk in the bay, posing a threat both to environment and the shipping in the area. (Murman.ru)

**November 20, 2008. The Republic of Komi**

Such data were announced at the V scientific-practical conference “Ecological measures on oil fields of Timano-Pechora province. Conditions and prospects”, which started in Syktvykar on November 19. In 2000, 166 cases of oil spills had been registered and in 2007 – 17 cases. Such results were achieved due to the system on prevention of the spills elaborated in Komi. Organisations of the oil complex have been equipped with highly technological means and highly productive outfit for ensuring a reliable work of pipelines, which reduces risks of emergency situations. Emergency services are in duty at the enterprises of oil complex.
6 Conclusions

The purpose of this report has been to present an overview of the level and extent of oil transportation within the Russian part of the Barents Region and further along the Norwegian coast. We have also presented the visions about the northern oil shipment development perspective and environmental challenges connected with that. We hope that this information can contribute to more focus on oil transportation safety, and in this last chapter we give some recommendations in a seven-step, for us, logical order.

6.1 INTRODUCTION

All oil transportation represents a risk of oil pollution. It is complicated to remove oil and petroleum products discharged to land and water environments. Practices from oil cleaning operations show that only 10-15% of the oil spilled is successfully removed in Arctic conditions. From our point of view, this should lead to a strategy where the goal is a considerable reduction of oil spill risks. A central element in this oil pollution protection is related to overall oil transportation safety.

In this report, we have presented information related to a complete oil transportation line from the production field and transportation along the Norwegian coast. Today, a relatively small amount of oil is produced in the immediate areas of the Russian part of the Barents Region. Most of it is carried over long distances and the transportation route starts in areas far away from the Barents Sea. Before it reaches the final destination, oil is transported by various transportation systems: pipelines, railroads and tankers.

During the recent years, the oil transportation logistic system in Russia has been both improved and more controlled by the state monopolies.

Before we continue the discussion about oil transportation safety and oil pollution prevention, we would like to underline some elements that influence the level of oil spill response preparedness standards:

1. Oil spills will happen – oil transportation will lead to increased risk of accidents, but the level of risk can be assessed.
2. Oil spills are in most cases detected too late and most of the spilled oil will never be removed.
3. It is resource demanding and therefore expensive to clean up oil polluted areas.
4. It will be a political question how much oil pollution a society will tolerate – prevention expenses will be evaluated against the costs of cleaning up after the accident.
5. Improvement of regulations always takes place after accidents have already happened.

6.2 TARGET ISSUES IN RELATION TO OIL PROTECTION

In the following presentation about oil transportation safety, we have structured our reflections and comments in some selected categories, which we recognise as central in oil spill protection.

We have divided oil spill protection in seven categories:

- laws and regulations;
- personnel;
- equipment;
- transport operators;
- traffic monitoring and control;
- towage capacity;
- oil spill response system.

All these factors are essential in an oil protection system and often work simultaneously, regardless of the fact that they are partially dependent on each other. In this respect, it is important to emphasise that oil spill protection in a broad sense is both extensive and dynamic. It is extensive because it contains numerous elements both public and private in character. It is dynamic because conditions and the framework of it in each and every area are constantly changing.
6.2.1 LAWS AND REGULATIONS

Laws and regulations provide a framework for human behaviour and every land adjusts and improves their normative guidelines constantly. After extensive disasters such as Prestige, authorities tend to make considerable progress in the development of the regulations. Both in Russia and Norway, the legislation and regulations in transportation safety and oil protection are well developed. Based on practical knowledge and information from newspapers and reports, our experience is that there seem to be some differences in how the countries are managing their regulations. In Norway, the authorities have adequate resources and therefore the possibility to control every operation whenever they want to. In Russia, the reality may be the opposite where the control authorities are lacking the capacity to check industrial operations or infrastructure.

6.2.2 PERSONNEL

The human factor is always important in obtaining successful results. In transportation activities, crew with sufficient education and high working morale will substantially reduce the risk of accidents. One of the best measures for reducing the risk of oil spills is to ensure that the crew operating the oil transports is well educated and has good technical skills. If we add high professional morale to this, we will make a big step towards the efficient prevention of the accidents. The knowledge must exist in combination with the practical experience. The theoretical knowledge about oil spills has a little value for a person who collects oil from the sea surface and does not have equipment or has never been trained in practise. Responsibilities and priorities must be clarified before an emergency occurs. The participants must know what institutions and persons should be contacted, and the people in charge must have the necessary licenses in order. The personnel must be trained through emergency exercises both on paper and in the field. The difficulty with exercises is that they cost money and for this reason they are not often highly prioritised in both countries.

6.2.3 EQUIPMENT

Reliable equipment in combination with well skilled workers helps to prevent disasters. Good equipment in combination with unskilled workers and low morale can increase the risk of accidents in addition to wasted financial resources. Bad equipment and workers with low education and low professional morale represent even a higher risk of accidents.

In Norway, it is not so easy for a transport operator to function with insufficient oil spill protection equipment. The control from the authorities together with input from trade unions and environmental organisations draws attention to poor conditions in the matter of prevention and damage the company’s reputation. In Russia, in this field we could come across different realities and see two extremes. The level of the equipment standards was very much dependent of the company’s policy and the way it did business. We have seen a positive trend in the recent years. The industry was motivated to lower the operational costs in the long term by investing into existing facilities reconstruction and building new safer infrastructure and logistic schemes.

6.2.4 TRANSPORT OPERATORS

It is important to use transport operators with good reputation. In international shipping industry the vessels’ control is recognised as a basic standard. National authorities and professional associations undertake frequent
inspections, based on international regulations for shipping in international waters.

Russia, still having a fleet of smaller vessels built in the Soviet time, is on the way to meet the national standards with the international ones. Most of the outdated fleet operates on domestic routes – in large rivers, canals and coastal waters. The tankers that carry oil from the Russian part of the Barents Sea along the Norwegian coastline are of good technical standard. Russia is in the process of getting the tanker fleet of the Russian companies under the Russian flag and in the national register. The Sovcomflot Group, the state owned biggest shipping company in Russia with one of the world’s youngest fleet, reached the agreements with Gazprom, Rosneft and Lukoil on developing the transportation schemes and serving their oil and gas projects. Sovcomflot has become a leader in shuttle transportation in Arctic and ice navigation.

In Russia, the pipeline operator Transneft has a monopoly to own and operate trunk oil pipelines. Oil companies themselves can only own local pipelines.

Large amounts of oil are also transported by rail in Russia. Russian Railways has a monopoly on the national railway network development. Large parts of it are under repair and modernisation. Oil and gas companies often invest in the parts of the railway system they plan to use for serving their project and transporting the products. That helps to modernise a considerable amount of railway system and it is a positive factor for all the railroad customers.

It is important that the transport operators are continually inspected and controlled so everyone can have sufficient information to select the most reliable and safest ways of transportation. In case of oil transportation, it can reduce oil pollution risks.

6.2.5 TRAFFIC MONITORING AND CONTROL

Both Norway and Russia shall develop control systems for ship traffic in the Barents Region. Norway has opened a new vessel traffic centre in Vardø in January 2007. In Russia, such traffic monitoring centre is established in Murmansk.

In the modern society, the authorities must have full control over ship traffic all the time. This is a condition so that in case of difficulties, ships will be provided with adequate help, and it presupposes that the help can be provided before a disaster can strike.

The traffic control functions are to:
• track all ship movements – register and identify;
• stay in constant dialogue with ships;
• respond and act as required by the situation.

It is desirable that traffic control centre also has dynamic biological data as a background for its activities. It mostly concerns spawning grounds, large concentrations of sea birds, fishes and mammals.
6.2.6 TOWAGE CAPACITY

Every oil tanker can be considered to be a threat to the environment unless there is a sufficient towage capacity. The traffic control system must have a possibility to summon tugs when the situation calls for it. The towage capacity both in size and number must meet the requirements at all time. When the oil traffic from Russia started in 2002 the tankers were mostly small. Today we see the appearance of less numerous but far larger ships with a steadily growing total volume.

The ideal situation for oil traffic is when the authorities on both Norwegian and Russian sides have proper information exchange and arrange the available resources such as towing vessels and other ships available for towing in time and place. Without advanced preparations, there is too little time to have efficient use of the resources.

6.2.7 OIL SPILL RESPONSE SYSTEM

The notion of oil spill response system is associated with events when resources are put in action because something has gone wrong and the system is needed to skim oil from the sea surface or clean up the beaches. A disaster can happen regardless of how well one is prepared. From time to time, it happens and sometimes it is quite serious. Exxon Valdez and Prestige are examples of when the situation gets extremely serious, and it has significant consequences for people, environment and economy.

Oil spill emergency response system in Norway consists of personnel and materials from the respective authorities and on all levels of oil companies’ management. Oil spill emergency response systems are relatively well developed around the large terminals such as, for example, Sture and Mongstad.

In Russia, there is less equipment for protection than in Norway and the oil spill response system is built and coordinated in a different way than in Norway. While Norway has relatively little traffic in ice covered areas (only in Svalbard), in most parts of the Russian Barents the operations continue in ice conditions six months of the year.

The practical cooperation between oil spill emergency response units from Norway and Russia works well. The Russian oil spill prevention and response authorities are to reach good standards, close to the Norwegian ones in equipment, knowledge and readiness. Norway and Russia must find a way to work together where Norway can also provide technical and scientific assistance for their oil spill prevention and response partners.

The focus must be put on prevention. The challenge is that it is difficult to demonstrate results of prevention work, although it is obvious that the costs when a disaster strikes will be enormous.

Figure 6.4  The focus must be put on prevention.
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BNA Prime-tass – www.prime-tass.ru
Business news of Komi Republic EIA – www.bnkomi.ru
Dvina Inform IA – www.dvinainform.ru
EuroArctic Petroleum Newsletter – www.petrobarents.com
Komi Online – www.komionline.ru
Komiinform.ru IA – www.komiinform.ru
Magentanews – www.magentanews.com
Mineral IA – www.mineral.ru
Murman IA – www.murman.ru
PortNews IA – www.portnews.ru
Regions IA – www.regions.ru
Regnum IA – www.regnum.ru
RIA Novosti – www.rian.ru
Rosbalt IA – www.rosbalt.ru
RusEnergy – www.rusenergy.com
Russian IA North – www.rsia.ru
SeaNews – www.seanews.ru

Newspapers, Weekly Papers and Journals:
“Arctic Synergy” weekly newsletter – www.arcticenergysummit.org
“Business Class” newspaper, Arkhangelsk
“Gazeta.ru” internet newspaper – www.gazeta.ru
“Izvestia” newspaper – www.izvestia.ru
“Moscow Times” – www.moscowtimes.ru
“Murmanskii Vestnik” newspaper, Murmansk
“Neft Rossii” journal – press.lukoil.ru
“Neftyanoe obozrenie” weekly – info.forest.ru/oil
“Pravda Severa” newspaper, Arkhangelsk – www.pravdasevera.ru
“Pravda.ru” internet newspaper – www.pravda.ru
“RBK daily” newspaper – www.rbcdaily.ru
“Rossiyskaya gazeta” newspaper – www.rg.ru
Reports and publications


8 Abbreviations

AIS - Automatic Identification System
AMNGR - Arktikmorneftegazraavedka
ATOC - Arctic Terminal Operating Company
BPS - Baltic Pipeline System
CDC FEC - Central Dispatch Control of the Fuel-and-Energy Complex
CIS - Commonwealth of Independent States
CNIIMF - Central Marine Research and Design Institute
COTU - Crude Oil Topping Unit
CPC - Caspian Pipeline Consortium
EC - European Commission
EIA - Environmental Impact Assessment
ESPO - East Siberia-Pacific Ocean pipeline
ETV - Emergency towing vessel
FOIROT - Fixed Offshore Ice-resistant Offloading Terminal
FSO - Floating Storage and Offloading Vessel
HRS - Search and Rescue Central
IMO - International Maritime Organisation
LNG - Liquefied natural gas
LPG - Liquefied petroleum gas
MARPOL - International Convention on the Prevention of Pollution from Ships
MBESD - Murmansk Basin Emergency and Salvage Administration
MNR RF - Ministry of Nature Resources and Ecology of the Russian Federation
MRCC - Main Rescue Coordination Centre
MSC - Murmansk Shipping Company
NAD - Nenets Autonomous District
NATO - North Atlantic Treaty Organisation
NCA - Norwegian Coastal Administration
NEZ - Norwegian Economic Zone
NIAC - Nenets Information Analytic Centre
NIS - Norwegian International Ship register
NGO - Non-governmental organisation
NMVOC - Non-methane volatile organic compounds
NO NJHQ - Norwegian National Joint Headquarters
NOFO - Norwegian Clean Seas Association for Operating Companies
OSPAR - Convention for the Protection of the Marine Environment of the North-East Atlantic
POLREP - Pollution Reporting System
PSA - Production sharing agreement
RF - Russian Federation
RHQNN - Regional Headquarters North Norway
RPK - Offshore oil transhipment complex
SFT - Norwegian Pollution Control Authorities
STS - Ship-to-Ship Transfer
TB - Tug boat
TOPP - Trunk oil products pipeline
UGSS - United Gas Supply System
UN - United Nations
UNEP - United Nations Environmental Programme
USA - United States of America
USSR - Union of the Soviet Socialist Republics
VLCC - Very large crude carrier
VOC - Volatile organic compounds
VTMIS - Vessel Traffic Management and Information Services
VTS - Vessel Traffic Services
WWF - World Wide Fund for nature

Conversion factor for oil:
1 barrel = 159 litre
1 ton = 7.3 barrels
1 ton = 1 metric ton