
Erratum to: Shipping in Arctic Waters

Erratum to:

Backmatter in: W. Ostreng et al., *Shipping in Arctic Waters: A comparison of the Northeast, Northwest and Trans-Polar Passages*, Springer Praxis Books, DOI 10.1007/978-3-642-16790-4, © Springer-Verlag Berlin Heidelberg 2013

Do to an oversight on our part the Appendices were omitted from this book. The error has been resolved and they are now included.

The online version of the original can be found under
DOI 10.1007/978-3-642-16790-4

Appendices

Appendix, chapter 3

Appendix 3.1:

Canada

2008		2008	
Share of world total exports	2.84	Share of world total imports	2.55
<i>By main destination</i>		<i>By main origin</i>	
1. The US	77.6	1. The US	52.4
2. European Union (27)	7.5	2. European Union (27)	12.5
3. Japan	2.3	3. China	9.8
4. China		4. Mexico	4.1
5. Mexico	1.2	5. Japan	3.5

Source: World Trade Organization, *Trade Profiles, 2009*

United States

2008		2008	
Share of world total exports	8.01	Share of world total imports	13.2
<i>By main destination</i>		<i>By main origin</i>	
1. European Union (27)	21.2	1. European Union (27)	17.4
2. Canada	20.1	2. China	16.5
3. Mexico	11.7	3. Canada	15.7
4. China	5.5	4. Mexico	10.1
5. Japan	5.1	5. Japan	6.6

Source: World Trade Organization, *Trade Profiles 2009*

Russia

2008		2008	
Share of world total exports	2.93	Share of world total imports	13.2
<i>By main destination</i>		<i>By main origin</i>	
1. European Union (27)	56.8	1. European Union (27)	42.6
2. Turkey	5.9	2. China	13.0
3. Belarus	5.1	3. Japan	7.0
4. Ukraine	5.0	4. Ukraine	6.1
5. China	4.5	5. United States	5.2

Source: World Trade Organization, *Trade Profiles 2009*

Germany

2008		2008	
Share of world exports	9.1	Share of world exports	7.3
<i>By main destination</i>		<i>By main origin</i>	
1. European Union (27)	63.8	1. European Union (27)	58.5
2. United States	7.2	2. China	7.2
3. Switzerland	4.0	3. United States	5.6
4. China	3.4	4. Russia	4.4
5. Russia	3.2	5. Switzerland	3.8

Source: World Trade Organization, *Trade Profiles 2009*.

Japan

2008		2008	
Share of world total exports	4.87	Share of world total import	7.3
<i>By main destination</i>		<i>By main origin</i>	
1. United States	17.8	1. China	8.8
2. China	16.0	2. United States	10.4
3. European Union (27)	14.1	3. European Union (27)	9.2
4. Korea, South	7.6	4. Saudi Arabia	6.7
5. Taipei, Chinese	5.9	5. Australia	5.2

Source: World Trade Organization, *Trade Profiles 2009*

China

2008		2008	
Share of total world exports	8.89	Share of total world imports	4.64
<i>By main destination</i>		<i>By main origin</i>	
1. European Union (27)	20.5	1. Japan	13.3
2. United States	17.7	2. European Union (27)	11.7
3. Hong Kong, China	13.4	3. Korea South	9.9
4. Japan	8.1	4. Taipei, China	9.1
5. Korea South	5.2	5. China	8.2

Source: World Trade Organization, *Trade Profiles 2009*

India

2008		2008	
Share of world total exports	1.1	Share of world total imports	1.79
<i>By main destination</i>		<i>By main origin</i>	
1. European Union (27)	21.6	1. Japan	13.9
2. United States	11.8	2. China	10.0
3. United Arab Emirates	10.5	3. United States	7.8
4. China	5.6	4. Saudi Arabia	7.3
5. Singapore	4.9	5. United Arab Emirates	6.2

Source: World Trade Organization, *Trade Profiles 2009*

Appendix 3.2: The Russian oil and gas network towards Europe



Source: US Energy Information Administration

Appendix, chapter 5:

**Appendix 5.1:
Ice Classes of Classification Societies¹**

Classification Society <i>Ice Strengthened Vessels</i>	Ice Class				
	<i>High</i>				<i>Low</i>
Russian Register of Shipping (Ice Rules 1981-1985)	UL/ ULA	L1	L2	L3	L4
Russian Register of Shipping (Ice Rules 1999)	LU5/ LU7	LU4	LU3	LU2	LU1
Lloyd’s Register of Shipping	IAS	IA	IB	IC	ID
American Bureau of Shipping	IAA	IA	IB	IC	
Det Norske Veritas	IA	IA*	IB	IC	
Nippon Kaiji Kyokai	IA Super	IA	IB	IC	
Finnish-Swedish Ice Class Rules	IA Super	IA	IB	IC	II
Canadian Arctic Shipping Pollution Prevention Regulations (ASSPR)	A	B	C	D	E

¹ The table is based on Kitagawa (2001), p.50 and ARCOP WS1, (2003), p.19. The lower ice classes are developed by the Finnish-Swedish Authorities, and all class societies include these notations directly as own regulations.

Appendix 5.2:
Ice Classes of Classification Societies²

Classification Society	Ice Class				
<i>Icebreaking Vessels</i>					
	<i>High</i>				<i>Low</i>
Russian Register of Shipping	LL9	LL8	LL7	LL6	
Lloyd's Register of Shipping	AC3	AC2	AC 1.5	AC 1	
Det Norske Veritas	Polar 30	Polar 20	Polar 10	Ice 10	Ice 05
			Ice 15		
Canadian Arctic Shipping Pollution Prevention Regulations	CAC1	CAC2	CAC 3	CAC 4	

² The table is based on Kitagawa (2001), p.50 & ARCOP WS1, (2003), p.19. This table shows only on approximate equivalence between the classification societies.

**Appendix 5.3:
Permitted Service Areas for Ships in Terms of Arctic Ice Classes³**

Ice Class	Mode of ice operation	Winter-Spring navigation					Summer-Fall navigation				
		Barents Sea	Kara Sea	Laptev Sea	East Siberian Sea	Chukchi Sea	Barents Sea	Kara Sea	Laptev Sea	East Siberian Sea	Chukchi Sea
		EHMEa	EHMEa	EHMEa	EHMEa	EHMEa	EHMEa	EHMEa	EHMEa	EHMEa	EHMEa
LU 4	IO	---+	----	----	----	----	++++	---+	---+	---+	---+
	IE	-*++	---+	----	----	---*	++++	*+++	--++	-*++	-*++
LU5	IO	--++	---+	----	----	----	++++	-+++	--++	--++	--++
	IE	*+++	--*+	---+	---+	--*+	++++	*+++	*+++	*+++	*+++
LU6	IO	*+++	---+	---+	---+	---+	++++	++++	++++	-+++	++++
	IE	++++	**++	*+++	-*++	-*++	++++	++++	++++	++++	++++
LU7	IO	++++	--++	-*++	---+	---+	++++	++++	++++	++++	++++
	IE	++++	++++	*+++	*+++	*+++	++++	++++	++++	++++	++++
LU8	IO	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
	IE	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
LU9	IO	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
	IE	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
Description:											
IO is Independent Operations		+= Service is permitted					E= Extreme navigation (Average reoccurre once every 10 years)				
IE is Icebreaker Escort		-= Service is not permitted					H= Heavy navigation				
		*= Service is recommended due to increased risk of damage					M =Medium navigation				
							Ea= Easy navigation (Average reoccurre once every 3 years)				

³ ARCOP Workshop 1 (2003), p.19

Appendix 5.4:
Shipping Safety Control Zones – Permitted Dates of Entry

NWP from west to east- Deep Draft Routing Control Zones Encountered⁴

Zone:	1	12	11	2	6	13
Arctic Class:	<i>M'clure Strait</i>	<i>Amundsen Strait South</i>	<i>Prince of Wales Strait South</i>	<i>Prince of Wales Strait North</i>	<i>Parry Channel</i>	<i>Lancaster Sound</i>
10	All year	All year	All year	All year	All year	All year
8	Jul. 1/Oct.15	All year	All year	All year	All year	All year
7	Aug.1/Sep. 30	All year	All year	Aug 1/Nov 30	All year	All year
6	Aug.15/Sep. 15	All year	Jun. 15/Dec.15	Aug 1/Oct 31	Jul 15/Feb 28	All year
4	Aug.15/Sep. 15	Jun.1/Jan.31	Jul 5/Jan 15	Aug 15/Oct 15	Jul 20/Dec 31	Jun 1/Feb 15
3	Aug. 20/Sep. 15	Jun. 10/Dec. 31	Jul 5/Dec 15	Aug 20/Sep 30	Aug 1/Nov 30	Jun 10/Dec 31
2	No entry	Jun 15/Dec 5	Jul 10/Nov 20	No entry	Aug 15/Nov 20	Jun 25/Nov 22
1A	No entry	Jul 1/Nov 10	Jul 15/Nov 10	No entry	Aug 25/Oct 31	Jul 15/Oct 31
1	No entry	Jul 1/Oct 31	Jul 15/Oct 20	No entry	Aug 25/Sep 30	Jul 15/Oct 15
Type A	No entry	Jun 15/Nov 10	Jul 10/Oct 31	No entry	Aug 15/Oct 15	Jun 25/Oct 22
Type B	No entry	Jul 1/Oct 25	Jul 15/Oct 20	No entry	Aug 25/Sep 30	Jul 15/Oct 15
Type C	No entry	Jul 1/Oct 25	Jul 15/Oct 15	No entry	Aug 25/Sep 25	Jul 15/Oct 10
Type D	No entry	Jul 1/Oct 20	Jul 15/Oct 10	No entry	No entry	Jul 30/Sep 30
Type E	No entry	Jul 1/Oct 20	Jul 15/Sep 30	No entry	No entry	Aug 15/Sep 20

⁴ CASA (2007), p.122

**Appendix 5.5:
Arctic and Ice Class Equivalences⁵**

Arctic Class	CAC/Type	Operating Role	Ice Type
10	<i>CAC1</i>	Unrestricted	Multiyear ice
8	<i>CAC2</i>	Transit or controlled ice breaking	Multiyear ice
7			
6	<i>CAC3</i>	Transit or controlled ice breaking	Second year ice
4			
3	<i>CAC4</i>	Transit or controlled ice breaking	Thick first year ice
2			
1A			
1			
	<i>A</i>	Transit	Medium first year ice
	<i>B</i>	Transit	Thin first year ice – 2 nd stage
	<i>C</i>	Transit	Thin first year ice – 1 st stage
	<i>D</i>	Transit	Grey-white ice
	<i>E</i>	Transit	Grey ice

⁵ CASA (2007), p. 125.

Appendix 5.6: The Seaport of Murmansk

General Characteristics:	Located on the coast of the Barents Sea, Kola Bay
Owner/Operator:	Main operator: JSC Commercial Sea Port of Murmansk.
Average sailing season:	Operational all-the-year-round.
Port status for foreign vessels:	Open permanently
Maximum ship size:	44750 dwt. Up to ULCC tankers in the Kola Bay.
Maximum ship length:	202 m
Maximum ship draft:	16 m
Airport:	Yes (Murmaschi)
Other connecting infrastructure:	Railway, Year-round roads
Ice Conditions:	Nonfreezing port. Some drift ice in mild winters
Service Facilities:	Pilotage (compulsory); Fresh water; Ship repairs up to 30000 dwt.
Cargo Turnover:	The total annual cargo turnover in 2002 and 2003 was 10 million tons; in 2005 it reached almost 17 million tons, and in 2008 exceeded 25 million tons (all operators included). ⁶
Berths and Port Mechanization:	<p>There are a total amount of 16 loading and 5 auxiliary operating berths with a total length of more than 3.4 km. The port is divided into 3 cargo handling areas:</p> <ol style="list-style-type: none"> 1) For the transshipment of bulk and general cargoes (coal, alumina, non-ferrous metals, pellets). The area incorporates 9 loading berths with a depth of 6 to 15 m. six berths possess approach railway lines. 2) For the transshipment of coal and general cargoes of the Norilsk industrial complex and of ferrous metals for export, three loading berths with a depth of 10- 15 m; 3) For the transshipment of apatite concentrate to export through a berth with a depth of about 11 m. Here, special transshipment complex is in operation including a system of carriers with a total technical capacity of 1200 t/h.
Other Comments:	All year round traffic to Dudinka. Icebreaker base. Supply bases on the west shore of Kola Bay are developed. The construction project of oil refinery with capacity of 6 million tons by Gazprom for refining of Prirazlomnoye field oil and condensate of Yamal peninsula is rejected, but repeated expertise of the project is possible. The governor of Murmansk region Marina Kovtun addressed to the president of Rosneft Igor Sechin with a request to provide supply of LNG for area gasification. ⁷

⁶ Bambulyak and Frantzen (2009), p.56

⁷ Mikhail Grigoriev (2013, Gecon Consulting Centre

Appendix 5.7: The Sea Commercial Port of Archangelsk⁸

General Characteristics:	Located in the Delta of the Northern Dvina River
Owner/Operator	Main operator: JSC Arkhangelsk Sea Commercial Port (ASCP)
Average Sailing season:	Early in November to early in May. Year-round with icebreaker assistance
Port Status for Foreign Vessels:	Open permanently.
Maximum ship size:	19240 dwt.
Maximum ship length:	162 m.
Maximum ship draft:	9 m.
Airport:	Yes (Talagi)
Other Connecting Infrastructure	Railway; Roads; Dvina River; White Sea-Baltic Canal.
Owner/Operator:	Main operator: JSC Arkhangelsk Sea Commercial Port (ASCP)
Ice Conditions:	Ice covered from end October to mid May. Ice thickness in the river in winter period can reach 100 cm.
Service Facilities:	Pilotage (compulsory); Harbor icebreaker assistance; Fresh water; Ship repairs up to 7000 dwt.
Cargo Turnover	In 2008 the total Cargo handling was 1.76 million tons. ⁹ In 2007, the Port handled 1.5 million tons of cargo that included 551 000 tons of metals, 323 000 tons of other cargoes, 260 000 tons of containers, 115 000 tons of timber goods, 107 000 tons of coal, and 19 000 tons of pulp and paper products. ¹⁰
Berths and Port Mechanization	Berths of the port are arranged alongshore the Northern Dvina river and its branches. 178 berths accept vessels with a draft from 4 up to 9.2 m. Loading berths are equipped with portal cranes with a lifting capacity from 5 to 40 tons. Container terminal contains open storage of 98 000 m ² for 5762 TEU. Cargo handling capacity of the container terminal is 75 000 TEU per year. Freight turnover of 4.5 million tons a year can be provided.
Other Comments:	Western starting point of NSR/NEP traffic. A main port for deliveries to NSR settlements. River Dvina needs frequent dredging. Home port of the Northern Shipping Company NSC.

⁸ http://www.ascp.ru/en_hm/3.htm, Tsoy (2004), AMSA (2008) & INSROP WP.64 (1996)

⁹ http://img0.custompublish.com/getfile.php/1051433.900.pcpceveesd/BUILDING_INDEPENDENT_TRANSPORT_CHAIN.pdf?return=www.barents.no

¹⁰ http://www.worldportsource.com/ports/RUS_Port_of_Archangelsk_1532.php

Appendix 5.8: The Port of Vitino¹¹

General Characteristics:	Located in the in the Kandalaksha Gulf of the White Sea, operational all-the-year-round. The Port specializes in storage and transference (transshipment) of such petroleum as black oil (May - October) and gas condensate (stabilized)
Average Sailing season:	Year-round with icebreaker assistance during winter navigation, with the assistance of icebreakers of the Murmansk Shipping Company.
Ice Conditions:	Lupcha Inlet in the port freezes early in November and clears late in May. Average number of days with ice is 183. During the winter period, navigation is provided with the nuclear ice breaker.
Port Status for Foreign Vessels:	Open.
Maximum ship size:	80000 dwt.
Maximum ship length:	230 m.
Maximum ship draft:	10.2 m.
Other Connecting Infrastructure	The Octjabrskaja Railway; Station: The "Beloye more". Vitino terminal receives crude oil, gas condensate and oil products by railway.
Owner/Operator:	Main operator: JSC Arkhangelsk Sea Commercial Port (ASCP)
Service Facilities:	Pilotage (compulsory); Harbor icebreaker assistance; Towing
Berths and Port Mechanization	There are four berths in the Port. Berth No.1 is used only for the vessels of the port fleet and has a depth of 3.5 m alongside. The berths No. 2 and 3 are used for river/sea-going vessels (ore-oil carriers) and have a depth of 4 m. alongside. Berth No. 4 is used for mooring of tankers of displacement up to 40,000 tons; it is the dolphin berth, consisting of 7 hauling-off buoys, pontoon passage with pipelines and anchor systems, and has a depth of 13.7 m alongside.
Oil Transhiment:	In 2012, Vitino exported 3.7 million tons of condensate and oil products(condensate – 2.95, gasoline 0.62, fuel oil 0.13). Since August, 2013 supply of condensate is stopped in connection with the redirection of condensate of the company Novatek on the constructed terminal of the company in Ust-Luga. ¹²

¹¹ <http://www.vitino.ru/>, Tsoy (2004) and Bambulyak and Frantzen (2009)

¹² Mikhail Grigoriev (2013), Gecon Consulting Centre

Transshipment Capacity:	Petroleum: up to 140 thousand tons per a month, Black oil: up to 100 thousand tons per a month, Gas condensate: up to 120 thousand tons per a month. Total capacity: 10 million tons per year.
Other information:	Transshipment of the gas condensate decreases. In June 2.5 times less condensate, than in May is put. Condensate shipments via the terminal Novatek in Ust-Luga on the Baltic Sea began; within a year considerable volumes of condensate will be delivered on domestic market for processing. The part of deliveries, obviously to remain - Mikhelson, Novatek CEO: port in Kandalaksha Bay is especially useful to sending export consignments to summertime by the Northern Sea Route. Supply of condensate through Vitino's port can be resumed in connection with the beginning of modernization belonging to the company Novatek of Purovsky plant on processing of gas condensate from which shipment to Ust-Luga is made. The capacity of the plant will increase with 5 to 11 million tons, which exceeds terminal capacity in Ust-Luga (6 million tons). «Mikhelson, Novatek CEO: Vitino port in Kandalaksha Bay is especially useful to sending export consignments to summertime by the Northern Sea Route».

Appendix 5.9: Varandey Oil Terminal¹³

General Characteristics:	Located in the in east Barents Sea, 22 kilometers from shore
Terminal Status:	Open permanently. Ice resistant terminal
Owner/Operator:	Main operator: Lukoil
Sailing Season:	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 the Varandey terminal.
Service Facilities/ Infrastructure:	<ol style="list-style-type: none"> 1) 150 km. long pipeline from Yuzhno Khylochuy to Varandey 2) The oil terminal is operated by three shuttle tankers belonging to Sovcomflot. The 70 000 tons ice class tankers transport the oil to the floating oil terminal Belokamenka in the Murmansk bay, and from there the oil is transported on 150 000 tons tankers to the markets in Western Europe and USA. 3) Lukoil has built the specialized 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 m³ (with newly constructed storages for 260 000 m³); 22.6 kilometers sub-sea oil pipeline (two lines with diameter of 820 mm); and the Fixed Offshore Ice-Resistant Offloading Terminal (FOIROT).
Oil Transhipment:	In 2012 via the terminal 3.18 million t of oil were shipped, them on the new oil pipeline 1.27 million tons were put.
Transhipment Capacity:	The declared capacity of the terminal 12 million tons of oil per year or 240,000 barrels per day. By an assessment Sovmomflot can be provided the maximum shipment of 17 million tons a year. [Grigoryev M. Transport maintenance of development of the mineral resources centers of the crude oil of the Timan-Pechora province. Drilling and petroleum magazine (Burenie I neft), 2012 No.3, pp. 8-14.]
Other information:	Start in October, 2012 of the oil pipeline with a power of 4 million tons per year (4.7 with use of the antifriction additives), connecting the terminal with the Haryaginsky field had provided annual shipment of the terminal to 5 million tons. Contrary to Argus Petroleum assessment, quality of shipped oil is improved (from API Gravity 32 to 36). It is expected that shipment in 2013 will make more than 5.5 million tons of oil. According to GECON forecast, taking into account input of new fields, shipment can increase to 16 million tons in 2020. ¹⁴

¹³ <http://www.barentsobserver.com/10-million-tons-shipped-from-varandey-oil-terminal.4725304-116321.html>

¹⁴ Mikhail Grigoriev (2013), Gecon Consulting Centre

Appendix 5.10: Pirazlomnoye Oil Terminal¹⁵

General Characteristics:	Located in the in east Barents Sea. The field is located at the distance of about 60 km from the shore
Ice Conditions	The winter temperatures down to minus 50°C and ice thickness up to 1.6 m.
Service Facilities:	Two icebreaking supply vessels Vladislav Strizhev and Yuriy Topchev were built at Havyard in Norway and delivered to Sovcomflot in 2006.
Maximum ship draft	20m.
Operator/Owner:	Gazprom neft shelf Company, a subsidiary of Gazprom.
Current Status:	The initial plan was to complete the construction and install the platform in the Pechora Sea in 2004, but the project was delayed. Pirazlomnoye oil field started commercial production in December 2013.
Transshipment Capacity:	The yearly production maximum of 7.5 million tons of oil can be reached in the fifth year of production. Crude oil from Pirazlomnoye will be shipped to export, and in the future may also go to a prospected refinery in the Murmansk region. Oil from Pirazlomnoye can be exported with transshipment in the ice free part of the Barents Sea (FSO Belokamenka or other terminals) or delivered to a refinery in the Murmansk Region. ¹⁶

¹⁵ Bambulyak and Frantzen (2009), pp.46-47

¹⁶ Mikhail Grigoriev (2013), Gecon Consulting Centre

Appendix 5.11: Kolguev Oil Terminal¹⁷

General Characteristics:	Peschanoozerskoye oil and gas condensate field at the Kolguev Island.
Sailing season	Crude oil exports from the island are limited as by a short navigation summer season that may last from two to six months
Maximum ship size:	Offshore oil terminal allows shipping tankers with maximum 40 000 tons dwt
Maximum ship draft	Offshore oil terminal allows shipping tankers with maximum 10.5 m.
Service Facilities/Infrastructure:	All oil produced in Kolguev is delivered by local pipelines up to 5 km long to the oil processing facilities located in the centre of the field. Further, the crude is piped 12 km. 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 m ³ . Two COTUs have a maximum capacity of approximately 200 tons per day.
Other comments;	Calling of tankers on the terminal is simplified: «To allow repeated crossing till December 31, 2013 of frontier of the Russian Federation to the vessels following from the water area of seaport Murmansk in Kola Bay to the sea terminal of specified port, located in southeast part of the Barents Sea near Kolguyev Island, and back, for export of the oil extracted on the Peschanoozersky field, on condition of ensuring transfer to boundary body and a staff of Northern fleet of information on their location, and also information on each vessel not later than 14 calendar days before calling in seaport Murmansk» (The order of the Government of the Russian Federation of April 23, 2012 No. 602-P). Oil production on Kolguyev Island in medium-term perspective won't exceed 0.1 million tons.

¹⁷ Bambulyak and Frantzen (2009)

Appendix 5.12:
Novy Port¹⁸

General Characteristics:	Western coast at the mouth of the Ob Gulf.
Average Sailing season:	Only summer navigation: from June to October.
Port Status for Foreign Vessels:	Open permanently.
Maximum ship draft:	7m.
Ice Conditions:	Stable ice formation in the port during moderate winters falls on 8 October (extreme dates: 23 September and 29 October). The first complete freezing of the port occurs in mid-October (extreme dates: 3 October and 29 October). Complete breakup and fracturing of fast ice in moderate winters occurs on June, 23 (in mild winter on June, 6; in severe winters on June, 13). Complete clearing of the water area from ice falls on the average on July, 1 (the earliest date, June, 16; the latest July, 18).
Service Facilities:	Pilotage (compulsory); Harbor ice breaker assistance; Fresh water
Berths and Port Mechanization	There are 3 piers. To provide cargo handling operations there are floating cranes with a lifting capacity of 16-25 t. In the middle part of Novy Port Bay, depths are 3-4 m. Depths at piers are 2.5-3 m.
Other Comments:	In September 2009 the Beluga ships, sailing from South Korea via the NSR, delivered heavy modules at this port

¹⁸ Tsoy (2004), AMSA (2008)

Appendix 5.13:
The Sea Commercial Port of Dikson¹⁹

General Characteristics:	South-eastern part of the Kara Sea at the entrance to the Yenisei Gulf.
Owner/Operator:	RAO Norilsk Nickel
Average sailing season:	Only during the period of summer navigation from July to October.
Port status for foreign vessels:	Open
Maximum ship size:	N/A
Maximum ship length:	500 feet
Maximum ship draft:	11-15m
Ice Conditions:	Average freeze-up date is mid-October. Maximum ice thickness is in late May or early June, reaching 214 cm with average value of 160 cm. Average complete clearing dates are the third week of July.
Service Facilities:	Pilotage (compulsory); Fresh water; Berthing towage; Minor repairs
Cargo Turnover:	N/A
Berths and	Berth facilities of the port involve:
Port Mechanization:	Main pier designed for general and bulk cargoes – the western side of the pier (berth No.1) with the length of 110 m and minimum depth 9.4 m and the eastern side (berth No.2) with the length of 95 m and minimum depth 7.6 m; Oil berth and berth No.7 designed for discharging oil products and for handling oil tankers. Cargo handling operations in the port of Dikson are carried out by means of three portal cranes with a hoisting capacity of 10-25 tons. If force of wind is 7 or higher all works are stopped.
Other Comments:	The western Marine Operations Headquarters is located in Dikson, operated by Murmansk Shipping Company. Adequate bunker port for NSR transit operations.

¹⁹ Tsoy (2004), AMSA (2008), Bambulyak and Frantzen (2009), pp.40-41
http://www.worldportsource.com/ports/portCall/RUS_Port_of_Dikson_2549.php & Ragner (2000b), p.83

Appendix 5.14: Port of Dudinka²⁰

General Characteristics:	230 miles from the mouth of the Yenisei river.
Owner/Operator:	RAO Norilsk Nickel.
Average sailing season:	All-the-year-round, from November to May under icebreaker assistance.
Port status for foreign vessels:	Open
Maximum ship size:	Approximately 20 000 dwt.
Maximum ship length:	N/A
Maximum ship draft:	11.5m
Airport:	Yes
Other connecting infrastructure:	Norilsk Nickel has built a fleet of six double-acting ice-breaking bulkers that allow it to carry out year-round operations between Dudinka and Murmansk, independent of icebreaker support.
Ice Conditions:	Average complete freeze-up date is the last ten days of December. Average complete clearing date is mid-June.
Service Facilities:	Pilotage (compulsory); Fresh water; Hospital;
Cargo Turnover:	N/A
Berths and Port Mechanization:	There is both a sea-vessel port and a river-vessel port. Up to ten vessels may berth at the same time. The port is equipped with gantry cranes, tug assistance, repair facilities and diving assistance. There are 32 berths in the port, 9 of which are designed for handling sea vessels. There are 100 portal cranes with a lifting capacity from 6 to 40 tons. Depths at the berths allow sea vessels between 8-11.5 m.
Cargo Capacity	Up to 10 million tons of cargoes each year. The volume of sea transfer doesn't exceed 1.5 million tons a year.
Oil Transshipment	In 2012 76.8 thousand tons of condensate is shipped.
Other Comments:	In 2012 in seaport Dudinka it was processed 1.1 million tons of freights. Year-round export from Norilsk Nickel to Murmansk. Year-round navigation – export of gas condensate (0.1 million tons) by the tanker Yenisei to Finland. Oil products necessary for the region (0.13 million tons) are delivered in summer navigation by Yenisei River Shipping Company. ²¹

²⁰ Tsoy (2004), AMSA (2008), http://www.worldportsource.com/ports/portCall/RUS_Port_of_Dudinka_2550.php, and Ragner (200b)

²¹ Mikhail Grigoriev (2013), Gecon Consulting Centre

Appendix 5.15: The Seaport of Igarka²²

General Characteristics:	370 miles from the mouth of the Yenisei river.
Owner/Operator:	Igarka Woodworking Integrated Plant
Average sailing season:	Summer period only, from June up to October.
Port status for foreign vessels:	Open permanently
Maximum ship size:	14200 dwt.
Maximum ship length:	150m
Maximum ship draft:	6.5-8m
Airport:	Yes
Ice Conditions:	Average complete freeze-up date is the last ten days of October. Average complete clearing date is mid-June.
Service Facilities:	Pilotage (compulsory) available to early December; Fresh water from river; Bunkers not guaranteed; Berthing towage (compulsory); Minor repairs.
Cargo Turnover:	N/A
Berths and Port Mechanization:	The port specialized on export of timber and can annually handle about 50 sea vessels and 60 river vessels. Shore terminals can allow ships with a draft up to 6.5-8.0 m depending on water level of the Yenisei river. Loading of saw-timber is carried out by shipboard loading facilities or by floating cranes. Dolphin berths can accept ships with a draft of up to 7 m and 150 m length. They are designed for loading timber and other cargoes from river vessels onto sea ships.
Cargo Capacity	N/A

²²Tsoy (2004), AMSA (2008), Ragner (2000b) & http://www.worldportsource.com/ports/portCall/RUS_Port_of_Igarka_2551.php

Appendix 5.16:
The Seaport of Tiksi²³

General Characteristics:	Located in the Tiksi Bay of the Laptev Sea, 45 km from the Lena River delta
Owner/Operator:	Republic of Sakha (Yakutia).
Average sailing season:	operational only 100 days (July-September)
Port status for foreign vessels:	Open
Maximum ship size:	N/A
Maximum ship length:	N/A
Maximum ship draft:	Port depth 9m; Berth depth 6m.
Airport	Yes
Other connecting infrastructure:	Lena River
Ice Conditions:	Average complete freeze-up date is early October. Average complete clearing date is last week of June
Service Facilities:	Pilotage (compulsory); Berthing and icy condition towage; Fresh water; Bunker; Disposal of waste, bilge and ballast waters; Minor repairs; Diving.
Oil transshipment:	In 2001, the port loaded 38 000 tons of oil for export; and in 2002 – 58 000 tons; In 2003 28000 ²⁴
Berths and Port Mechanization:	Piers and petroleum berth; 25 t gantry cranes; two piers in the port with the depths of up to 6m. The most part of the cargo is handled at the road with the help of cargo means onboard the ship and by using the floating cranes.
Port Capacity	N/A
Other Remarks:	Specialization: Cargo transshipment between sea vessels and river barges.

²³ Tsoy (2004), AMSA (2008), Ragner (2000b), Bambulyak and Frantzen (2009) and: http://www.worldportsource.com/ports/RUS_Port_of_Tiksi_2574.php

²⁴ Bambulyak and Frantzen (2009), p.40 & http://www.arcop.fi/workshops/ws6day2_mikhailichenko.pdf

**Appendix 5.17:
The Seaport of Pevek²⁵**

General Characteristics:	Located on the east coast of the Gulf of Chaunskaya in East Siberian Sea.
Owner:	The port is under Federal control, owned by the Russian Ministry of Transport.
Average sailing season:	The port is operational 150 days per year. All year round operation is possible with the assistance of icebreakers.
Port status for foreign vessels:	Open
Maximum ship size:	N/A
Maximum ship length:	N/A
Maximum ship draft:	Depths near the road are 14-19 m and the depths at berths are about 10 m
Airport	Yes (Pevek Airport)
Ice Conditions:	Average complete freeze-up date is the first ten-day period of October. Average complete clearing date is the third period of June. The maximum of ice thickness reaches 192 cm (average value is 152 cm).
Service Facilities:	Pilotage; Berth towage; Disposal of solid garbage not polluted with oil; Bunkers, Supplies; repairs.
Berths and Port Mechanization:	There are three berths in the port with the depths of up to 10 m, transshipment complexes, and ship service (bunkering) and repair facilities.
Other Remarks:	Specialization: cargo handling for the extractive industry of the Chaunsky region and Pevek city, as well as cargo transshipment and storage. Port reconstruction and construction of new objects of port services are required.

²⁵ AMSA (2008), Ragner (2000b), Bambulyak and Frantzen (2009) and: http://www.worldportsource.com/ports/RUS_Port_of_Pevok_2547.php

Appendix 5.18:
The Seaport of Provideniya²⁶

General Characteristics:	Provideniya Bay on the Chukotka Peninsula
Owner/Operator:	N/A
Average sailing season:	05.05 – 05.01 (225 days, including 45 days with icebreaker assistance)
Port status for foreign vessels:	Open permanently
Maximum ship size:	N/A
Maximum ship length:	N/A
Maximum ship draft:	+20m
Airport	Yes
Other connecting infrastructure:	No
Ice Conditions:	Frozen: November - May.
Service Facilities:	Pilotage (compulsory); Fresh water; Bunker; Disposal of polluted water; Berthing towage; Minor repairs; Divers.
Cargo Turnover:	N/A
Berths and Port Mechanization:	Cargo and auxiliary berths; Tanker berth; Warehouses and open storage areas available; 5-40 t portal cranes, 16-25 t caterpillar cranes. (Some cranes reported being dismantled in 2000).
Other Remarks:	Poor technical state of port facilities.

Terminal Cape Kamenny

Note: Location of the planned Gazpromneft terminal with capacity 8 mtpa.

Current status (navigation 2012):

- 0.15 million tons, 8 voyages;
- Seasonal board-about-board transshipment (July-October) by LUKOIL since 1999;

²⁶ Ragner (2000b) & http://www.worldportsource.com/shipping/ports/RUS_Ports_of_Provideniya_2548.php

- Transshipment location – opposite to the Taz River confluence;
- Obtaining permission to calling of vessels under a foreign flag is necessary;
- Cargo base: crude oil of Sandibin and Mid. Hulym fields;
- Direct supply of crude oil to Europe.

For navigation of 2013 LUKOIL reduces shipment via the terminal; will be oil of only a local field (Sandibin) is taken out (earlier the part of oil was delivered down the river Ob from the Mid. Hulym fields).

Negative factor: In the navigation-2012 tanker SKF Neva with deadweight of 47 thousand tons was used, but loading no more than 20 thousand tons. The reason of the underloading is small depths through the passage.

Terminal Yamal LNG project

Construction is provided with deliveries of freights in the winter navigation from Arkhangelsk; in the summer time the main transportations are provided down the river Ob (Ob-Irtysh river shipping company).

Novatek agreed to sell to the Chinese CNPC of 20% in the Yamal LNG, and also to conclude the long-term contract for delivery of 4.5 million tons per year of LNG in China (practically the whole delivery in the summer navigation through NSR). Reached agreements include assistance of CNPC in attraction of financing for the project. Finally key parameters of the transaction aren't determined (as on June, 2013).

Terminal Pechora LNG Project

The project is supported by the Plenipotentiary of the President of the Russian Federation in the Northwest federal district. The decision on creation of the working group with the Partnership North West was made by the governor of the Nenets Autonomous Area Igor Fyodorov. On the March meeting Miller-Fedorov stated: "the decision to continue work on further promotion of the Pechora LNG project is made: to conduct additional market research on studying of sales markets of finished goods and to carry out a number of meetings". On the April meeting, Miller (the President of ALLTEK Group Bosov) stated: "the decision of carrying out additional market researches for studying of sales markets of finished goods is made. The agreement on carrying out expanded meeting with participation of specialists of JSC Gazprom and JSC Pechora SPG at the end of April, 2013 has also also reached."

Pechenga port project

Construction of port facilities and supplied rail road are proposed. State examination of the project is expected in the fall. At the same time, there are two main uncertainties of implementation of the project:

- Cargo base
- State share of the project budget

Appendix 5.19: The Seaport of Churchill²⁷

General Characteristics:	Located on the west coast of Hudson Bay
Operator:	Hudson Bay Port Company
Average sailing season:	The current shipping season runs from mid-July to the beginning of November (Icebreaker assistance)
Port status for foreign vessels:	Open permanently
Maximum ship length:	225m
Maximum ship draft:	8.5m
Airport	Yes
Other connecting infrastructure:	Close coordination with the Hudson Bay Railway allows efficient access to all North American railways through a connection with the Canadian National Railway system.
Ice Conditions:	Frozen: November - May.
Service Facilities:	Pilotage (compulsory); Fresh water; Electricity; Tugs; Bulk; Towage; Minor repairs; Divers.
Cargo Turnover:	N/A
Berths and Port Mechanization:	Located at the Port is a 140000 ton elevator, with the ability to unload over 100 rail cars per day and load over 1200 MT per hour into vessels. The port can efficiently load Panamax size vessels and offers four berths for the loading and unloading of grain, general cargo, and tanker vessels.
Other Remarks:	Export of grain, wheat, manufactured, mining and forest products, as well as the import of ores, minerals, steel, building materials, fertilizer and petroleum products for distribution in Canada and U.S.

²⁷ <http://www.portofchurchill.ca/>