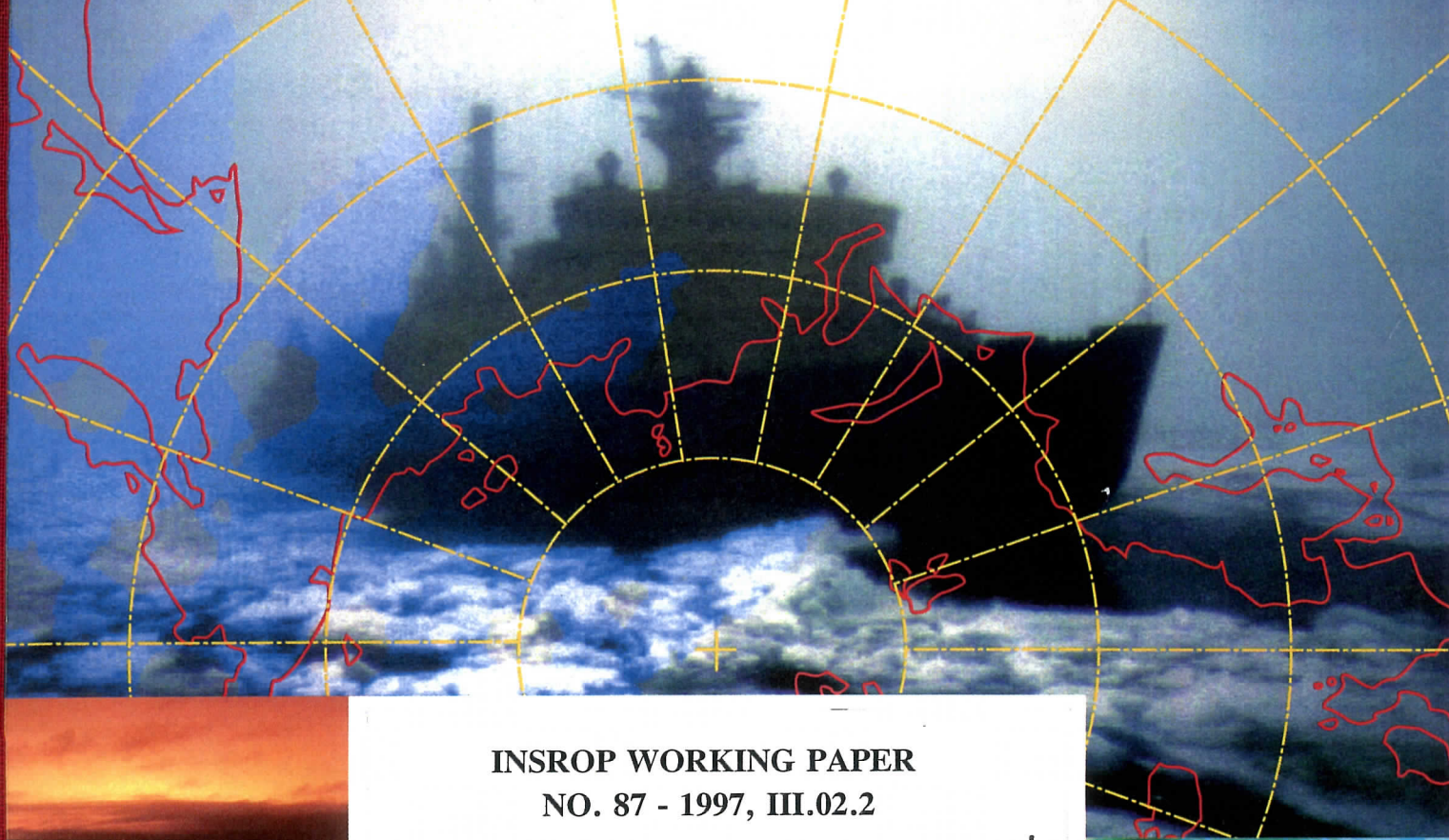

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Regional Port Development along the NSR.

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T. Patrakova and N. Sadofieva

INSROP International Northern Sea Route Programme

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship and Ocean Foundation, Japan

International Northern Sea Route Programme (INSROP)

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Title:	**Regional Port Development along the NSR.**
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FOREWORD - INSROP WORKING PAPER

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

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SUMMARY - INSROP WORKING PAPER

The present project " Regional port development along the NSR" seems to be intermediate assessment stage of the specialization and state of the existing ports along the NSR which are open for foreign vessels to call.

The elaborated projects on mastering new fields of oil and gas in regions of the Extreme North, require the development of the existing ports and the construction of new ones on the Baltic and the Kola Peninsula.

Total amount of prospective liquid cargoflows from the North-Western region and East Siberia, affected by the NSR, is estimated at up to 30 mln tn of crude oil , condensate and oil product and up to 20 mln tn of LNG from the Kharasavey field a year.

In order to transport the above amount, increase in throughput capacity of the existing ports of Arkhangelsk, Kandalaksha, Murmansk as well as necessity of the construction of new liquid port of Pechenga, are considered.

Pipe laying to the Baltic sea is considered together with the construction of new ports on the Baltic, and in this respect the proposals on the development of new ports are presented in the projects.

Suggestions on the development of transit cargo transportation between the states of the West Europe and Asian-Pacific Region require the creation of new specialized transshipment terminals in the west and east of the NSR.

In this respect, versions of building new ports in Varanger Fjord and transshipment terminals in Petropavlovsk-Kamchatskiy, Providenija, Dutch-Harbour are presented in the project.

The basic data on hub ports of Prymorje through which the cargo supply is fulfilled to the Arctic, is also given in the project.

The present project seems to be continued at the second phase of INSROP. In particular, it should include the data on ports along the NSR which will be opening for foreign vessels.

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CONTENTS

INTRODUCTION

Development of Russian ports of the Arctic basin is of a great significance for mastering rich resources in the Russian northern region and also is an important goal for the world transport and port businesses.

Economic development of Russia is impossible without assimilation of the richest reserves of mineral, energetic and biological resources available in the North region.

At present the North produces a major portion of the Russia's production, particularly: oil (73 %), natural gas (92 %), diamonds (practically 100 %), copper (about 70 %), nickel (75 %), tin, tungsten, gold and other precious and nonferrous metals, iron ore, mining and chemical raw materials. The Northern regions play an important role in fishery, reindeer breeding, stocking up fur, stocking up and processing wood.

The gross product of the Northern region comprised (in 1990): industry - 61%, construction - about 16 %, transport and communications - 10 %, trade - 10 %, while agriculture (including reindeer breeding and game) - less than 3%. In industrial production the leading role belongs to fuel and power industries - 38 %, forestry - 17.5 % and metallurgy - 15.5 %.

For the Russian economy it is of great importance that the export of the Northern region products provides for about 60 % of the total hard currency (Project III.I.I. INSROP-1993).

At present only 40 ports (one half of the USSR ports) persist to function, and eleven of them handle 70 % of traffic volume including foreign trade cargo. After the disintegration of the USSR many specialized loading complexes capable to handle about 100 mln. tons of bulk and general cargo fell outside Russian borders.

The problem of increasing cargo handling capacities with the aim of enhancing foreign trade will be solved by modernization of existing and construction of new overloading complexes and ports.

Commercial interests of foreign firms and companies contribute, to a great extent, to investment of their capital into realization of fields assimilation projects and Russian enterprises development. In this respect, international cooperation of scientists and specialist's of different countries are formed and wide individual investigations on each project and discussion of possible results are held out at different levels.

Presently, some projects of ports' modernization start to be realized but many problems of new fields assimilation, particularly in the North regions are now in the process of consideration.

To this end, it deems urgent to formulate a general view of the problem of development of Russian ports with the aim of providing regional and transit traffic along the NSR, taking into consideration different views and opinions presented by CNIIMF, DNIIMF, LENMORNIIPROYECT and the RAN (Russian Academy of Sciences) Institute of System Analysis, existing at the moment of writing this paper.

The paper suggests a view to prospects of the regional and transit cargo transportation developments for the Northern Sea Route of Russia and presents the technical descriptions of certain projects on new ports construction.

Some details of updated port state descriptions on coast of the NSR which are open for visiting foreign vessels, are presented in supplements. More detailed descriptions of new projects on the port construction are also here shown.

The paper is of interest in light of assessments of the transport potential and economic development of the northern regions through Arctic sea front of Russia.

1. PROSPECTS OF THE REGIONAL TRANSPORTATION DEVELOPMENT

An estimation of the development of navigation along the NSR is performed on the basis of prognosis of the regional and transit traffic of large-scale cargoes, such as bulk, general packaged and palletized and timber cargoes.

Forecasting the volumes of cargo carriages under the existing conditions is a quite complex task for a number of reasons including:

- a lack of long-term contracts concerning the delivery volumes and times between the suppliers and consumers;
- a lack of the scientifically grounded balances of production and consumption of products within the Far-Eastern economic region;
- mass access of the domestic enterprises to the international market directly through shipping companies and intermediaries;
- a reduction of volume of information about carriages by the shipping companies under the conditions of unstable economic situation that makes analysis and forecasting difficult, etc.

In the present state of affairs, a forecasting of volumes of carriages by sea for the period to 2010 has been carried out on the basis of the tendencies revealed and regularities of their development. In view of the prerequisites of the country economy improvement In the coming 3-5 years.

Transportation volume of coastal cargo will increase from 5,9 mln.tn in 1995 to 13,0 mln.tn in 2000 and 20,3 mln.tn. in 2005. Prospective increase in coastal transportation is mainly predicted in the Northern and the Far Eastern basins. It is expected to be the re-start of Norilsk technical sulphur transportation in the Northern basin. Technology of transshipment of technical sulphur from sea vessels into railway wagons in the port of Murmansk. Coal cargoflow will increase from Spitzbergen to land. Coastal cargo transportation increase from 5,0 mln. tn in 1995 up to 14,0 mln.tn in 2005 is planned in the Far Eastern basin in connection with the development of the region's economy. Cargo transportation volume for prospects will increase here due to mainly bulk cargo (by 4,8 mln.tn as compared to 1995) and general cargo (by 5,1 mln.tn). Transportation in this basin will most cover the supply cargo.

1.1. The Western region

Traffics of liquid cargoes are formed as the result of assimilation of new fields in the Western region of the Arctic. The fields, assimilation of which is prognosticated in the nearest future, include:

- Vankor oil field in the basin of the Yenisey river;
- Priobskoye and Barsukovskoye oil fields - in the basin of the Ob river;
- Prirazlomnoye and other oil fields of the Timan-Pechora province;
- Stokmanovskoye gas and condensate field in the Barents sea;
- Kharasaveyskoe gas - on the Yamal peninsula

Total annual volumes of perspective traffics of bulk liquid cargoes from the Northern-Western region and Eastern Siberia region affected by the NSR, are evaluated at up to 30 mln. tons of crude oil, gas condensate and oil products, and up to 20 mln. tons of LNG from the Kharasaveyskoye field.

Delivery of oil products to Arctic stations does not exceed 1 mln. tons during the Arctic navigating time.

Export wood product transportation from Igarka has stabilized at the level of 700,000 - 750,000 Ton a year.

Traffic of export timber cargoes from Igarka has been stabilized at the level of 700-500 mln.tons annually.

1.2. The Eastern region

Pursuant to the prediction for the period to 2010, the volumes of carriages through the ports of the Far East are assumed to be increased to 52.6 mln.tons including an increase in coastal carriages of up to 23.19 mln.t while in overseas carriages-up to 29.4 mln.t (Table 1.1).

Predicted transportation volumes on Arctic direction broken down according to the cargo kind, are presented in Table 1.2.

Data of tables 1.1., 1.2. shows that 15 next years is predicted the economy to be stabilized and slight grows of transportation volume will be observed.

Nevertheless, this prognosis is an optimistic one.

Table 1.1

Predicted transportation volume in the Far East region for the period of up to 2010 depending upon trade mode (mln .tn)

Description	2000	2005	2010
Total carriages (mln. tons) including:	39.27	45.95	52.60
• Coastal carriages	19.51	21.33	23.19
• Foreign trade transportation	19.76	24.62	29.41

Table 1.2

Predicted transportation volume in the Far East region for the period of up to 2010 depending upon the cargo kind (ths. tn)

Cargo kind	2000	2005	2010
Total carriages (thousand tons) including:	2084.0	2119.0	2133.0
• Liquid cargoes	670.0	706.0	723.0
• Bulk cargoes	704.0	715.0	680.0
• Timber	115.0	92.0	100.0

The data obtained, demonstrates that the fundamental changes in the structure of Arctic cargo carriages are not forecasted.

Regional transportation development will be increased by prospective rising volume of the transit transportation. This fact is promoted by opening the NSR for international trade. Economic feasibility of the transit transportation organization may not be counted without substantial development of the shore technical/material base. In order to determine demand in the creation of new transshipment terminals and mainly container ones, it is necessary to make an assessment of NSR transit transportation potential.

2. TRANSIT TRAFFIC ALONG THE NSR

Cargoflows of general packaged and palletized cargoes are considered in connection with the potential of transit traffic along the NSR.

Worthy of notice are prognostic evaluations of well-known specialists in potential volumes of container traffic between the European and Pacific ocean ports.

According to calculation of Dr. I. Schwartz (Germany), 886500 containers were transported from the Northern and Central Europe to the far East via the Suez Canal in 1990, including 317300 containers (36%) which were shipped from Germany. 1105287 containers were transported from the Far East to the Northern Europe.

Dr. G.Serebryanskiy cites the evalution of several American investigators in the area of potential traffic along the NSR for a period of up to 2010. The annual traffic volume between Europe and Asia, according to the evaluation, may increase up to 50 mln.tons; the traffic in the reverse direction is evaluated at 90 vln. tons at the condition of the year-round navigation.

Freight ttaffic between Europe and the USA and Canada for the period of up to 2010, under the condition of the year-round navigation is forecasted as 230000 tons, while the reverse traffic may amount to 3,5 mln.tons.

According to the expert evaluation of Academician A.Parfenov, one can not witness a stable loading base for transit traffic along the NSR. It is possible to overload up to 5000 containers annually in the ports of Archangelsk and Murmansk.

It seems unnecessary to build a port in the Pechenga Guba during the period of up to 2005. In the case of stable container traffic with the annual volume of 100000 containers, it seems expedient, from the economic point of view, to build a container terminal in the port of Murmansk on the new territory between the 19th and 20th berths.

3.THE EXISTING REGIONAL PORTS

Shipping along the Northern Sea Route is provided through ports of the western and eastern regions of the northern basin and the Arctic.

In the western region, 6 ports among 16 ones are located in the northern zone and 5 ports are on the passage of the NSR, including:

Northern Zone

1. Murmansk	
2. Mezen	Barents sea
3. Narjan-Mar	
4. Kandalaksha	
5. Onega	White sea
6. Archangelsk	

Arctic Zone

1.Amderma	
2. Kharasavey	Kara sea
3. Dikson	
4. Dudinka	
5. Igarka	Enisey river (Kara sea)

At present the ports of Amderma, Kharasavey, Dikson and Dudinka are closed ones to be visited by foreign vessels, and its characteristics will be presented upon its opening.

Among 7 ports of the eastern region, 2 ports are located in the northern zone and 5 ports in the Arctic one, including:

Northern zone

1. Petropavlovsk-Kamchatskiy	
2.Provideniya	Bering sea

Arctic zone

1. Mys Schmidta	
2. Pevek	East-Siberian sea
3. Zeleniy Mys	
4. Tiksi	
5. Khatanga	Laptev sea

Among the above listed ports ,the only open port for foreign vessels in the eastern region is port of Provideniya. Characteristics of other port activities in this region will be published in press upon port opening for international shipping.

Location of the Russian ports in the northern and Arctic zones as well as its interrelation to inland transport networks are presented on Figs 1a and 1b.

Fig. 1A
TRANSPORT NETWORK OF THE NORTH OF RUSSIA

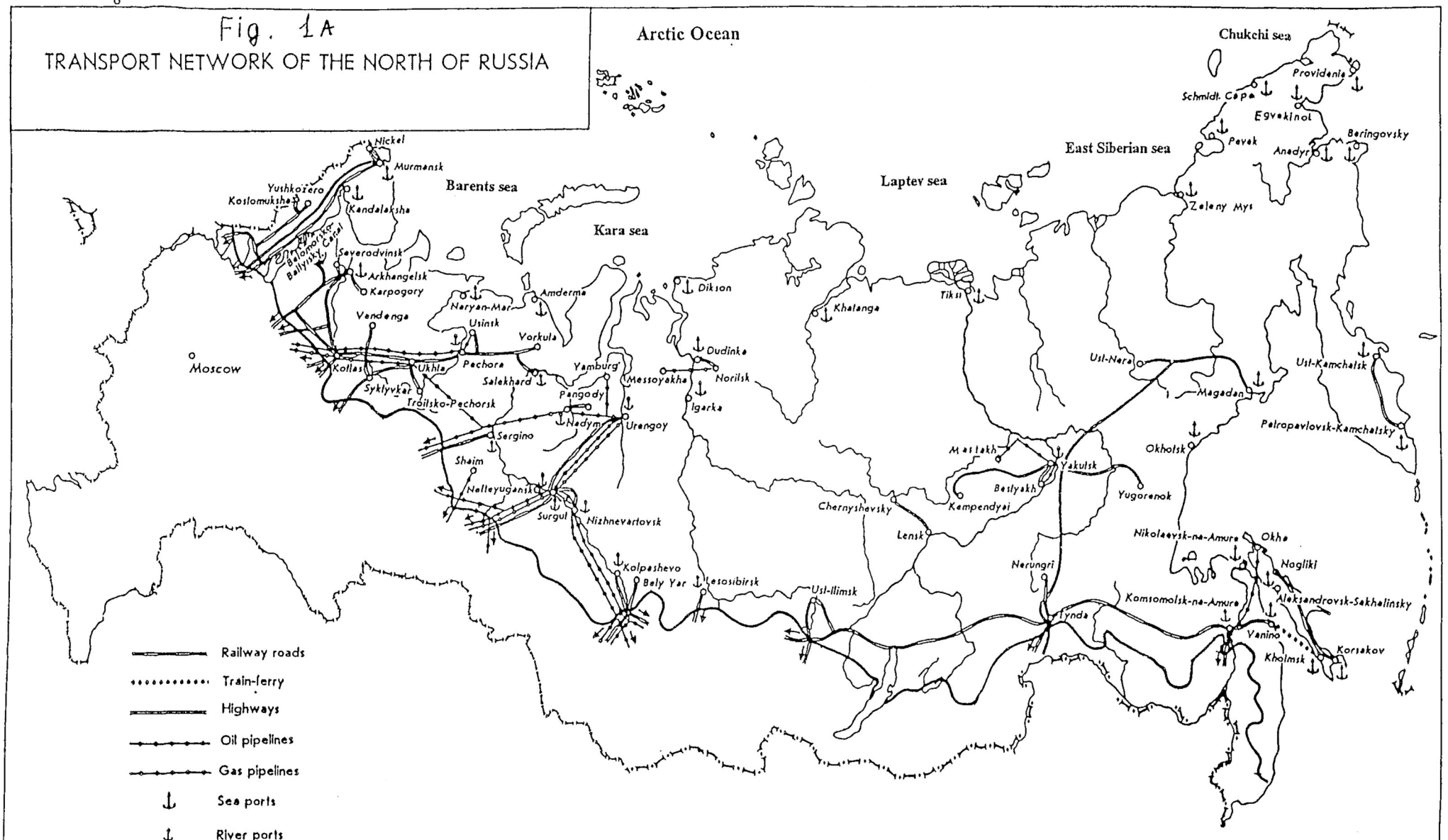
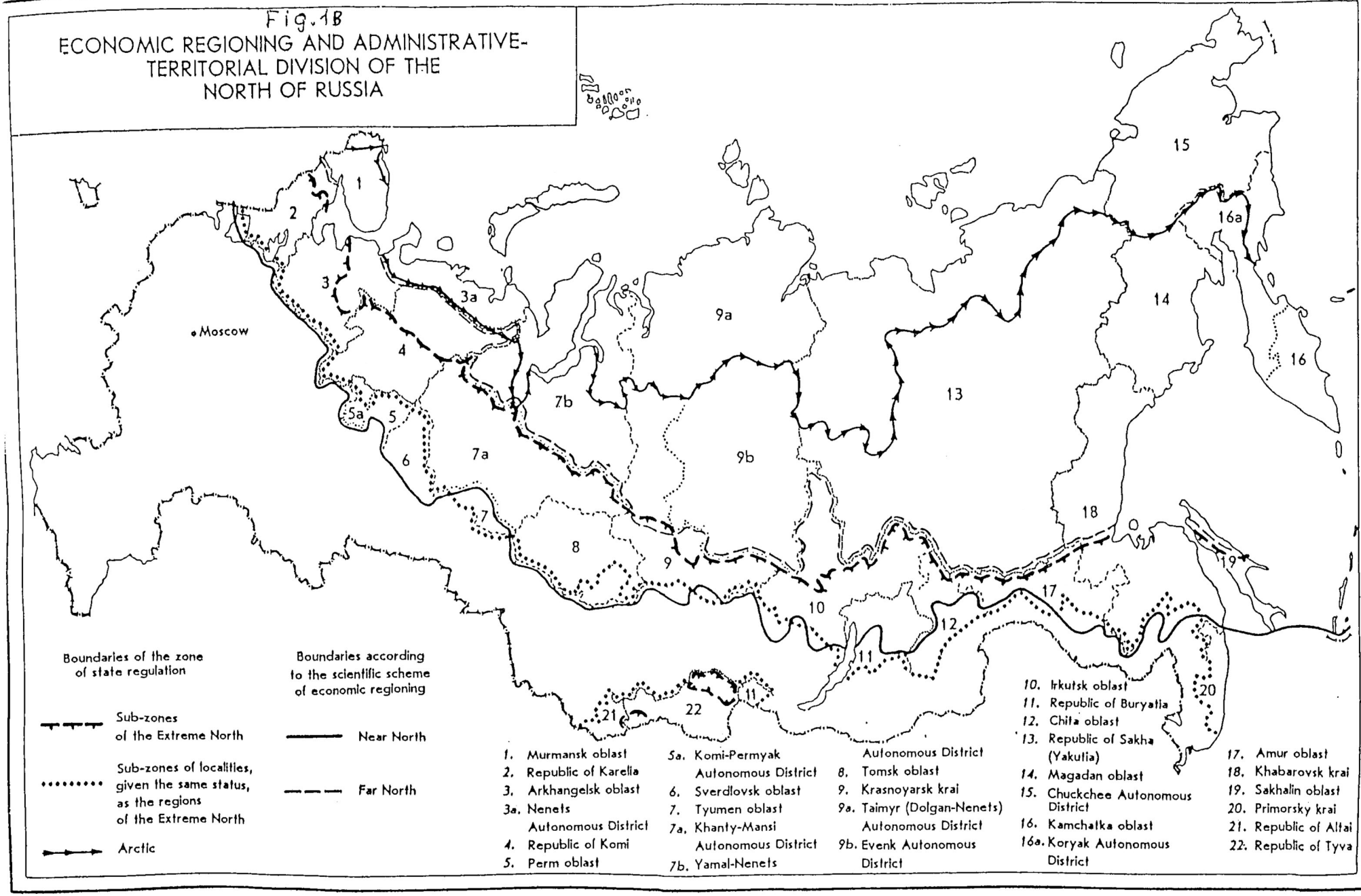


Fig. 1B

ECONOMIC REGIONING AND ADMINISTRATIVE-TERRITORIAL DIVISION OF THE NORTH OF RUSSIA



3.1. Brief characteristics of sea ports

Port of Murmansk

The sea commercial port of Murmansk is situated at the Eastern coast, in the middle part of the Southern elbow-shaped bend of the Gulf of Kolsky, at a distance of 26 miles from the Barents Sea.

The port has the following geographical co-ordinates: 69° 0″ N
33° 4″ E

The Gulf of Kolsky is marked by sea-marks and is safe for navigation. The port is open for navigation twenty-four-hour and all the year round. In severe Winters the Southern elbow-shaped bend gets frozen over for a short period of time. In mild Winters drift ice is observed.

The water level changes are due to the low and high tides which change every 6 hours. The tide magnitude reaches 4 meters. In Winters when the Gulf vapors, the visibility is reduced considerably. Under these conditions the navigation is controlled by using a coastal radar station.

The anchorage for vessels of all dimensions is situated between the Mishukov and Abram capes, Westward of the Kievaraksky leading line. The depths reach 20 to 25 m.

The port of Murmansk is a base port for navigation on the Northern Seas Route.

The port is connected by railway, airborne and road transport with all the regions of country. Between the port and settlements ashore as well as the port of Archangelsk a scheduled navigation in Summer is arranged.

The port of Murmansk is the last northern port among the unfrozen ports of Russia. Only in very severe Winters the Gulf of Kolsky within the port area is covered with ice which disrupts the scheduled local lines of small vessels. In this case the pilotage is carried out with port tugs assistance. The arrangement of navigation all the year round on Dudinka line allows to the port of Murmansk to handle in Winter the cargoes coming from Norilsk integrated factory, the fact that facilitates a higher port capacity and steady operation.

Maximum cargo turnover of the port was recorded in 1989 and amounted 8,8 mln tn.

Port of Kandalaksha

The commercial sea port of Kandalaksha is situated at the peak of the Kandalaksha Bay of the White Sea named as Lupcha Bay, at southern coast of the Kola Peninsula.

The Kandalaksha Bay occupies an extreme north-western position relative to the central part of the White Sea (the White Sea basin).

The port of Kandalaksha is located within the Polar circle and like all the port of the White Sea is frozen, but the navigation can last in Winter by using ice-breakers from mid-December till mid-May.

The depths of approach waterways are enough in order to ensure the passage to the Port and anchorage of vessels having a draft from 7,5 m to 9,0 m.

The maximum depths alongside at full water are -9,7 m, at low water -7 m.

The roadstead of Kandalaksha is located in the Eastern part of Lupcha Bay and divided into the inner and the outer. The anchorage at the outer roadstead is at depths exceeding 20 m.

The port is connected to the railway network of country via main line St.Petersburg-Murmansk of the October railway and river vessels to all the inner water ways and to road routes.

The Port is connected to inner water ways of Russia, Baltic ports and the ports of the Black and Caspian Seas via White sea-Baltic Canal.

The port of Kandalaksha handles coastal cargoes and, to a lesser extent, export and import cargoes.

Port of Onega

The Commercial Sea Port of Onega is situated at the head of the Onega Bay of the White Sea, at 3 miles mouth up of the same name river, on its right bank. The Port of Onega is last southern port at the White Sea. From the end of October-beginning of November till the end of April-May, sometimes early June the river within the port area is covered with ice. This time the port is closed for carriers.

The depths of the Onega river are small: the accesses to the timber export terminals and the berthing are possible for vessels having a draft up to 5,6 m.

In front of the Onega river's mouth there are anchorages where the vessels accommodate waiting for full water to approach the berths.

The port has a raft roadstead where the round wood is loaded to the sea-going and river vessels.

The port carries out mainly the shipment of timber cargo for export (lumber and round wood). In small quantities the timber is shipped to coastal vessels. The port has annually handled 200-230,000 tn of cargo.

The port is connected with railway and maritime routes to other cities and ports of Russian Federation.

Port of Archangelsk

The commercial sea port of Archangelsk, a major port at the North of Russian Federation, is situated at the mouth of the Severnaya Dvina river.

The Severnaya Dvina river during the Summer navigation is used as a waterway connecting the port with remote areas situated upper reaches of the river as well as to the settlements of the Baltic Sea via White sea-Baltic Canal.

The port of Archangelsk has communication with the settlements of the White and Barents Seas coasts as well as the Arctic coasts.

The port is a transshipment point for cargoes destined to northern regions as well as a major port exporting timber cargoes.

Archangelsk is connected to the ports of West Europe, Africa and Cuba by foreign trade lines. Apart from the commercial port, the berths of saw mills, tank farm and river port are located at the mouth of the Severnaya Dvina river.

The port can accept vessels with a draft up to 9,0 m.

The depths are maintained by dredging after which the draft of vessels is announced to navigate on waterway and in channels.

The aquatorium of the port of Archangels has several roadsteads:
- the Maimaksansky timber port for call the vessels up to 8,0 m draft,
- the Solombala roadstead, up to 8,1 m,
- the Lower-town, up to 6,0 m,
- the Town, up to 8,1 m and
- the Krasnoflotsky roadstead, up to 8,1 m.

The port of Archangelsk has three cargo handling areas located at a considerable distance from each other.

The Economia Avant-port is situated at the northern end of the Solombala islands; the Left bank cargo area is situated at the left bank of the Severnaya Dvina, below the bridge; the Bacariza cargo area, above the railway bridge, also at left bank of the Severnaya Dvina river.

The passenger area with a 600 persons terminal for sea and river lines is situated at the right bank of the Severnaya Dvina river at Krasnaya dock in the center of the city.

The Bacariza area is most remote from the sea with shallow-water berths (from 7,3 to 8,0 m). All the areas are interconnected and connected with the railway network.

The navigation in the port of Archangelsk without ice-breaker assistance begins from the end of May till October-November when the Severnaya Dvina estuary ice breaks up till it gets frozen over. The ice in the Severnaya Dvina estuary is broken with ice-breakers assistance at the end of April - beginning of May. In Winter the navigation is carried out from November till May with ice-breaker assistance.

Port of Mezen

The commercial sea port of Mezen is situated at a distance of 21 miles above the mouth of the Mezen river flowing into the head of the Gulf of Mezen, in the White Sea.

The port of Mezen is mainly assigned to handle timber cargo for exports and the cabotage trade as well as supply cargo, oil products for needs of local industries and population.

In the mouth of the Mezen river, there is situated the Outer Mezen roadstead with 5 to 7 m depth, and at a distance above the river mouth, the Kamenka settlement abeam, the Inner Mezen roadstead with 3 to 5 m depth.

The area of the port shows considerable changes in water level. In the mouth the difference of level during the tide is 6 to 8 m.From the mouth of the Mezen river the tides extend up the river at a distance of 64 km.

Due to the complicated hydrological conditions (water level changes) the port has three sites to locate berths:

- close to the town of Mezen (right river bank);
- near the Kamenka settlement (left river bank);
- near the Krivka settlement (right bank).

From the end of October - beginning of November and until mid-May the river is covered with ice. The Summer navigation begins from June and is completed in the first half of October.

The permissible draft of the vessels calling the port every year is advised in navigation notice, since at Spring drifting of ice the river banks, island coasts and sand shoals are destroyed by ice. Due to this condition the depths and channel course change.

Port of Naryan-Mar

The port of Naryan-Mar is situated at the Pechora river estuary, at a distance of 100 km from the Pechora Bay.The main territory of the Port is located at the right bank of the Gorodetsky Shar Creek, at a distance of 1,5 km from its confluence with the Bolshaya Pechora river.

The main purpose of the port during it's construction was to transship coal of the Pechora field from river onto sea vessels going to Murmansk and Archangelsk. Due to high expenses on maintenance of navigable leads (up to 5 m) on approaches to the port from a seaside, deepening of the fairway is not carried out in full scale. Coal is delivered to coastal points of the White sea even in small quantity.

At present the port handles export timber cargo from the local plant and bulk mineral-construction and general supply cargoes from sea and river-sea vessels (to consumers located in the middle and low parts of the Pechora river). They are local population and geologic expeditions.

Maximum cargo turnover of the port for a period of the summer Arctic navigation amounts up to 200,000 tn.

The port is frozen, the navigation lasts about 3,5 months. The ice within the port area is observed from October until beginning of June.

The port is open for sea-going small-tonnage vessels and sea-river vessels.

The tidal changes of sea level almost do not produce an impact on the water level change within the port zone. The spring floods and wind regime have the most considerable influence on the river level.

The maximum water level at the port aquatorium changes from +2,90 m up to +7,40 m level; at the spring flooding, up to 5,40 m level.

The berths land level is +4,5 m (in spring the berths are flooded).

In the Pechora river inlet, the channels are made having a length of 10,2 km with 4,9 m depth. In the river section the total length of man-made channels is 5,9 km with 5,2 m depth.

For navigation in the Pechora river there are several anchorages with 8 to 10 m depth for vessels accommodation. At the entrance to the Pechora river in the aquatorium of the Pechora inlet northward of the Bolvansky inlet there are several anchorages for vessel accommodation under the winds of different direction.

In summer the port has a marine link to the port of Archangelsk and populated settlements located on banks of the Pechora river. The port has no link to railway net of the country.

Port of Igarka

The port of Igarka is located on the right bank of the Enisey river in the Igarskaya passage at a distance of 687 km from south part of the Enisey gulf (settlement Sopochnaya Karga). The port is owned by the wood processing and transferring combinat, the former enterprise "Krasnoyarsklesexport" (Krasnoyarskiy Kray).

The port's business is to transship the wooden cargo (logs and timber) from river vessels onto sea ones and logs from the plant onto sea vessels. Timber materials are delivered to Igarka from upper Enisey and Angara by river vessels.

Maximum cargo turnover of the port for a period of the summer navigation is more than 700,000 tn.

The navigating period in the port of Igarka does not exceed 120 days, and limiting factors are ice conditions of the Enisey river.

The port of Igarka is connected by river transport to ports and points of the Enisey river in the summer and by air transport to airport of Krasnoyarsk all year- round.

Port of Provideniya

Sea commercial port of Provideniya is located on the northern bank of the Komsomolskaya Bay in the Anadyr gulf. The bay is wholly surrounded by mountains of up to 650m high that is a good protection against winds of all directions.

Depth is 20-30 m. On the whole, the Bay is suitable anchor place which protects against storm winds.

The port discharges the cargo delivered for enterprises of the Provideniya region.

The port of Provideniya is a basic one which forms vessel caravans escorted by ice-breakers along the Northern Sea Route. Vessels here are supplied with bunker, water, food before they go to the NSR way. Besides, this port is a feeder one for handling tankers which carry oil products to Arctic regions and those not ice-classified or of less than L2 ice class. For these purposes the Komsomolskaya Bay is the best place.

The port is frozen one. Navigation commences in the first decade of May and expires in the first decade of January. Average duration is 225 days, including 45 days with an ice-breaker support.

Pilotage to berth is compulsory for vessels of 500 BRT and more.

Port capacity is set at 370,000 TON for a navigation.

Detailed descriptions of ports opened for foreign vessels to call, are presented in Supplement 1.

An important role in cargo supply to the western region points belongs basic ports of Primorjie: Vladivostok, Vostochniy, Nakhodka, detailed characteristics of which are presented in Supplement 3.

Growth of transportation volumes for prospects is foreseen by means of modernization of the transshipment terminals in the existing Russian port and construction of new ports in the Baltic, Northern and Pacific basins. Some of these projects are taken into consideration in the next section.

4. PERSPECTIVES OF THE DEVELOPMENT OF REGIONAL PORTS

4.1 Regional projects of the existing port modernization.

- Construction of auto-railway and railway terminals in the town of Murmansk Term - 1996-2000.
- Construction of an overload complex for bulk dry cargoes in the port of Murmansk. Term.- 1996-2000.
- Reconstruction of berths 1 and 2 for general cargoes in the port of Murmansk. Term. - 1996-2000.
- Construction of a deep - sea overload complex for general cargoes in the port of Kandalaksha Term 1996-2000.
- Constraction of sea overload terminals inthe ports of Naryan Mar, Amderma, Dickson, Khatanga, Tiksi, Pevek, Provideniya, Anadyr, Beringovskiy.Term -1996-2000.

4.2. Projects of construction of Russian new ports in the Baltic and White seas

Oil port in the town of Primorsk

Primorsk is placed at 130 km from St.Petersburg and 60 km from Vyborg. Its main designation - to handle oil products and liquefied bulk cargoes. The port's complex annual freight capasity is assessed as 29 mln.tons now and up to 45 mln.tons in prospects. The port is found in the aquatorium of the Bjerkesund Strait which allows it to accept ships of up to 150000 tons of deadweight.

Commissioning of the port is scheduled by stages:
- The 1st stage (starting complex) is rated at 29 mln.tons of crude oil annually.
- The second stage - at 19 mln/tons annually, including:
  - light oils - 8 mln.tons annually;
  - liquefied gas and chemicals in bulk - 1 mln.tons annually;
  - general cargoes, 1 mln.tons annually.

Oil port in the Batareynaya Gulf

The Batareynaya Gulf is 60 km from St.Peterburg.

The port is designed to handler oil products. Port's capasity will amount 7,5 mln.tons a year and then up to 15 mln.tons a year. It can accommodate ships of 40000 tons of deadweight.

Delivery of oil products by railway is planned (by pipeline - in perspective).

Construction of inner railway tracks and the Batareynaya railway station (with approaches to the port) as well as the branch line Voronka-Batareynaya by passing the nuclear power statio is also planned.

Dry cargo port in Ust'Luga

Ust'Luda is 110 km from St.Petersburg. The ports annual freight turnover will amount to 17 mln.tons and in prospects up to 35 mln.tons. The port will be able to accomodate ships of up to 70000 tons deadweight.

The planned length of berths is 7700 m depths of up to 15,7 m.

Commissioning of the port is scheduled by stages. The port's freight traffic, evaluated as 17 mln.tons annually, includes the following cargoes:

- general cargoes - 7,7 mln.tons;
- including container - 2,7 mln.tons;
- dry cargoes in bulk - 4.0 mln.tons;
- timber - 1.0 mln.tons;
- liquid cargoes in bulk - 2.0 mln.tons.

Dry cargo port of Lomonosov

The town of Lomonosov is 40 km from St.Petersburg.

The port will handle general and refrigerated cargoes including containers. The annual freight turnover will amount 2.1 mln.tons a year, including:

- refrigerated cargoes - 20000 tons;
- metals - 1080000 tons;
- general cargoes in containers - 800000 tons.

Construction of the port is scheduled by stages. The Ist stage is designed for the annual turnover of 700000 tons. Mostly metals will be handled in the port.

4.3. Projects of construction of new ports in the Barents and Kara Seas.

Constraction of the international transit port of Kirkenes

(Based on materials submitted by members of the Norway Parliament Finn Turesen and Anders Aune, June 1992)

Prerequisites:
Basins of the Northern seas which are crossed by the shortest routes between the two continents of the Northern Hemisphere are of great interest to the countries of the Northern America (Western coasts of the USA and Canada), as well as Japan and the Far East countries. Ships there with don't enter the zone of intensive navigation around the central part of Europe, which results in decreasing transport coast. Being one of the nearest to the North pole non-freezing ports, Kirkenes, by its own nature, is well suited to maintaining navigation in the Northern Atlantic and along the NSR.

The region of Kirkenes is of interest due to the following circumstances:

- the port functions regularly and round-the year, ice conditions here are favourable;

- it can accommodate ships of up to 130-150 thousand tons dw.
- there exist favourable conditions for constraction of deepwoter berths, protected against sea waves, convenient anchorages and areas for cargo storage;
- the land relief is favourable for laying up a railroad to Russia;
- the port is not far from the Russian border, which makes it possible to construct the railway track with Russian gage;
- economic possibilities of the town of Kirkenes may be greatly improved;
- there exists a well developed infrastructure in Kirkenes, capable to serve the needs of heavy industry as well as the port tquipped with facilities for loading cargoes in bulk.

The port turnover:
Dry cargo in bulk. The turnover is assessed as 10 mln.tons of export and import loads annually, which illustrates high through-put of the loads of given category. The use of the existing 340 m deepwater berth providing mooring of ships of up to 130000 tons deadweight is being now under consideration.

Containers and general cargo. It is recommeded to proceed from the turnover of 6,6 mln.tons annually at the Ist stage of construction, including 600000 standard 20-feet containers. It is evaluated that basic length of berths should be 1 km (which is enogh to accommodate 4 dry cargo ship of 130000 tons deadweight and two Ro-Ro ships) with the following increase to 1750 and 2000 m correspondingly. The container terminal, as suggested, may be placed in the region of Rupelv.

Existing container traffic between the Northern Europe and the Far East countries via the Suez Canal may be considered as a base for loading of the container terminal in an alternative variant. A small part of the traffic (about 25 % of annual traffic) may be assumed for economic evaluation of benefit gained at transporting cargo along the NSR.

Construction of the bulk oil port of Pechenga

Prerequisites:
Basic areas of oil and gas production have been found on the shelf of the Barents and Kara Seas. Among the projects of field assimilation , such field as Stokmanovskoye and Kharasaveyskoye (gas condensate) with maximum annual production of up to 80 mlrd. cu m. and Prirazlomnoye (oil(with maximum annual production of up to 16-20 mln.tons, are mentioned.

Heavy ice and climatic conditions of the Pechorskoye and Kara Seas characterized by extremely low air temperatures make it possible to recommend, for assimilation of fields, and industrial-transport system on the base of sea tankers suited for navigation in the Arctic (as a transport part of the system), which would transport oil and LNG from the fields to a non-freezing port (say, Pechenga) of the Kola Peninsula round the year.

There are several pressing reasons for elaborating the port of Pechenga problem:
- functioning of the port is regular and round the year;
- it can accommodate ships of up to 130-15- thousand tons deadweight;
- there exist favourable conditions for construction of deepwater berths protected against sea waves, covenient anchorages and areas for a high-capacity oil depot;

- there is a railway track to Pechenga;
- intensive economic development of Pechenga becomes possible;
- there are many qualified specialists in Pechenga; the town is situated not far from the big town and port of Murmansk with its developed infrastructures;
- due to short distance between Kirkenes and Pechenga it becomes possible to consider the problem of creating a unified complex of handling dry bulk, liquid bulk and general cargoes in the North-West with the aim of providing effective freight traffic along the NSR in the West-East direction round the year and increasing export-import traffic between Russia and West European, Northern and Central America countries.

The port turnover:
The calculated turnover of the port will comprise:
- oil export from the fields of the Timan-Pechora province tin the volume of up to 20 mln. tons annually;
- export of LNG from the Kharasavey field in the volume of up to 20 mln.tons annually;
- export of methanol in the volume of 3-5 mln.tons annually.

Construction of the bulk oil port Kharasavey.

Prerequisites:
The Kharasavey gas field is situated at the Western Coast of the Yamal Peninsula and comes out to the shelf of the Kara Sea. Evaluated gas resources make it possible to bring the production to the level of up to 32 mlrd.cu.m.annually. Technical and economic calculations have proved the priority of transporting LNG by ships over transporting it by pipelines. The flow process of preparing gas to transportation involves its liquefaction which means building of a LNG plant in the immediate neighborhood of the overload terminal.

Calculated turnover of the port:
The annual export of LNG in the volume of 20.9 mln.tons is planned on the round - the year principle.

Distribution of the volume by navigation periods (taking into consideration complicated ice conditions as for navigation of gas carriers in winter) is carried out in two variants: in summer - 6.6 - 8.6 mln.tons, in winter - 14.3 -12.3 mln.tons.

To improve ice conditions at the approach canal and in the port aquatorium release of warm water from cooling systems of the LNG plant technical equipment is envisaged.

Construction of the bulk oil port in Obskaya Guba

Prerequisites:
In the basin of the Ob river there are big oil field: Priobskoye and Barsukovskoye. the oil export from these is planned by pipelines. But a part of oil, assigned to mutual commercial activities with foreign companies may be transported by ships. To this end a number of investigations of oil and gas condensate export via the Obskaya Guba was carried out.

Calculated turnover of the port:
In accordance with a number of commercial affers and based on preliminary calculation of economic evaluation of transporting oil and oil products by sea, the calculated turnover of the port includes:

- export of crude oil in the volume of 5,0 mln.tons annually, and
- export of condensate in the volume of 0.5 - 1.0 mln.tons annually.

Further investigation of the transport scheme allows for organization of oil products export in summer in the volume of up to 500 tons including road overloading in the port of Yamburg from river tankers to sea tankers of the "Samotlor" type or some other ships of the same deadweight provided by ice reinforcement of hull.

In the case of further increase of export volume it will be expedient to build a stationary ice-proof pier from the depths of 10.5-11.0 m in the mounth of the Yarengsedeyakha river (70 km to the North from the port of Yamburg).

In this variant it becomes necessary to lay out 70 km of oil pipeline from Yamburg to the new port Yasya, construct a new oil depth and oil transfer pumping station in Yamburg.

Reliability of the round-the-year navigation in the Obskaya Guba is provided by 15-years practice of pilitage of ships to the port of Dudinka on the Yenisey river, where ships work under similar conditions of the Arctic on schedule.

Construction of the international port of Petropavlovsk-Kamchatskiy

The port of Petropavlovsk-Kamchatskiy is now major transport centre of the Kamchatka Peninsula. Almost all cargoes (85 % in volume) necessary for functioning of industrial enterprises and the peoples; everyday life, come to the peninsula via the port.

At present, economic development of Kamchatka is mostly determined by fishery. Increase of export profits and, of the result, improvement of the populations well-being greatly depend on fishery industry development.

Kamchatka with its vast sea resources is of great interest to foreign countries and other regions of Russia, where industry exists, but lacks enough resources for its functioning, which does not contribute to fulfiling the needs for fish products.

On assignment of the Kamchatskaya Region Administration, the DNIIMF company together with some foreign companies, in November 1994, carried out development of the concept of transformation of the existing fishing and commercial ports into the international port of Petropavlovsk-Kamchatskiy.

Opening the port of Petropavlovsk-Kamchatskiy for international trade creates objective prerequisites for increase in traffic through the sea commercial port.

According to prognosis of the Ministry of Economy of Russia, the turnover of the port in 2000 will be 5 mln.tons and equal that of late 80s.

The prognosis of volumes and structure of the port's turnover for 2015 was carried out by the ABST Associates (Seattle, USA) company. The turnover is estimated to be 7.0 mln.tons. To assimilate the calculated turnover it will be necessary to complete the planned development of the port's loading facilities to 2015.

As container turnover is to be increased up to 190000 containers annually it becomes necessary to preserve the existing specialization of loading facilities of berth 10 and increase the length of berth 13, which is now in the process of constraction, form 278 to 360 m with the aim of providing processing of such ships of international class as of the Panamax type. In accordance with the provisions of the BST Associates company, such ships may in future call at the port.

According to the prognosis of expenses for reconstruction of the commercial port, construction of auxiliary objects and infrastructure, resulting from the overspecialization of the shore line, the investments will constitute 215.5 mln.rbl. In the prices of 1991 (600 mlrd.rbl. In the prices of the current 1995) objects of the commercial port only - 90.0 mln.rbl. (250 mlrd. rbl. Accordingly). Availability of construction base and labour in the region provides for favouradle conditions and prerequisites for realization of the project by local recources.

The project realization will take 18-20 year in all, constraction of the fishing port - 8-10 years, constraction of the commercial port - 4-5 yeas.

The international port of Petropavlovsk-Kamchatskiy, being now under cnstruction, is called upon to turn to a centre of international trade in the Northern part of the Far East region of Russia.

As problems of international use of the NSR in the interests of the countries gravitating to the basin are being now under consideration , the constructed port may become a transit point in the traffic of container loads from the countries of the Asian-Pacific region to Europe along the NSR, due to its location and the presence of the corresponding fleet of Russia shipping companies in the Far East basin.

CONCLUSIONS

The fulfilled investigations permit to make the following conclusions and proposals:

1. Economic integration of Russian and foreign companies acting in the sphere of foreign trade, reconstruction of existing enterprises and assimilation of new field is greatly hampered by lagging behind in development of transport.

2. At the expense of inner resources and foreign credits for construction of new ports and overloading complexes at the Baltic and Northern-Western regions of Russia, realization of many projects and intensification of traffic along the NSR will be accelerated.

3. Mutual technical and economic feasibility studies (made by the specialists of Russia and Scandinavian countries) for the new internatioanal port in the Varanger Fjord designed for handling oil, bulk container cargoes will create a new big economic impulce for development of traffic along the NSR.

4. With advaces in trade and economic ties between the Europe and North America, on one hand, and the countries of the Asian-Pacific region, on the other hand, the interest in using the NSR for transit traffic is being increased now.

5. According to evaluations of home and foreign researches the volume of traffic along the NSR will increase in 2010 from 1,5 to 2,5 times, and in 2050 - 4 times.

6. The traffic increase will ask for corresponding development of ports and making decisions on their loading schemes which, in turn, fully depends on justification of rational transport schemes.

7. At the Ist of development of transit traffic along the NSR it is Expedient to use the existing facilities of the port of Provideniy, Petropavlovsk-Kamchatskiy and Dutch Harbour. The following traffic increase will ask for technical reconstruction and construction of new facilities in these ports.

8. Having in mind specific characteristics of the NSR (low temperature, frosts and polar nights) it is necessery to plan more detailed feasibility studies on load nomenclature and volume, rational transport routes, equipment of the route and types of cargo vessels.

9. With the aim of providing more reliability of transit traffic along the NSR with its characteristically heavy ice conditions in the East-Siberian and Chukcha Seas, it would be appropriate to investigate the possibility of using the following transport scheme: Europe - the port of Tiksi - the Lena river - the Baikal - Amur railway - the port of Vanino - the port of the Asian -Pacific region, and in the opposite direction.

10. It is planned to continue this Project in the 2 nd stage of INSROP. Particularly, it will include ports being opened to foreign vessels and notices to seamen published.

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4. Towards construction of international transit port of Kirkenes.(based on materials of proposals of the Norwegian Parliament's deputies - Finn Turesen and Anders Aune, June 1992).

5. Projects of building new transshipment terminals and ports based on the results of studies of Russian Institutes for 1990-1994.

SUPPLEMENTS

Supplement 1

BRIEF CHARACTERISTICS OF SEA PORTS

1.1. PORT OF MURMANSK

Port application.

The basic application of the port consists in handling export/import and coastal cargoes.

Plan-scheme of the port is presented in fig.2.

The Port operates the vessels coming from West and East Europe, North and South America, South-Eastern Asia. The coastal voyages are realized to the Spitsbergen Island and along the northern coast of Russia up to the Far East.

On the basis of deep-water berths the port can accept the vessels having a tonnage up to 50000 tons.

On the line connecting the port of Murmansk the passengers transportation on long-distance vessels is carried out as well as on local lines within the zone of the Gulf of Kolsky.

The line vessels navigation is realized in traffic with Archangelsk, settlements of the Kola Peninsula coasts and Norwegian ports.

Cargo delivery time for the main navigable routes is as follows:

Dudinka - Murmansk - 5 days

Murmansk - Rotterdam - 6 days

Murmansk - USA - 23 days

Murmansk - China - 49 days

Murmansk - China (the NSR) - 35 days

Passenger travelling time:

Murmansk - Norway - 0,5 days

Murmansk - Arkhangelsk - 1,5 days

Description of basic production assets.

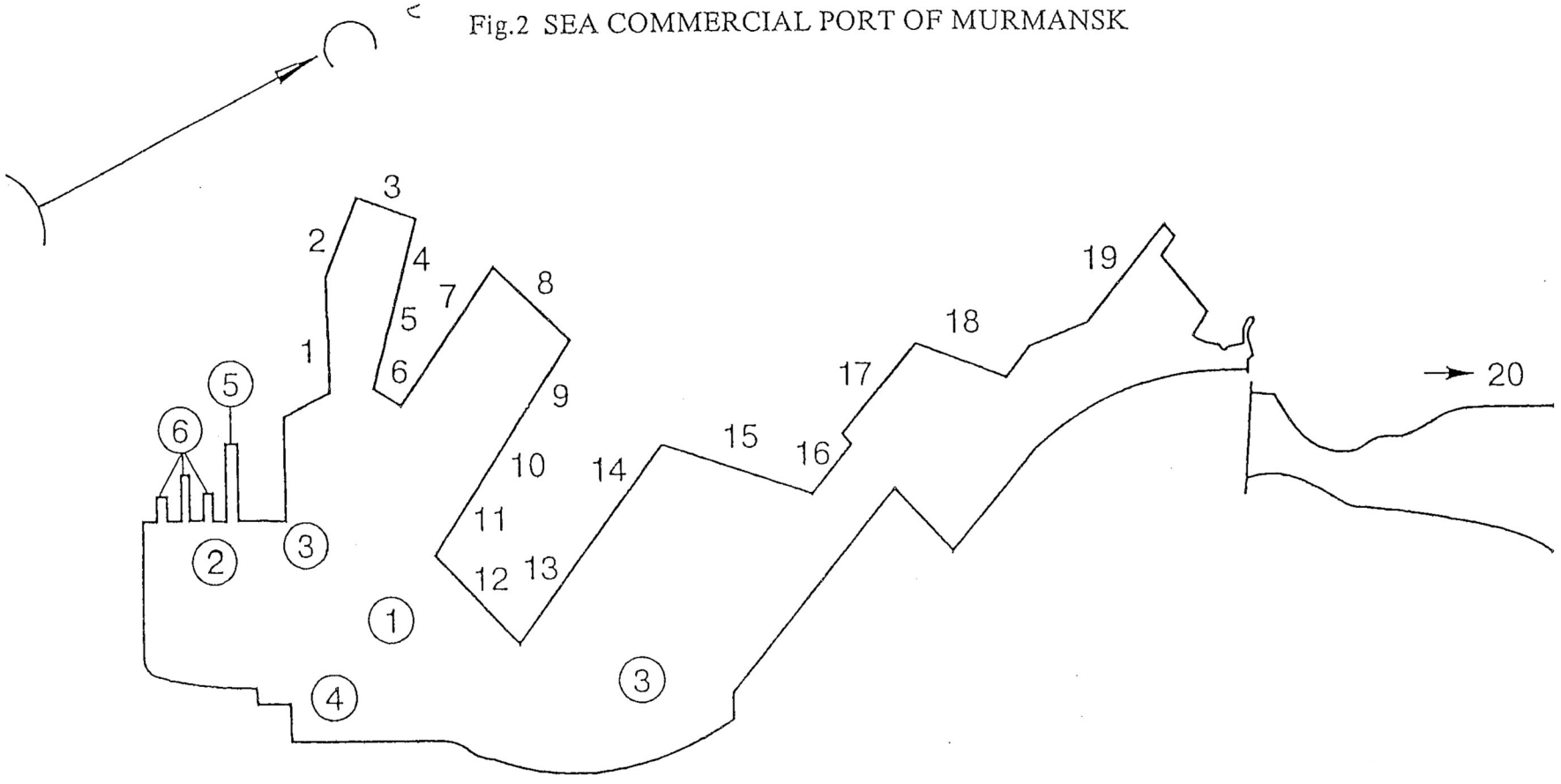
Berths

The port disposes of 3,8 km quayage length, 60 000 sq.m of open storage area and 25 500 sq.m of storehouses.

The "Commercial Sea Port of Murmansk" Joint Stock Company leases 16 berths from Maritime Administration of the port of Murmansk

The area of the CSPM is divided into three production handling complexes:

Fig.2 SEA COMMERCIAL PORT OF MURMANSK



1. Port Authority
2. Maritime Station
3. Workshops
4. Torgmortrans base
5. Passenger Pier
6. Floating piers

Piers:
1,2,4,5,8,11,14 - general cargo
6,7,9,10,13,17,18,19,20 - bulk
(iron ore concentrate, coal,
apatite concentrate)
15 - containers, general cargo
3,12,16 - auxiliary

1. The special handling complex No.1 (SPPK-1) is located at the berths Nos. 18 and 19 which handle bulk cargoes (apatite concentrate, mineral fertilizers) by using a special equipment.

2. The production handling complex No.2 (PPK-2) includes berths Nos. 13, 14, 15, 16 and 17 which handle bulk and general cargoes by using multipurpose handling equipment: 40 tons gantry cranes having a boom overhang up to 40 m and lift trucks up to 32 tons lifting capacity.

3. The production handling complex No.3 (PPK-3) includes berths Nos. 1,2,3,4, 5,6,7,8,9,10,11 and 12 which handle bulk and general cargoes by using multi-purpose equipment: 32 t gantry cranes having a boom overhang up to 32 m and lift trucks up to 32 tons lifting capacity.

Now the berth No.1 is under reconstruction.

Within the passenger zone a maritime terminal with berths for line and local ships is located.

The general berths composition of the port of Murmansk is given in the Table 1.1

Table 1.1

General composition of the Port berths

Application	Quantity		Length, m		Capacity, 1.000 t/year		Passenger traffic, .000 pers./year
	Total	Special	Total	Special	Total	Special	
I. Cargo handling berths	13	2	2482	353	9500	3700	-
for local fleet	-	-	-	-	-	-	-
for cargo fleet	13	-	2482	-	9500	-	-
1.1. For dry cargo	13	2	2482	353	9500	3700	-
general cargo	5	1	830	190	1000	200	-
bulk cargo	7	1	1445	163	7400	3500	-
cereals	1	-	207	-	1100	-	-
II. Passenger berths	8	-	492	-	-	-	1305
incl. for line ships	2	-	220	-	-	-	80
III. Ancillary berths	5	-	659	-	-	-	-
Total in the Port	26	2	3633	353	7500	3700	1305

Table 1.2

Performance and specialization of cargo and auxiliary berths

No.	Berths			
	Length, m	Depth, m		Specialization
		actual	design	
2	187	7,7/9,1	10,5	General cargo
3	127,3	8,2	10,5	Ancillary
4	207	9,8	10,5	General/bulk cargoes
5	103	7,9	8,2	General cargo
6	85	7,8	8,2	General cargo
7	202	10,1	10,5	General/bulk cargoes
8	231	8,0	8,5	General/bulk cargoes
9	213	9,8	10,5	Bulk cargo
10	240	9,0	10,5	General/bulk cargoes
11	32	4,7	5,0	General cargo
12	198	3,6/7,5	5,0/10,0	Ancillary
13	260	12,0	13,0	General cargo
14	265	12,0	13,0	General cargo
15	190	9,6	9,75	General cargo
16	91	5,9	9,2/6,0	Ancillary
17	247	10,5	13,0	Under renovation
18	187	8,9	11,0	Bulk cargo
19	197,8	10,0	11,0	Bulk cargo
20	120	6,0	8,5	Removed from operation

Reconstructions of berth 17 (discharging alumina) and complex for handling fertilizers on berth 17 started.

Due to lack of investments, port's technical reconstruction proceeds slowly.

Port throughput.

The throughput of the port of Murmansk for last reported years by enlarged cargo range is given in the Table 1.3.

Throughput of the Port of Murmansk Table 1.3.

1.000 tons

Cargo type	1992					1993					1994				
	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total
	dispatch	arrival				dispatch	arrival				dispatch	arrival			
Total: including:	401,4	1396,0	2144,4	395,4	4336,9	189,8	942,2	2737,7	345,4	4115,1	189,0	1633,5	3033,1	861,4	5717,0
Liquid bulk cargo	6,4	0,7	-	-	7,1	-	0,1	-	-	0,1	-	-	2,4	-	2,4
Dry cargoes including:	394,7	1395,3	2144,4	395,4	4329,8	189,8	942,1	2737,7	345,4	4215,0	189,0	1633,5	3030,7	861,4	5714,6
Bulk cargoes	92,1	969,0	1804,2	129,2	3215,8	16,1	861,0	1839,0	281,2	2997,3	29,5	1457,6	1743,4	827,2	4057,7
Timber cargoes	1,8	4,6	6,4	-	12,8	0,3	0,6	2,1	-	3,0	0,2	0,2	2,9	-	3,3
General cargoes	300,8	421,7	333,8	266,2	1101,2	173,4	80,5	896,6	64,2	1214,7	159,3	175,7	1284,4	34,2	1653,6

As the findings indicate, the bulk cargoes form occupy maximum specific weight in the port throughput.

During 3 last reported years the actual load of the port has been reduced considerably as compared with recent years.

The port throughput of more early years is illustrated by the following findings:

mill tons

1988 - 7,82	1992 - 4,34
1989 - 8,83	1993 - 4,21
1990 - 7,82	1994 - 5,72
1991 - 5,38	1995 (first half-year) -2,64

These findings of 1991-1994 show an abrupt reduction of throughput and reserve of its production capacity.

The production capacity installed for the port of Murmansk amounts to 8,5 mill tons per year.

The further development of the port of Murmansk is restricted within the existing port limits and due to the lack of free land at the zone of the Gulf of Kolsky.

The passenger area also has no possibility for further development due to the lack of land and aquatorium.

1.2. PORT OF KANDALAKSHA

Port application.

The port of Kandalaksha handles coastal cargoes and, to a lesser extent, export and import cargoes.

The port is open for foreign flag vessels.

The plot plan of the port is given in Fig.2.

Port throughput

The port throughput by basic cargo range during the last reported years is given in the Table 1.4.

As shows the table, the total throughput of the last reported year is almost one-fifth as tall as compared with 1992.

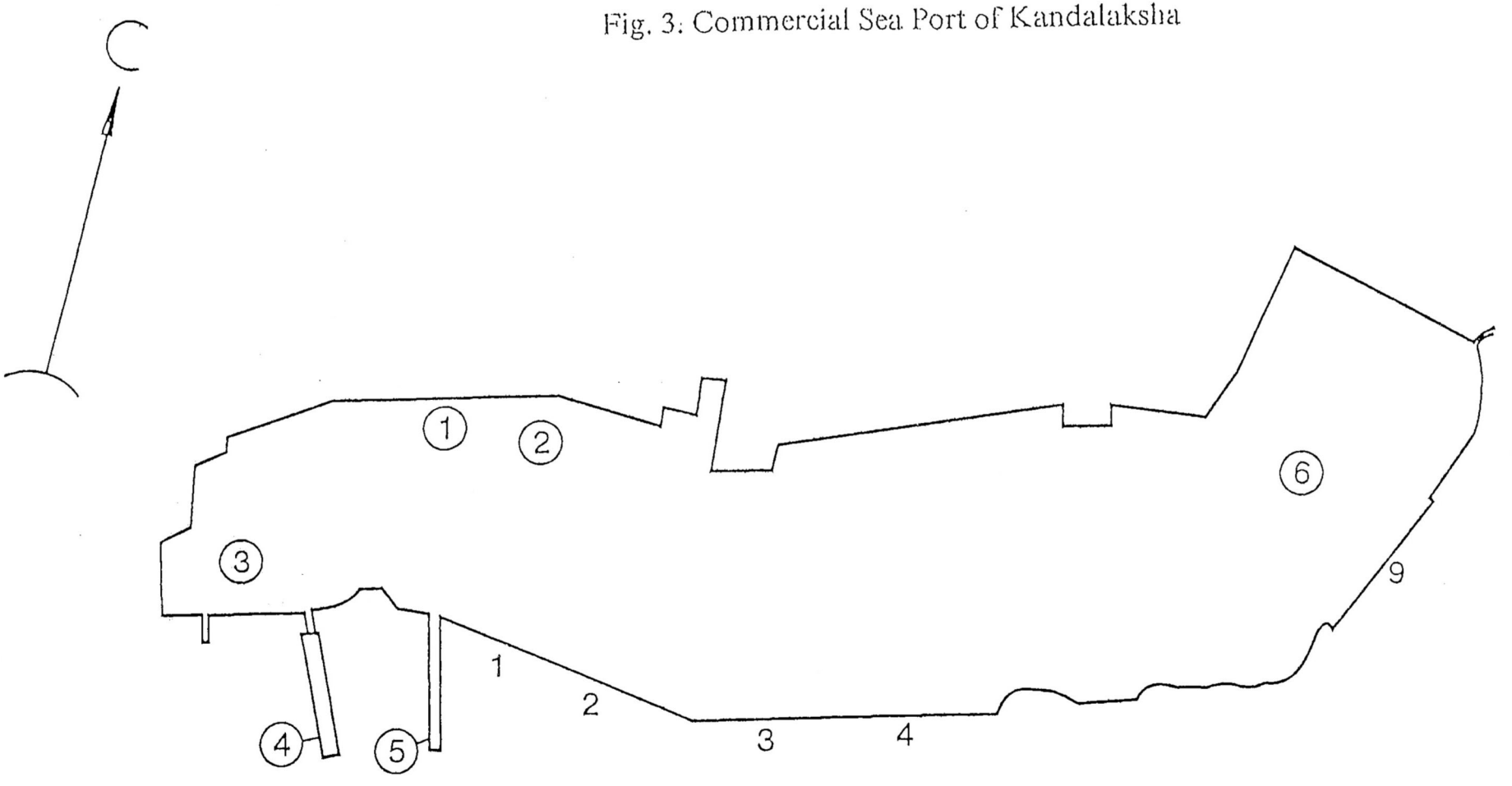
For more early years as compared with the last the throughput is expressed in the following findings:

1.000 tons

1989 - 422	1992 - 1596
1990 - 457	1993 - 467
1991 - 550	1994 - 324

In 1992 the throughput of Kandalaksha has been increased due to the growth of iron ore concentrate transhipment coming from the Kola Peninsula for the plant of Cherepovets (from railway to river vessels via White Sea-Baltic Canal).

Fig. 3. Commercial Sea Port of Kandalaksha



① Port Authority
② Maritime Terminal
③ Workshops
④ Floating berth (Harbour craft)
⑤ Passenger pier (No.6)
⑥ Special complex to handle iron ore concentrate

Berths:
1 - local cargoes
2 - bulk cargoes
3,4 - general cargoes
9 - iron ore concentrate

Table 1.4

Throughput of the Port of Kandalaksha

1.000 tons

Cargo types	1992					1993					1994				
	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total
	dispatch	arrival				dispatch	arrival				dispatch	arrival			
Total including:	113,5	283,5	36,5	146,2	1596,7	293,6	26,2	46,4	101,5	467,7	117,0	156,3	35,7	14,7	323,7
Liquid bulk cargoes	-	0,5	-	-	0,5	-	-	-	-	-	-	-	-	-	-
Dry cargoes including:	1130,5	283,0	36,5	146,2	1596,2	293,6	26,2	46,4	101,5	467,7	117,0	156,3	35,7	14,7	323,7
Bulk cargo	756,0	263,5	4,9	34,5	1058,9	80,1	11,5	17,9	8,4	117,9	29,7	154,9	-	-	184,6
Timber cargo	0,2	3,1	-	-	3,3	0,1	-	-	-	0,1	0,1	0,1	-	-	0,2
General cargo	374,3	16,4	31,6	111,7	534,0	213,4	14,7	28,5	93,1	349,7	87,3	1,3	35,7	14,7	138,9

1.3. PORT OF ONEGA

Port application

The port carries out mainly the shipment of timber cargo for export (lumber and round wood). In small quantities the timber is shipped to coastal vessels.

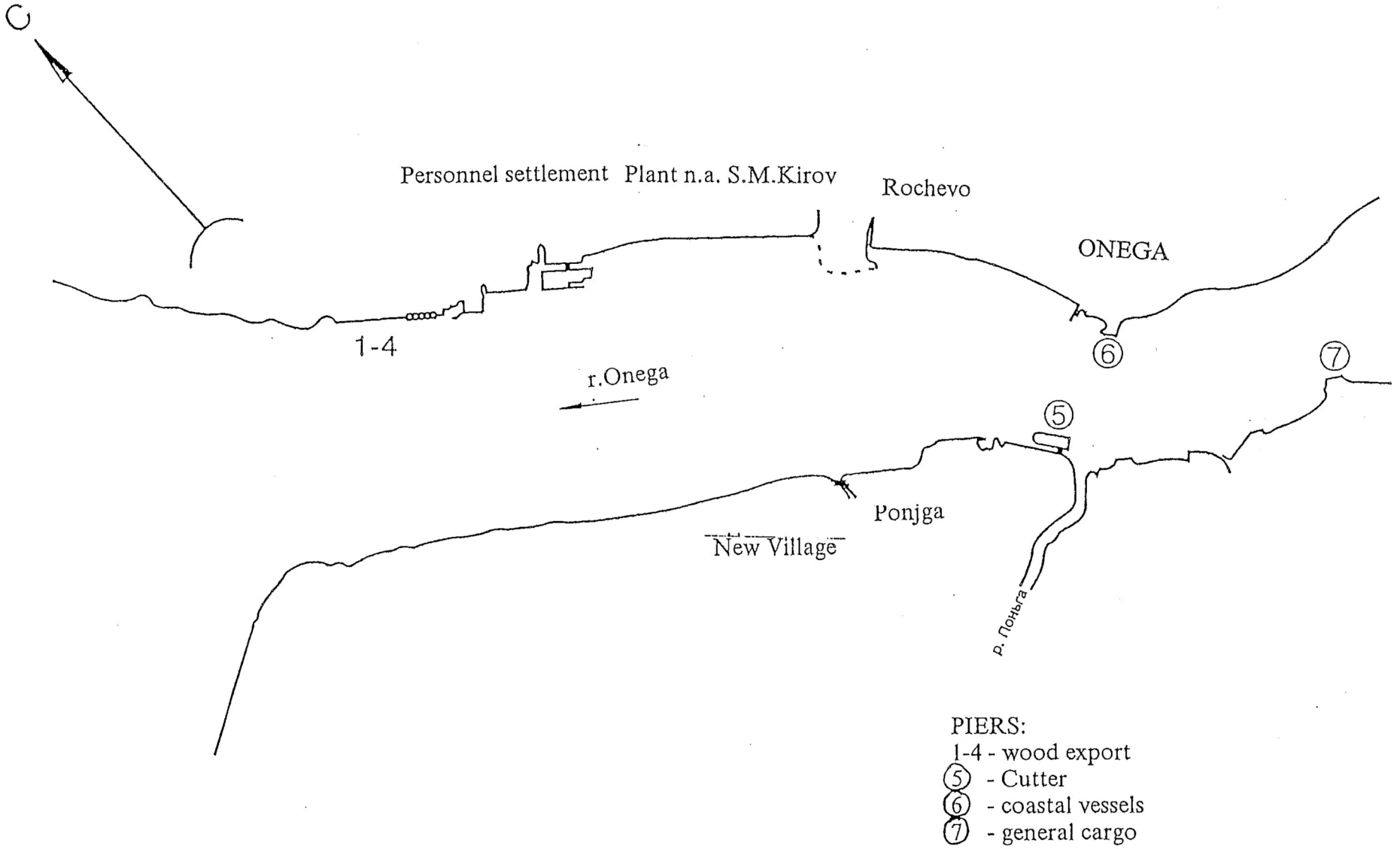
Port throughput

Apart from the timber cargo the port of Onega handled mineral and building materials, small quantities of general cargoes. Annually the port has handled up to 200-230 000 tons. During the last reported years the throughput was reduced considerably and it is illustrated by findings of the Table 1.5.Table 1.5.

Throughput of the port of Onega

Cargo types	1992				1993	1994
	Cabotage dispatch	Export	Import	Total	Export	Export
Total:	0,4	70,1	0,3	70,8	63,9	51,6
including bulk liquid	-	-	-	-	-	-
Dry cargoes,	0,4	70,1	0,3	70,8	63,9	51,6
including:						
bulk cargoes	-	-	-	-	-	-
timber cargoes	0,4	70,1	-	70,5	63,9	51,6
general cargoes	-	-	0,3	0,3	-	-

Fig.4 SEA COMMERCIAL PORT OF ONEGA



1.4. PORT OF ARCHANGELSK

Port application

The commercial sea port of Archangelsk is applied to handle coastal cargo for settlements of the Arctic, the White and Barents Seas, as well as for outdoor/ indoor general cargoes.

Basic production assets

Plan-scheme of sea commercial port of Archangelsk is shown in fig.4 - Economia area and in fig. 5 - Bacariza area and Left Bank area

Economia cargo area.

The area includes 7 berths (Nos.1 through 7) of 1110 m overall length and with 7,8 to 9,6 m depth alongside. These berths handle large-tonnage containers, imported grain, metals, export wood-pulp and timber. Moreover different general cargoes for settlements of the White and Barents Seas, the Arctic zone and Dudinka direction are handled.

Bacariza cargo area.

This area has 13 berths (Nos.133 through 145) of 1793 m overall length, including: 1258 m of wooden structure (Nos. 133 through 141) and 535 m of concrete structure (Nos.142 to 145), the depth alongside is 7,3 to 8,0 m. The berths Nos.133 and 134 with 286 m total length have been turned over to the harbour craft. There are 11 berths under operation with 1507 m total length which handle different general cargoes.

Left Bank area.

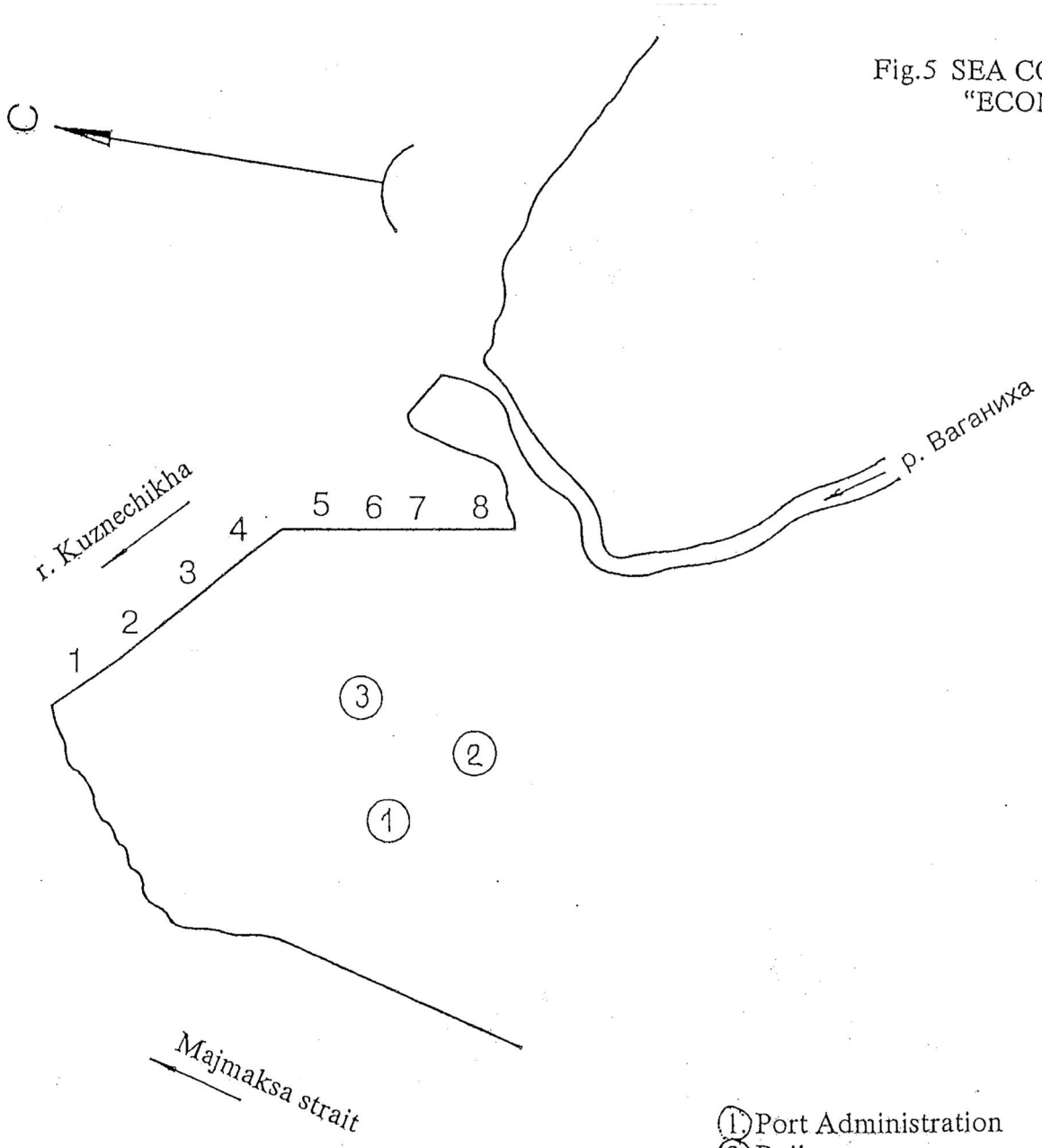
This area is specialized in coal handling of the maritime traffic (reception of coal coming from Spitsbergen Island), as well as the coal from river vessels of the Pechora fields with transhipment via the Kotlas terminal coming from railway cars.

The area includes 3 berths Nos.120 to122 of 443 m total length and depths alongside of 4,5 to 7,5 m.

The berth No.122 with 83,3 m length has been transferred to the Logistics Service of the Northern Shipping Company.

Thus, 2 berths (Nos.120 and 121) with 360 m overall length and 7,5 m depth alongside are used in handling operations.

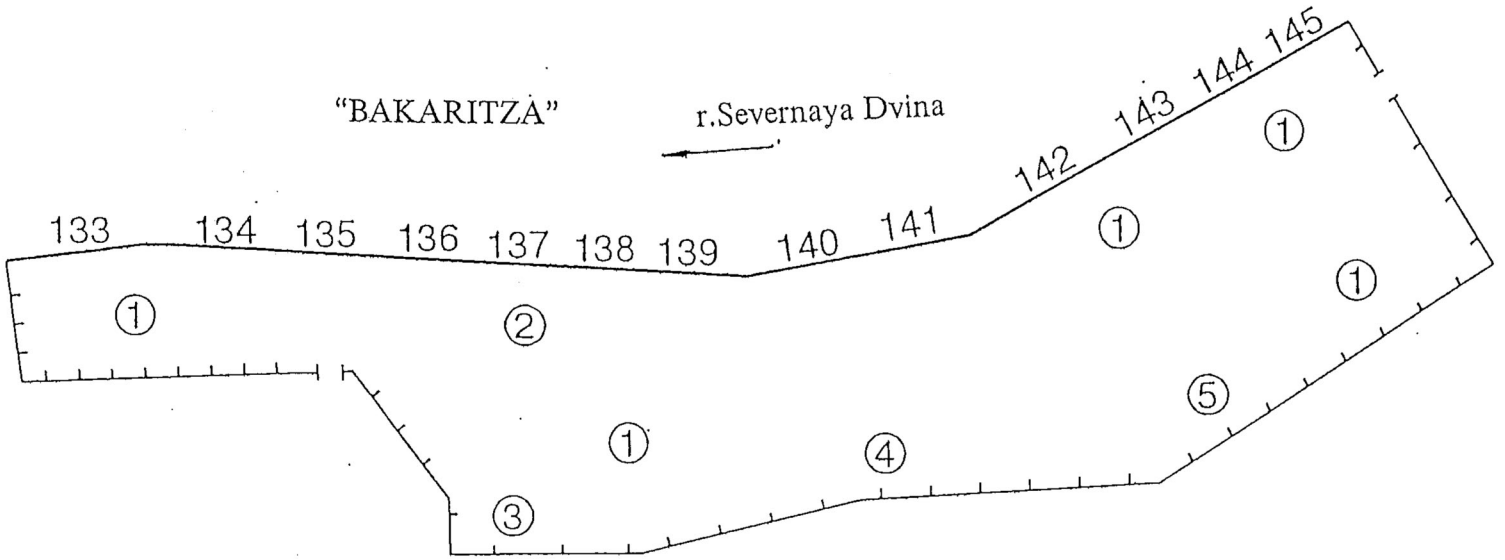
Fig.5 SEA COMMERCIAL PORT OF ARKHANGELSK
"ECONOMIJA" REGION



1. Port Administration
2. Boiler room
3. Workshops

PIERS:
1- containers
2-8 - general cargo

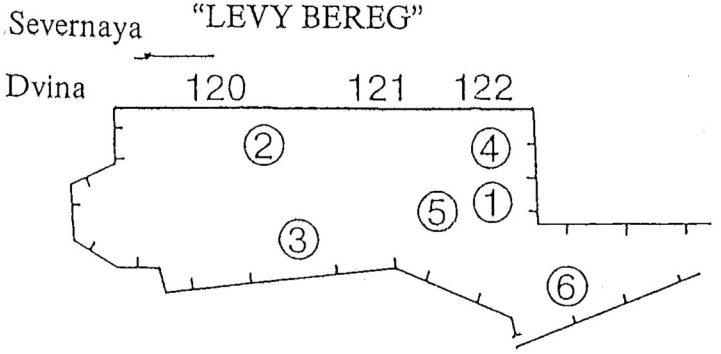
Fig.6 SEA COMMERCIAL PORT OF ARKHANGELSK



REGION "BAKARITZA"

PIERS:
133,134 - port fleet
135-145 - general cargo

①- covered store
②- open store
③- garage
④- garage of small vehicles
⑤- workshops



REGION "LEVY BEREG"

PIERS:

120,121 - coal
122 - material technical supply service (MTSS) of the NSC

①- covered store
②- open store
③- store of oil
④- room of MTSS
⑤- workshops
⑥- base

Throughput of the port of Archangelsk

The throughput of the port is given in the Table 1.6.

The port is specializing in dry cargo handling. The oil products are loaded to the sea-going vessels at two terminals of the Novo-Archangelsk tank farm owned by "Rosnefteproduct" JSC of Russian Federation. The tank farm is situated at the right bank of the Kuznechikha river (a tributary of the Severnaya Dvina).

During the last reported years the port has handled about 3 mill tons of dry cargoes annually.

But the recent years the throughput was reduced considerably due to different reasons.

The capacity of dry cargo berths in the port accounts for 3 mill tons/year.

The throughput of the port of Archangelsk (including the oil tank farm) is represented by the following findings:

mill tons

1989 - 6,1	1992 - 3,0
1990 - 5,3	1993 - 2,2
1991 - 4,0	1994 - 1,3

Table 1.6.

Throughput of the Port of Archangelsk Table 1.6.

1.000 tons

Cargo type	1992					1993					1994				
	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total	Cabotage		Export	Import	Total
	dispatch	arrival				dispatch	arrival				dispatch	arrival			
Total:	877.1	714,7	1356,8	86,2	3034,8	512,5	285,6	1287,5	169,6	2255,2	319,7	85,5	866,5	69,9	1341,6
including:															
bulk liquid cargo	316,6	-	530,0	-	846,6	151,9	20,7	409,5	-	582,1	34,9	20,0	137,0	-	191,9
Dry cargo	560,5	714,7	826,8	86,2	2188,2	360,6	264,9	878,0	169,6	1673,1	284,8	65,5	729,5	69,9	1149,7
including:															
bulk cargoes	110,6	499,9	7,8	6,2	624,5	120,4	148,9	-	24,1	293,4	113,9	13,2	1,3	-	128,4
timber cargo	103,2	48,8	560,5	-	712,5	16,2	28,9	548,6	-	593,7	54,5	5,7	376,7	-	436,9
general cargo	346,7	166,0	258,5	80,0	1563,7	224,0	87,1	329,4	145,5	786,0	116,4	46,6	351,5	69,9	584,4

1.5. PORT OF MEZEN

Port application

The port of Mezen is destined mainly for shipment of timber cargo for export and cabotage, as well as for reception of different support cargoes, bulk oil products of local industries and population.

Production assets

Depending upon consignees location, ship location at berths is carried out. Plan-scheme of the port is presented in fig. 7.

The sea-going vessels at the town of Mezen and the Krivka settlement are unloaded at the roadstead to floating means of the port. This operation is carried out at shallow-water berth by using a floating crane.

The cargo unloading at the Kamenka settlement from floating means (barges) is carried out to the shore by using a crawler crane.

Throughout of the port

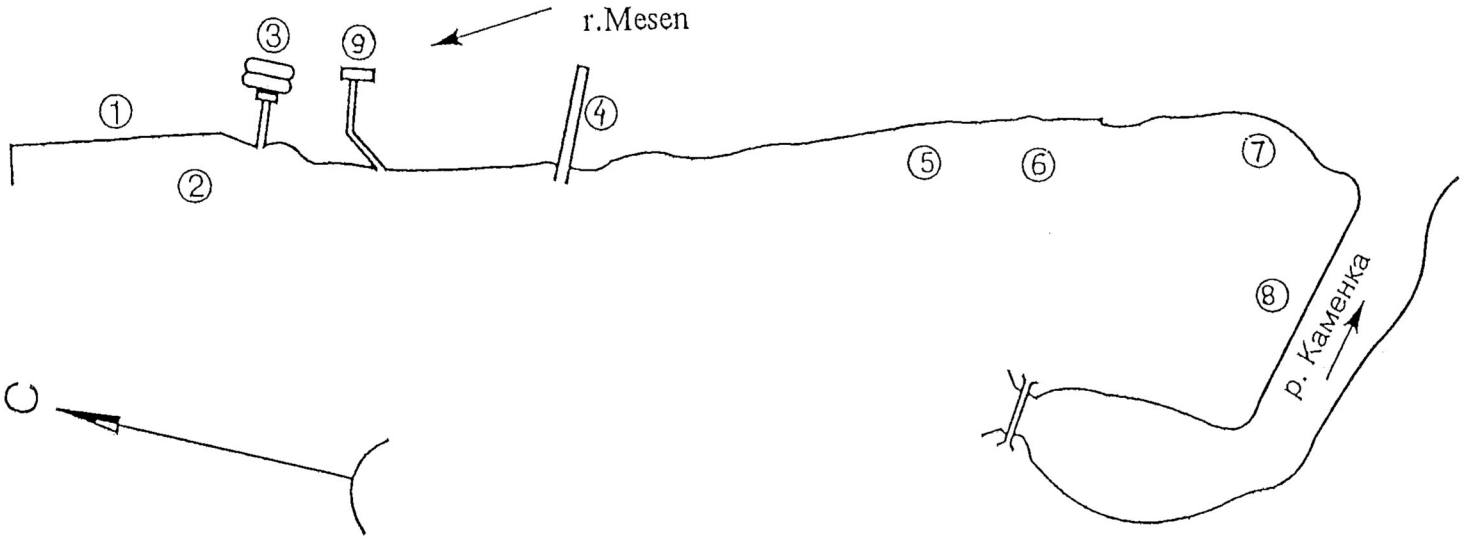
The throughput of the port by main cargo types during the last reported years is given in the Table 1.7. The berths and loading bays handle only dry cargoes. The bulk liquid oil products are unloaded from sea-going small-tonnage vessels and river tankers at the berths of local tank farm.

The throughput of the port of more early reported years is illustrated by the following findings:

1.000 tons

1989 - 297	1992 -193
1990 - 290	1993 - 172
1991 - 264	1994 - 87

Fig.7 SEA COMMERCIAL PORT OF MESEN



1- Pier
2- Office
3- Navigational pier
4- Wood site
5- Port Administration
6- Marine Terminal
7- Office of river department
8- Workshops
9- Passenger pier

Region Krivka
10 - Floating crane
11 - Passenger Pier
12 - pier
13, 14 - Open store

Table 1.7.

Throughput of the Port of Mezen

1.000 tons

Cargo type	1992				1993				1994			
	Cabotage		Export	Total	Cabotage		Export	Total	Cabotage		Export	Total
	dispatch	arrival			dispatch	arrival			dispatch	arrival		
Total	40,2	125,3	27,5	193,0	31,9	109,9	30,2	172,0	4,3	52,8	30,3	87,4
including the liquid	-	37,3	-	37,3	-	38,3	-	38,3	-	15,9	-	15,9
Dry cargo	40,2	88,0	27,5	155,7	31,9	71,6	30,2	133,7	4,3	36,9	30,3	71,5
including:												
bulk cargo	-	43,3	-	43,3	1,2	38,7	-	39,9	-	23,2	-	23,2
timber cargo	33,4	-	27,5	60,9	24,2	0,1	30,2	54,5	2,9	-	30,3	33,2
general cargo	6,8	44,7	-	51,5	6,5	32,8	-	39,3	1,4	13,7	-	15,1

1.6. PORT OF NARYAN-MAR

Port application.

The main application of the port during its construction consisted in coal transhipment coming from the Pechora fields on river and sea-going vessels to Murmansk and Archangelsk. Due to the large operating costs in maintenance of navigational depths (up to 5 m) at accesses to the port on seaside, the dredging of the waterway is carried out in restricted volumes. The coal is transported only in small quantity to small coastal settlements of the White sea.

At present the port handles general supply cargoes from sea and river-sea vessels (to consumers located in the middle and low parts of the Pechora river). They are local population and geologic expeditions.

Basic production assets.

The port has three berths (in timber cribs), the 4th berth is removed from operation due to the technical conditions. This berth is used on a limited scale for accommodation.

Plan-scheme of the port of Naryan-Mar is presented in fig.8.

In the summer the port has a marine link to the port of Archangelsk and populated settlements located on banks of the Pechora river. In the winter only air line is maintained between Naryan-Mar and Archangelsk. The port has no link to railway net of the country.

Port throughput

The port handles export timber cargoes coming from local mills, mineral and building bulk materials and different general cargoes.

The throughput of the port of last reported years is given in the Table 11.

The throughput of early years is represented by the following findings:

1.000 tons

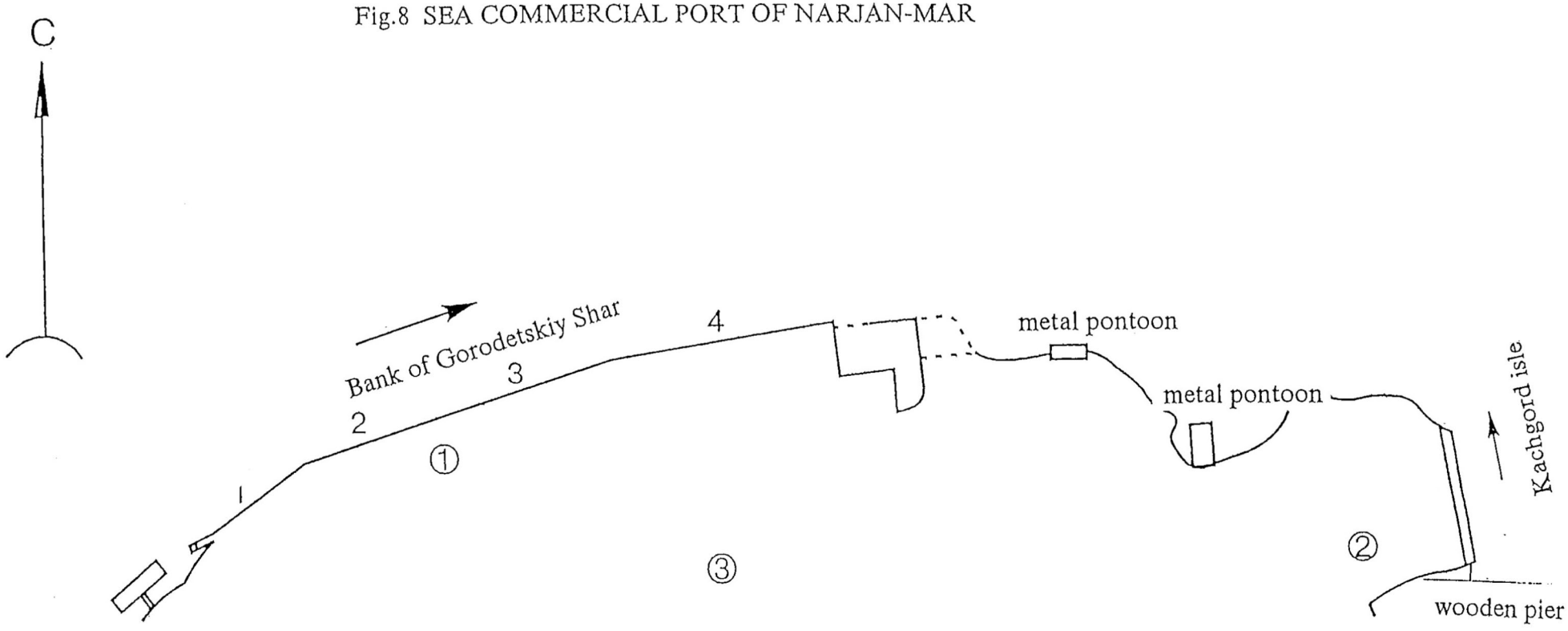
1989 - 196	1992 - 139
1990 - 212	1993 - 81
1991 - 150	1994 - 32

Throughput of the Port of Naryan-Mar

1.000 tons

Cargo type	1992				1993				1994			
	Cabotage		Export	Total	Cabotage		Export	Total	Cabotage		Export	Total
	dispatch	arrival			dispatch	arrival			dispatch	arrival		
Total	20,9	102,5	15,7	139,1	4,5	65,6	10,9	81,0	1,9	24,0	5,8	31,7
including the bulk liquid	-	2,7	-	2,7	-	3,8	-	3,8	-	-	-	-
Dry cargo	20,9	99,8	15,7	136,4	4,5	61,8	10,9	77,2	1,9	24,0	5,8	31,7
including:												
bulk cargo	3,4	10,0	-	13,4	-	4,4	-	4,4	-	3,3	-	3,3
timber cargo	4,1	3,4	15,7	23,2	-	0,9	10,9	11,8	-	0,6	5,8	6,4
general cargo	13,4	86,4	-	99,8	4,5	56,5	-	61,0	1,9	20,1	-	22,0

Fig.8 SEA COMMERCIAL PORT OF NARJAN-MAR



①- Cargo places
②- Wood processing plant
③- Port Administration's building

Piers:

1- to receive vessels of the NSR
2 - to receive vessels of the NRSC
3 - to receive vessels of the PRP
4- to receive the port fleet

1.7. PORT OF IGARKA

Port application

The port is destined for transhipment of timber cargoes (saw logs and lumber) from river vessels to sea-going ships coming from berths and timber mills. The river vessels transport timber cargoes to Igarka from upper reaches of the Yenisei and Angara rivers.

Basic production assets

The port of Igarka has a vertical type quaywall of 510 m overall length and a depth which allows to call the vessels having a draft not more than 6,4 m at low water.

The plot plan of the coastal and roadstead berths (with a possibility of further development) is given in Fig.9.

The sea-going vessels with more draft partially are loaded at the berth and then are completed at roadstead by using 5 t floating cranes. The coastal berths are equipped with 5 tons gantry cranes. The timber is shipped in bundles, mainly.

To transport workers and crews to the roadstead (vessels) or to shore the passenger river launches are used, for berthing, the tugs.

Throughput of the port of Igarka

In general the port is destined for shipment of export timber. The shipment volumes during the last reported years are illustrated by the following findings:

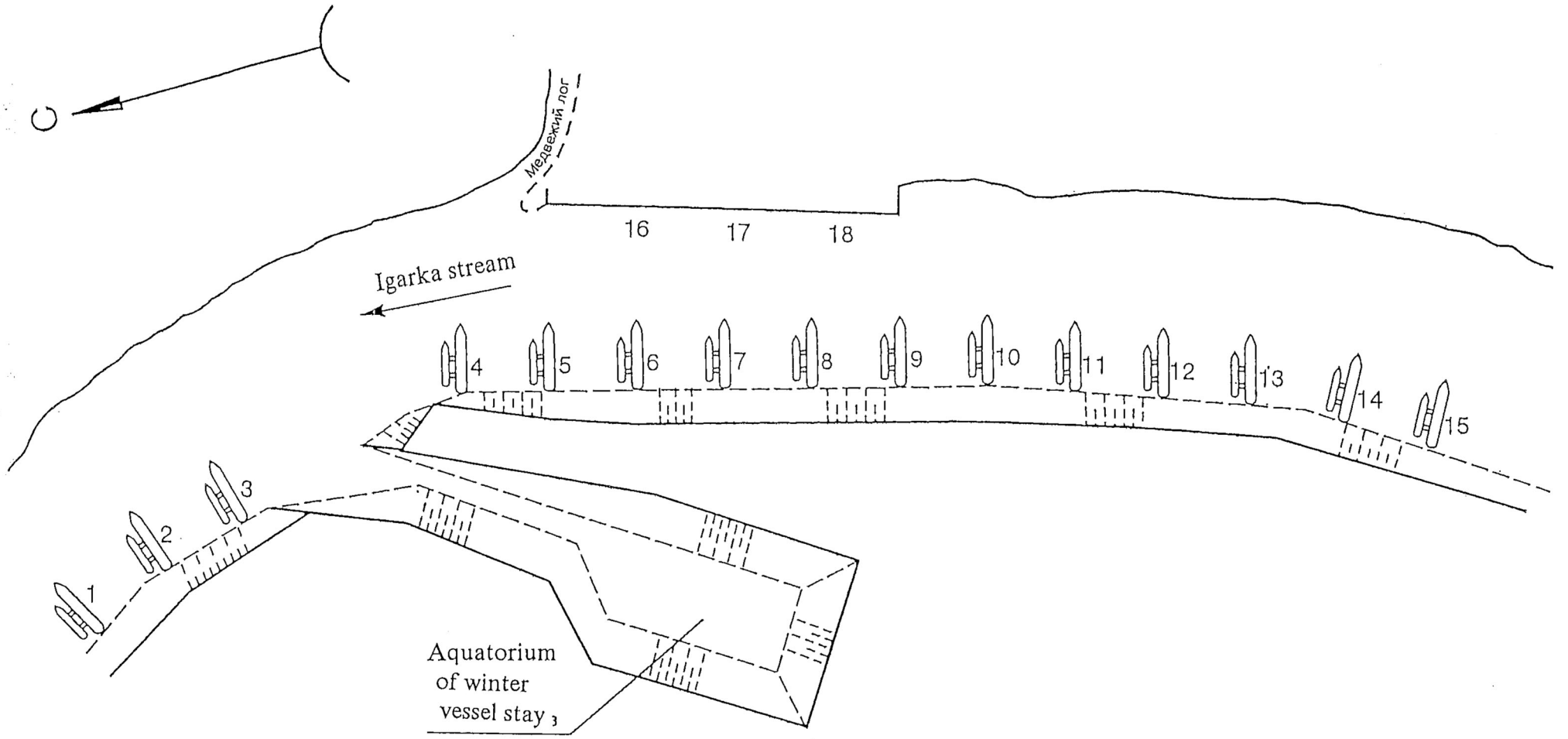
1.000 tons

	Total	incl. for export
1990	710,7	703,1
1991	360,7	347,8
1992	218,8	247,2
1993	229,1	229,0
1994	129,5	129,5

As this data shows , since 1991 the export timber volume was reducing sharply and in 1994 reduced almost five times as compared with 1990.

In general the export timber cargoes are transported by vessels of the Northern Shipping Company.

Fig.9 PORT OF IGARKA



PIERS: 1-15 - roadstead
16,17,18 - wood

1.8. PORT OF PROVIDENIYA

Port application

The major function of the port is to unload cargoes delivered for the enterprises of the ProvidenskiyDistrict.

The port is open for calling of foreign ships.

Basic production assets

Plan-scheme of the port is presented in fig. 10.

Berth front includes cargo and auxiliary piers with total distance of 630 m: two cargo piers of 370 m long and 10m deep, one cargo pier of 140 m long and 7,5 m deep and one oil pier. Other piers are auxiliary. Rail ways for cranes with 10,5 m wide are laid on cargo piers.

Deep water piers are kept at a good technical state, other are in satisfactory one.

Oil base consists of 5 stores (3500 cu.m.) - for light and 2 stores (8000 cu.m.) - for dark fuel kinds. Besides, there is a open storage of 1375 cu.m. for oil products in tares.

Throughput of the port

Troughout capacity of the port is estimated at 370,000 ton for a navigation.

List of complex services for transit vessels embraces only necessary minimum:

- fuel/oil bunkering, water and food supply, releasing dirty water, submerged survey, hull small and propeller group repair, pilotage, tug and road boat service, etc.

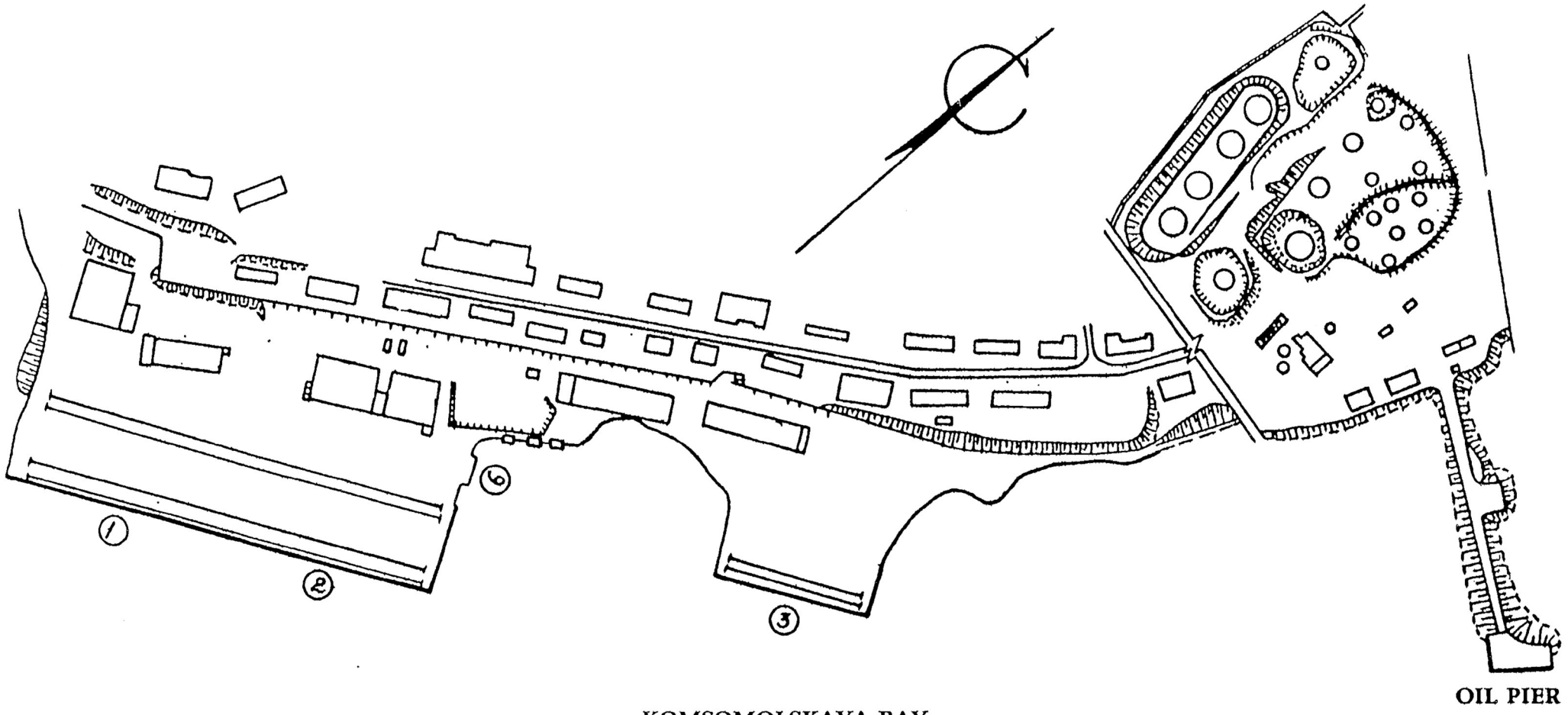


Fig. 10 . SEA PORT PROVIDENIYA

Supplement 2

PERSPECTIVES OF DEVELOPMENT OF REGIONAL PORTS

To provide for the export of increasing volumes of production from the Northern and Arctic regions of Russia and delivery of construction cargoes and food, reconstruction of existing and creating new ports in the Northern and Eastern regions of the country is suggested.

2.1.BULK OIL PORT IN THE TOWN OF PRIMORSK

The length of berthing is 2035 m (3635 m - in perspective) with depths up to 30 m. The round-the-year exploitation of the port is provided. The complex incorporates:

Hydrotechnical constructions:

- an open jetty and 3 piers (4 berths) for discharging oil and oil products;

- an open jetty and 2 piers (6 berths) for discharging liquefied bulk cargoes (including loading chemicals in bulk);

- 3 berths for overloading general cargoes;

- 3 berths for harbor craft.

Shore objects:

- and oil depot with complete set of equipment and services; storage volume is 1500000 cu.m.;

- liquefied gas and liquid chemicals depot with complete set of equipment and services; storage volume is up to 2 mln.cu.m.

Transport access:

-construction of a railway station near the port and reconstruction of railway approaches 115 km long;

- laying out a two-way pipeline for transporting oil products from Torzhok, 800 km long;

- laying out a two-way pipeline for transporting oil products from Yaroslavl via Kirishi, 900 km long, with pipe diameter 426 mm.

The length of berthing is 990 m with depths up to 14 m. The year round exploitation of the port is provided. The complex incorporates:

The port complex incorporates:

-aquatorium with approach canal;

- protective constructions, 2000 m long;
- two oil piers, 275 m long with depth 14 m;
- a jetty, 125 m long with depth 7.5 m;
- a loading berth for general cargoes, 325 m long with depth 11.5 m;
- a berth for auxiliary vessels, 250 m long with depth 7.5 m;
- a boat berth, 50 m long with depth 5 m;
- a shore warehouse and open-storage areas for general cargoes;
- utility and working buildings.

The shore constructions include:

- an oil depot stock;
- railway zones for discharging oil products from tank cars;
- pump stations for taking oil from tank cars and delivery to berths;
- industrial pipelines for transporting oil products along the territories of oil depot and the port.

2.2. BULK OIL PORT IN THE BATAREYNAYA GULF

The Batareynaya Gulf is 60 km from St. Petersburg.

The port is able to accommodate ships of 40000 tons deadweight. The length of berths is 990 m with depths up to 14 m. Year round work of the port is provided.

The port complex incorporates:

-aquatorium with approach canal;
- protective constructions, 2000 m long;
- two oil piers, 275 m long with depth 14 m;
- a jetty, 125 m long with depth 7.5 m;
- a loading berth for general cargoes, 325 m long with depth 11.5 m;
- a berth for auxiliary vessels, 250 m long with depth 7.5 m;
- a boat berth, 50 m long with depth 5 m;
- a shore warehouse and open-storage areas for general cargoes;
- utility and working buildings.

The shore constructions include:

- an oil depot stock;
- railway zones for discharging oil products from tank cars;
- pump stations for taking oil from tank cars and delivery to berths;

- industrial pipelines for transporting oil products along the territories of oil depot and the port.

2.3. DRY CARGO PORT IN UST' LUGA

The port is able to accommodate ships of up to 70000 tons deadweight. The planned length of berths is 7700 m with depths of up to 15.7 m. The port will perform on round-a clock and round a-year principle.

The port incorporates the following complexes:

- handling general cargo;
- handling timber cargo;
- handling containers and Ro-Ro ships;
- handling grain cargo;
- handling raw sugar cargo;
- handling liquid bulk cargo;
- - an automobile crossing;
- a railway crossing;
- the passenger complex.

2.4. DRY CARGO PORT OF LOMONOSOV

Construction of 4 berths 700 m long with depths of 12.2 m is planned. Total length of berth - 205 m. The port will be functioning all the year round.

Construction of the port is scheduled by stages.

The 1st stage is designed for the annual turnover of 700000 tons.

Metals will be the main cargo for the handling in the port.

Supplement 3

THE PORT OF DUTCH HARBOR, THE UNALASKA ISLAND, USA

Port and harbor engineering structures

3.1. Deepwater cargo terminals

There are two main terminals for handling ships of big drought. The dock of the APL (American President Line) company is situated on the coast of the Iliuliuk Bay and serves linear ships bound for Asia from the USA Western coast. The dock may handle the most big container ships, functioning presently in international trade. Now the dock is being modernized and equipped additionally by the second container crane, the dock itself being widened.

UMS (Unalaska Marine Centre) incorporating the Balluhoo Dock owns a berth with one crane. The Sea Land Services company has got a preferential agreement on using the berth, and presently the linear ships sailing from the USA Western coast to Asia, container ships rotating in the direction Takoma - Kodiak - Ancoridge, as well as feeder ships and barges of other lines, but providing services of the SLS company are handled at the berth. The 2nd berth of the UMS is used for loading and discharging fish and oil products to and from the cisterns placed nearby. This sea terminal is owned by the Unalaska authorities.

3.2. Other sea terminals

There are a number of privately owned terminals serving the trade. They include bulk oil berths, facilities for fish receipt, loading facilities, berths of facilities of different kinds of supply and ship repair. The comprehensive list of berths in the region of the Unalaska Island - Dutch Harbor port, including their characteristics, forms of ownership and assignment is given in the Ports of Alaska: and some other publications issued later. General list of berths and their disposition are shown in Figs. 2-3. Short description of the port's facilities is given below, beginning with the South-Western point of the Captains Bay and throughout to the end of the hydraulically deposited sand bar of the Dutch Harbor port.

The Offshore Systems, Inc. (OSI) exploits two berths near the end of the Captains Bay known as the Tanner Landing. The berths are of the latest design, where flat railway car frames and steel piles are used. At each side of the effective length of the berth. These multipurpose berths are designed for loading and discharging tinned products and may handle other needs of merchant marine.

Further along the Southern coast of the Captains Bay the main complex of OSI is placed. The complex handles any needs of the fishing fleet including bunkering by fuel and lubricating oil and water, rendering telephone communication service, leasing warehouses with necessary equipment, freezers and refrigerators, expedition and storage of cargo, and its loading and discharging by the berth's loading facilities. Some other auxiliary teams are functioning at the berth.

The Crowley Maritime company acting through its subsidiary Pacific Alaska Fuel Sales (PAFS) owns the next port's facility on the Captain's Bay coast. It supplies fishing boats with fuel oil, lubricants and renders other services. The latter includes storage, leasing warehouses and living quarters.

The Walashtk Industries company owns a slip and repair ship for boats residing in the Iliuliuk Harbor. The slip capacity is 318 metric tons. Here also a land piece is rented for placing housings and shops.

The harbor for small-sized craft is owned by the town of Unalaska. It accommodates 511 m of berths, used for mooring boats 4.6 and 12.2 m long. But there are also several berths for mooring boats with the length of 18.3 m.

The next port's construction along the Iliuliuk Harbor shore adjacent to the Unisea Plant is the Galaxy Dock owned by the Universal Seafoods company. Here ships of the Galaxy type visiting the port may moor and be loaded and discharged of any general cargo any time of the year.

Processing plant Unisea Plant boasts a wide berthage which extends over the whole length of the plant. The Unis berth is used mainly in the inherent technological operations, such as loading and discharging fishing ships and shipment of ready products by tramps.

Presently there are no berths in the Margaret Bay, but in future a berth may be constructed and conditions for handling sea ships created.

The Royal Aleutian Seafoods company uses a processing vessel moored between two piers in the Iliuliuk Harbor. The seaward board of the vessel is used as a berth for loading or discharging fish and ready products. The company is going to widen its piers and provide therewith an additional berthing front.

The East Point Seafoods company, to ensure its technological operations, uses the berth of its processing plant. Constantly barges are moored tot he East Point berth owned by the company's fish-processing plant. These mooring facilities and the Alaska Plant are placed on the opposite sides of the narrow throat of the Iliuliuk Harbor.

The Alaska Seafoods company berth is directly opposed to the East Point berth. The berthage extends over the entire perimeter of the fish-processing plant and equals to 277 m. The berths are mainly intended for providing technological operations of fish processing. Coastal ships delivering supplies and trumps receiving ready products are moored at the berth.

The berths of the FPL company have been mentioned above. The company expands the process of enhancing its possibilities at the expense of increasing the berthing length and installing a big crane. Additionally a warehouse designed for storing dry cargoes for the fishing fleet or some other purpose is being under construction now.

The next on the Iliuliuk Bay coast is the berth of the Delta Western Fuel company. It is used solely for bunkering.

The next berthing facility along the Dutch Harbor coast is the Unalaska marine Center, known formerly as the Dilyhoo berth. It can be added that the facility includes a new warehouse across the road to the berth, the warehouse having been built by the Petro Marine company. The town of Unalaska and other organizations rent spaces in the warehouse.

Moving further in the direction of the Dutch Harbor Mountain we come across the Magone Marine berth. The latter uses two constantly moored barges for repairing business.

The Trident Seafoods company owns a berth and warehouse placed further behind the Magone Marine. The facilities are used as auxiliary for the Trident Plant situated in Akufan.

Adjacent to the berth of the Trident Seafoods company is that of the Petro Marine company which is mostly used for bunkering ships.

The Delte Western company uses berth for storage of cargoes and equipment, grocery trade, rendering inn services, selling alcoholic liquor, retail trade, repair of fishing nets, repair of machinery, storing nets and other goods. Blue Wave, while working in the Dutch Harbor moors at the Deltata Western Dock berth.

The Marcenco's company is involved in the business of storing canned products. Its berth is at the head of the Dutch Harbor. When the berth is not used for loading or discharging crab cans the company allows other companies to load or discharge general cargoes.

The Icicle Seafoods company periodically handles crab boats in the end of the Dutch Harbor. Crab-processing vessel Arctic Star is moored between two piers, when processing is exercised in the Dutch Harbor. The seaward board is used as a berth for performing technological operations of crab processing.

The last in the list is the Spit Dock owned by the town of Unalaska. It is placed along the coast of the Dutch Harbor in the region of shoal and provides general services of mooring big merchant and fishing ships within the harbor.

3.3 Public sea berthing constructions

At present there are two sea berthing constructions in the harbor owned publicly. The town owns the Spit Dock berth which is a sole berth where ships and boats may moor on both sides of the berth. It is placed on the shoal side, facing the shore between the Dutch Harbor and Iliuliuk Bay. Big merchant and fishing ships may stand there for short and long periods of time. The town also owns a haven in the Iliuliuk harbor for small craft, accommodating boats with the lengths of up to 18.3 m.

Supplement 4

SHORT CHARACTERISTICS OF BASE PORTS OF THE PRIMORYE REGION

(Vladivostok, Nakhodka, Vostochny, Vanino)

The base ports of the Far East are of importance for performing the carriages in the East Arctic Sector.

These ports are concentrators of the Arctic cargo traffic in the internavigational period and navigation period. Through these ports, 60-68% of the Arctic cabotage are transhipped.

General cargoes are sent from the ports of Vladivostok, Nakhodka, Vanino, cargoes in large-tonnage containers - from the port of Vostochny while oil products are forwarded from the Nakhodka oil-bulk port (see fig. 11-14).

In addition to the basic southern ports, the ports of Magadan (general cargoes) and Beringovsky (coal) take part in creation of the Arctic cargo traffic.

In the present paper, the southern ports of the Region having an access to the railway are of greatest interest.

General feature of these ports is that they are the joint- stock companies. In addition, the marine port authorities were created in these ports.

Vladivostok, Nakhodka, Vanino are the specific-purpose ports and they have all-purpose berths. The port of Vostochny is a general-purpose one and has both all-purpose and specialized berths (coal, container and wood chips transhipment complexes).

Characteristic peculiarity of the ports mentioned is their full interchangeability. This is favoured by the connection of the ports with the railway along which the cargoes are delivered. from the Central Russia as well as by the equipping of the berths with the cranes.

The base ports provide a complete complex servicing of the ships including taking in fuel, water, oils and supply with foodstuffs, equipment, etc.

Not only direct voyages of the transport vessels are carried out to the Chukot-Arctic ports but also rotating voyages to a. number of ports and voyages of the vessels-suppliers to the points with non-equipped coast.

Brief description of these ports is presented in Table 4.1 and that of cargo traffic in Table 4.2.

Table 4.1

Brief characteristics of base ports

Name of port	Property Specialization	Shipping season	Berths,		Depth,	Installed capacity,	Storages, thousands sq. m	
			quantity,	length, m	m	thousands tons	total	incl.open
Vladivostok	Jont stock company, universal	all the year round	24/12	3995/2563	7,75-13,0	4120,0	194,4	138,0
Nàkhodka	the same	the same	23/18	3616/2890	9,75-11,5	6050,0	288,1	174,9
Vostochny	Joint stock, special	-"-	18/15	3671/3210	8,25-16,5	17560,0	475,1	465,5
Vanino	Joint stock, universal	-"-	22/21*	3035/2869	6,5-9,75	13440,0	190,6	159,3

* Including terry births 244 m/

* Including terry births 244 m.

Table 4.2

Structure and actual freight flows by commodity base ports (thousands tons)

Title Cargo	1992				1993				1994			
	Export	Import	Cabotage	Total	Export	import	Cabotage	Total	Export	Import	Cabotage	Total
Vladivostok												
Total	835,2	1710,3	1270,7	3816,2	1644,9	1155,6	1025,8	3826,3	2711,8	1197,3	566,4	4475,5
Liquid	-	-	-	-	-	-	-	-	-	-	-	-
Dry	835,2	1710,3	1270,7	3816,2	1644,9	1155,6	1025,8	3826,3	2711,8	1197,3	566,4	4475,5
Bulk	58,1	168,5	-	226,6	13,1	190,0	0,4	203,5	8,2	52,8	14,9	75,9
Grain	-	1306,2	18,2	1324,4	-	677,9	2,9	680,8	-	964,0	0,3	964,3
Timber	7,5	-	19,0	26,5	23,7	5,4	5,8	34,9	31,5	-	4,9	36,4
Gånåràl	769,6	235,6	1233,5	2238,7	1608,1	282,3	1016,7	2907,1	2672,1	180,5	546,3	3398,9
Nàkhodka												
Total	3746,2	961,3	418,4	5125,9	5320,9	458,7	122,5	5902,1	5867,2	207,3	29,1	6103,6
Liquid	-	-	-	-	-	-	-	-	-	-	-	-
Dry	3746,2	961,3	418,4	5125,9	5320,9	458,7	122,5	5902,1	5867,2	207,3	29,1	6103,6
Bulk	88,7	108,9	114,4	312,0	11,4	69,6	-	81,0	8,8	84,9	1,6	95,3
Grain	-	684á4	21á2	705,6	-	162,2	-	162,2	-	-	-	-
Timber	991,6	-	-	991,6	1147,4	1,3	1,8	1150,5	992,1	-	0,5	992,6
General	2665,9	168,0	282,8	3116,7	4162,1	225,6	120,7	4508,4	4866,3	122,4	27,0	5015,7

Cont. Table 4.2

Title Cargo	1992				1993				1994 ã.			
	Export	Import	Cabotage	Total	Export	Import	Cabotage	Total	Export	Import	Cabotage	Total
Vostochny												
Total	5409,7	628,6	1187,4	7225,7	6462,7	540,6	901,0	7904,3	7060,2	463,7	67 6,9	8200,8
Liquid	-	-	-	-	-	-	-	-	-	-	-	-
Dry	5409,7	628,6	1187,4	7225,7	6462,7	540,6	901,0	7904,3	7060,2	463,7	676,9	8200,8
Bulk	-	-	-	-	-	-	-	-	-	-	-	-
Timber	532,0	-	-	532,0	645,5	-	4,7	650,2	299,7	-	-	299,7
Gånåràl	756,2	628,6	358,1	1742,9	1132,0	540,6	234,3	1906,9	1362,7	463,7	152,5	1978,9
incl. transit	411,3	333,3	-	744,6	373,3	256,3	-	629,6	292,8	124,5	-	417,3
Vànino												
Total	1857,0	102,5	5756,6	7716,1	2682,9	221,5	4128,6	7033,0	3749,9	469,4	2711,7	6931,0
Liquid	-	-	4,6	4,6	-	-	4,5	4,5	34,5	-	82,5	117,0
Dry	1857,0	102,5	5752,0	7711,5	2682,9	221,5	4124,1	7028,5	3715,4	469,4	2629,2	6814,0
Bulk	279,5	-	968,4	1247,9	244,4	37,1	496,1	777,6	174,6	264,2	485,0	923,8
Timber	1264,8	-	101,6	1366,4	1250,8	-	56,0	1306,8	1715,1	-	9,7	1124,8
Gånåràl	312,7	102,5	4682,0	5097,2	1187,7	184,4	3572,0	4944,1	1825,7	205,2	2134,5	4165,4

Notice : There are not included volumes of the oil cargoes, exempt port of Vanino

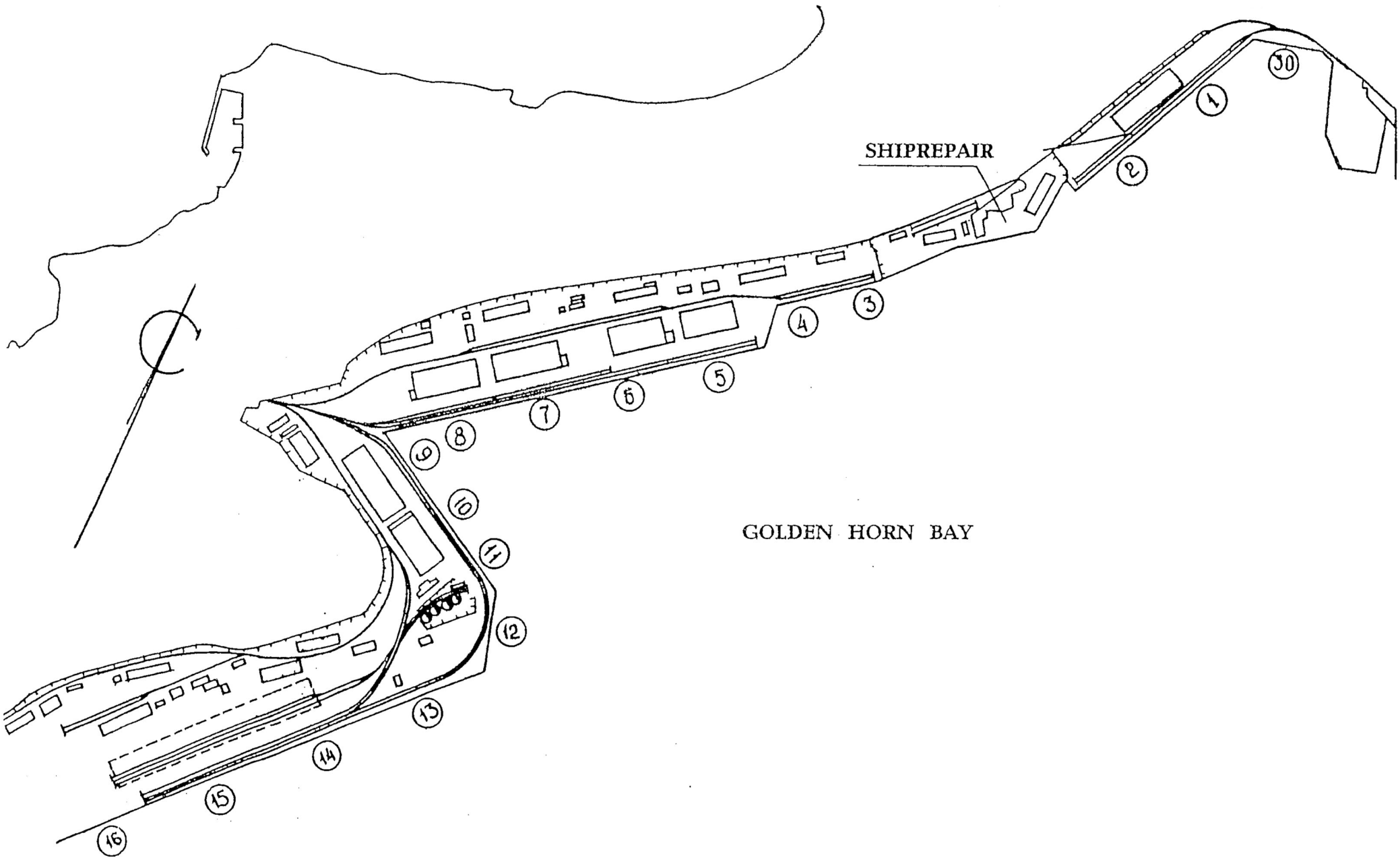


Fig. 11 SEA PORT VLADIVOSTOK

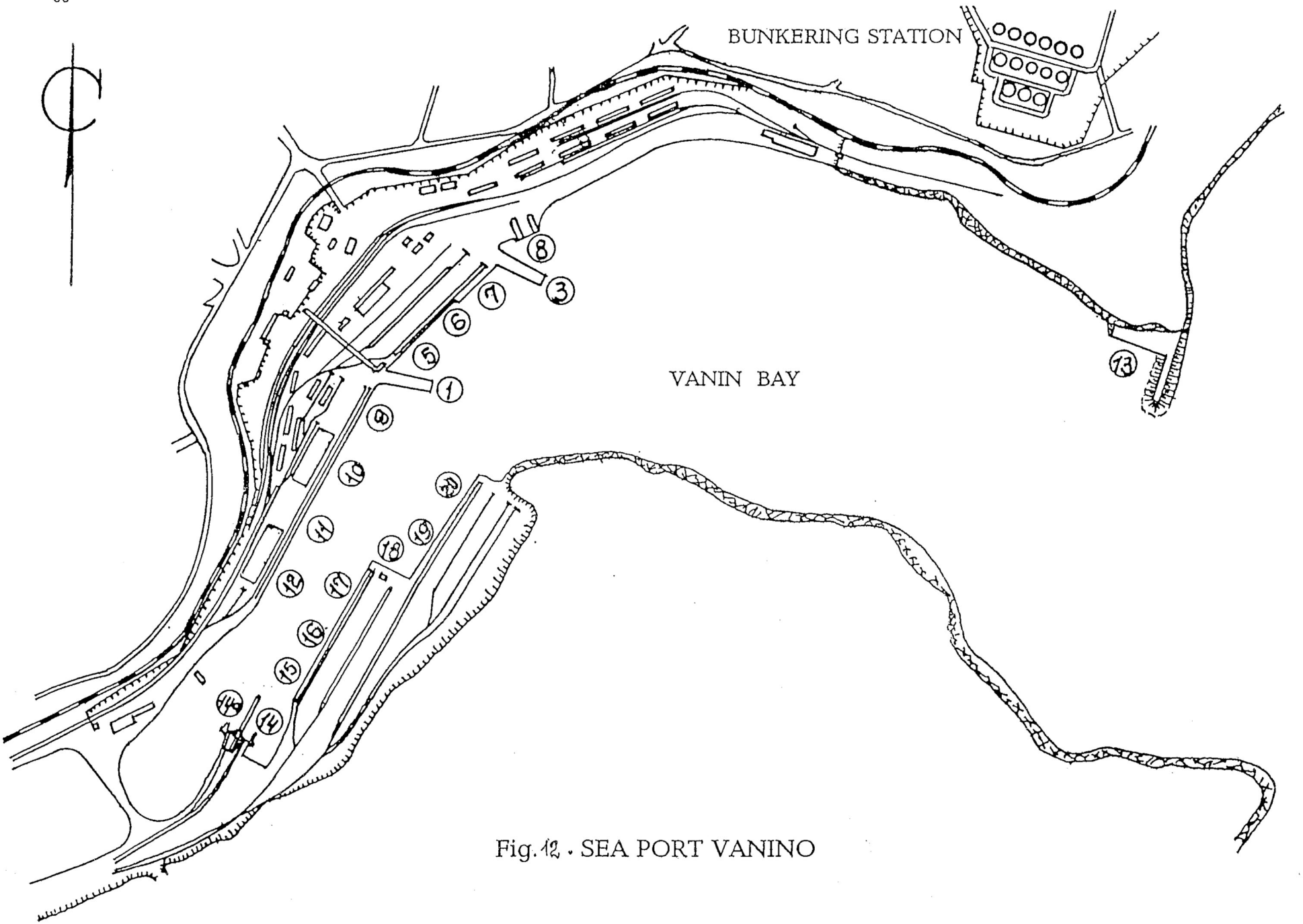


Fig. 12 - SEA PORT VANINO

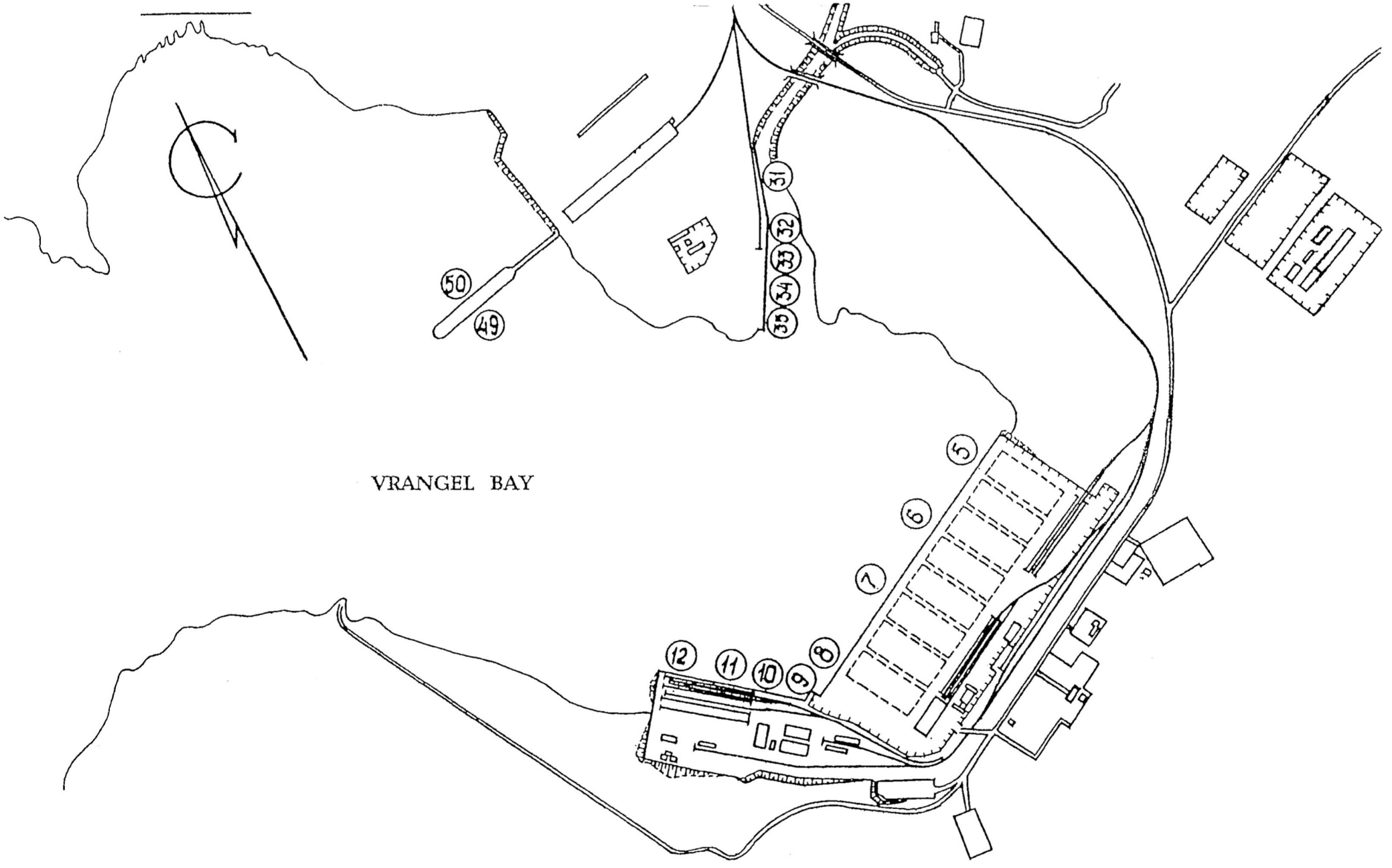


Fig.13. SEA PORT VOSTOCHNY

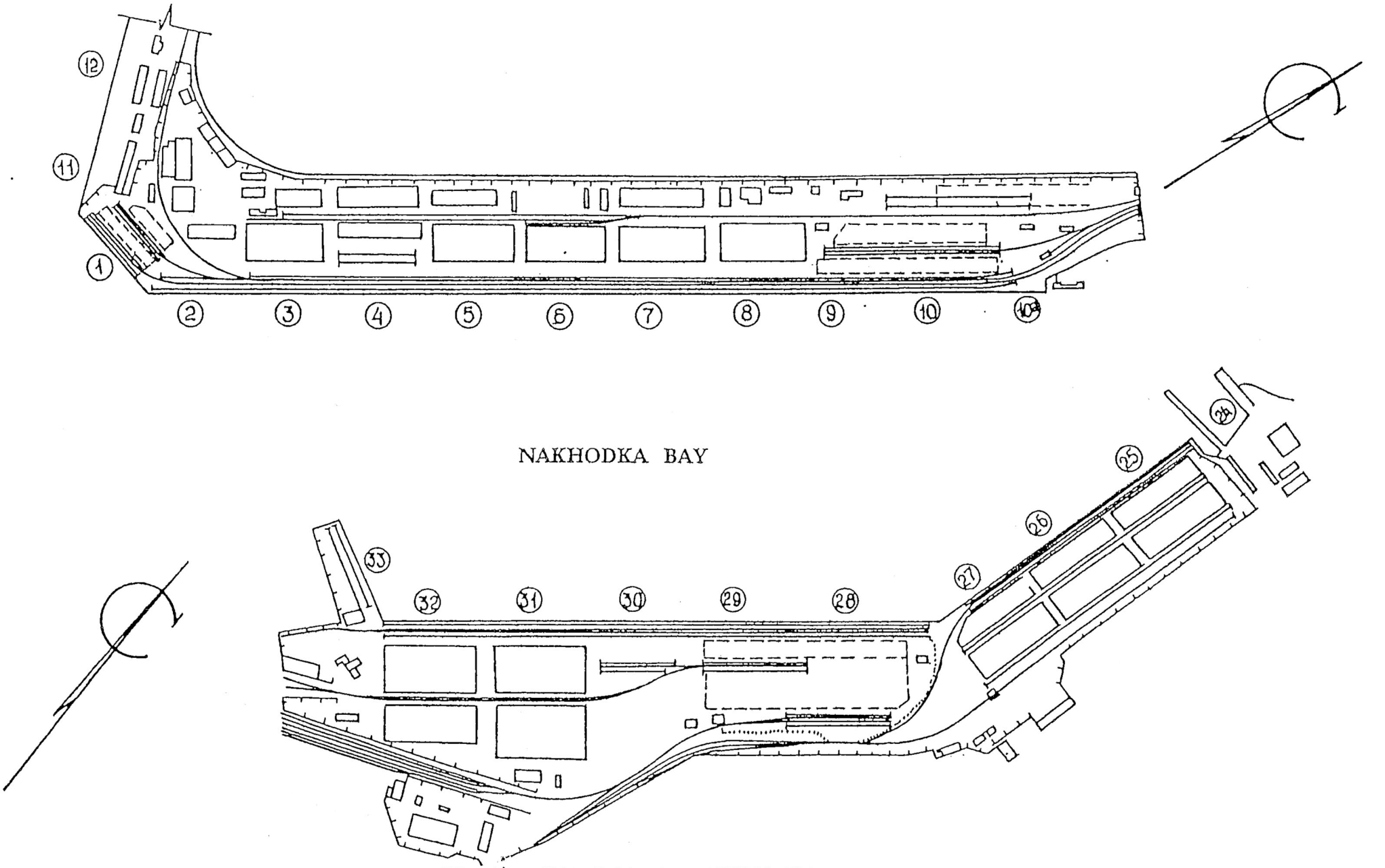


Fig. 14 · SEA PORT NAKHODKA

Reviewer's Comments

By H.A. Lavooij,
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The Netherlands

1) General

The paper gives very interesting information about a very unknown area, with much potential for the future.
It gives a very good description of the physical situation in the ports. The transport economic aspects however, such as origin-destination of cargo, hinterland connections and forecasts per commodity, based on macro economic projections are under-exposed.

In chapter 1 it is explained how complicated a forecasting analysis is. It is also important to get an overview of the ports, the regions, the industrial areas. A map indicating all mentioned names of the ports and areas, like figure 15 with more details and hinterland connections would be very useful.

2) Introduction

The problem in phrase 1 is not fully understood and not very positive to start with. Our suggestion is to start with a more positive phrase like e.g.:
For the development of the rich reserves in the Northern region of Russia, the development of Russia's Arctic Sea Basin ports are of utmost importance and are one of the greatest challenges in the worlds ports and transport business. We suggest to include a brief description of the article's content and leave most of the figures for the appendix.

3) Perspectives of Traffic Development

A map indicating the location of the areas would be very useful. If forecasting of the traffic volumes is difficult, it would be useful to give more emphasis to the present situation and include throughput or transport volume figures, especially origin destination figures per commodity.

The subject of chapter 1.2 is very interesting but not very relevant for this article.

4) Perspectives of Development of Regional Ports

The chapter contains several lists of present and future facilities to some ports. We suggest to leave the details to the supplements. In the supplements however very interesting subjects are discussed which are very useful to be included in the article, like e.g. the first two pages of supplement 1 and many aspects in supplements 2 and 3.
The general recommendation is to leave the details to the supplements and to abstract the most important and interesting issue from the supplements into the article.

Although the subject is very interesting and the paper and appendixes include a lot of interesting information, we feel that a final editor who would re-write the subjects in order to make an integrated and comprehensive piece would significantly improve the editing quality of the article.

I realize that the above comments are very short. Due to assignments abroad and a busy agenda, I see no possibility to pay more attention to this subject.

H.A.Lavooij,
06.03.1997

Authors' answer to comments of Mr. H.A.Lavooij

We sincerely appreciate You for valuable suggestions and remarks which helped us to improve the structure and contents of project III.02.2. on each section.

In accordance with your proposals and notes, we have put in the following corrections and additions:

- revised first section "Introduction";

- included the map indicating the majority of ports mentioned in the report and hinterland connections;

- edited the report abstracting the details and tables to the supplements from the text , and vice versa;

- tried to explain what the reason is to include chapter "Transit transportation along the NSR" into the report.

However, we see great difficulties to completely answer your following comments

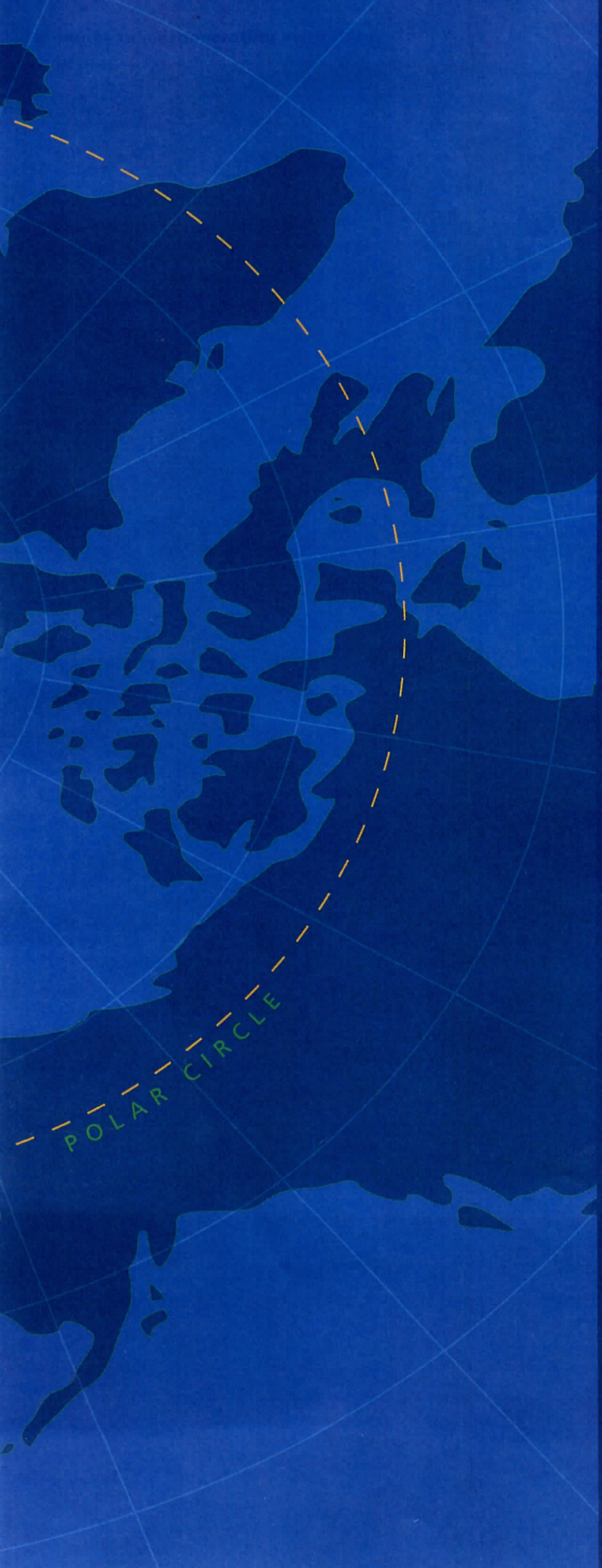
"...The transport economic aspects however, such as origin-destination of cargo, hinterland connections and forecasts per commodity, based on macro economic projections..." which You wish to find in section 3) Perspectives of Traffic Development.

Cargo origin questions for the period of economic reforms became considerably complicated because fulfillment of the order on cargo supply to the regions of the Extreme North is mainly covered by commercial groups at the basis of competition.
A lot of commercial groups are existing for a short time, and it makes impossible to form statistics processing. The majority of orders is not related to traditional shippers and is fulfilled within limited volume.

To some extent (more or less generally), information to cargo origin from particular industrial regions is included in independent projects of an Academician A.Granberg III.1.1, III.1.2, III.2.3, III.7.2.

Forecasting of transportation volumes and description of the present situation in terms of port development and throughput is presented, in our view quite completely, by Lenmorniiproject and CNIIMF for ports of western Russia, as well as by FESRI for ports of eastern Russia in sections 3 and 4 and in supplements 2,3,4, of project III.02.2. However, limited number of ports those open for foreign vessels to call and which is included in the present paper, does not enable us to show entirely hinterland connections and prospects for cargoes based on macro economic projections .

Best Regards
Y.Ivanov, N.Isakov



The three main cooperating institutions of INSROP

Ship & Ocean Foundation (SOF), Tokyo, Japan.

SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Sasakawa Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.

CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.

FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.