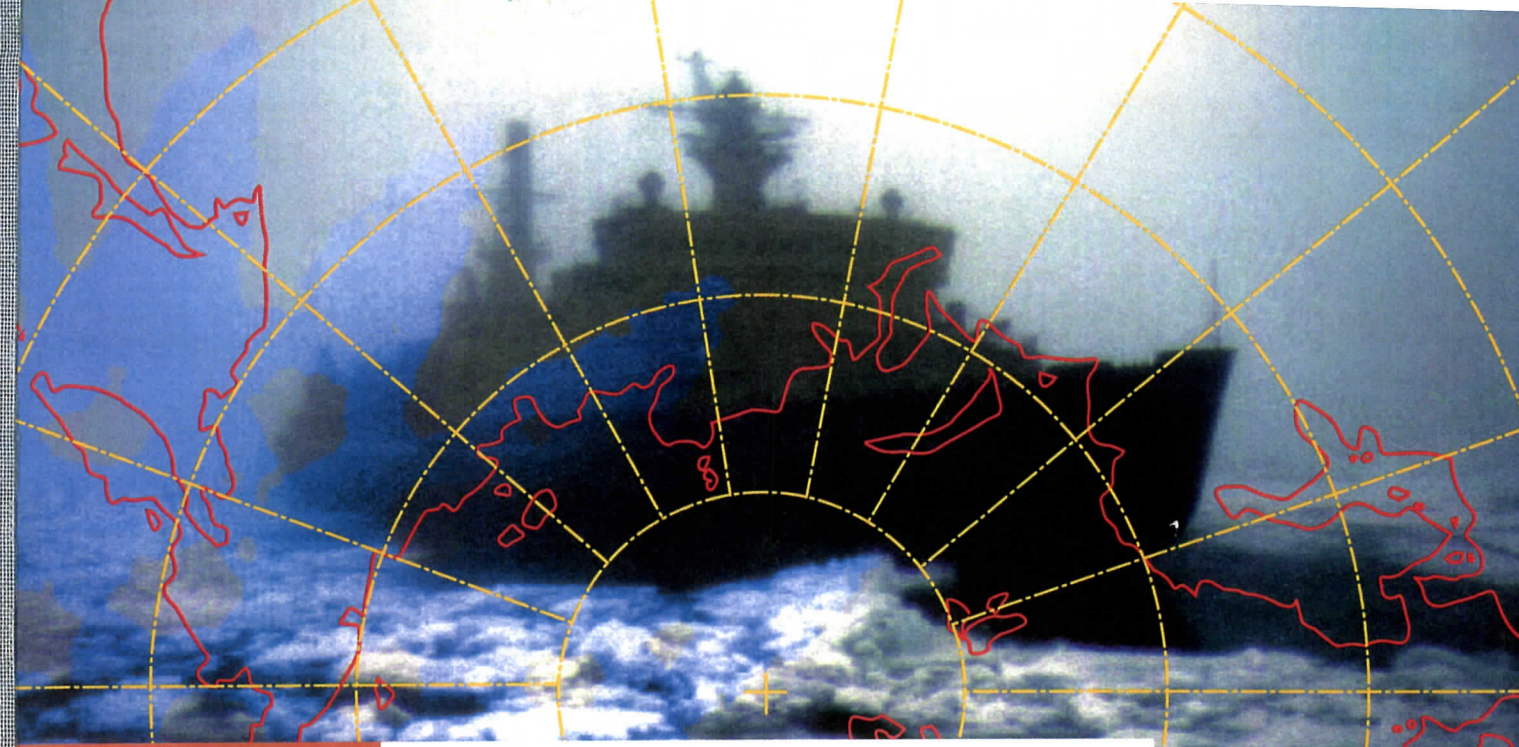

INSROP WORKING PAPER
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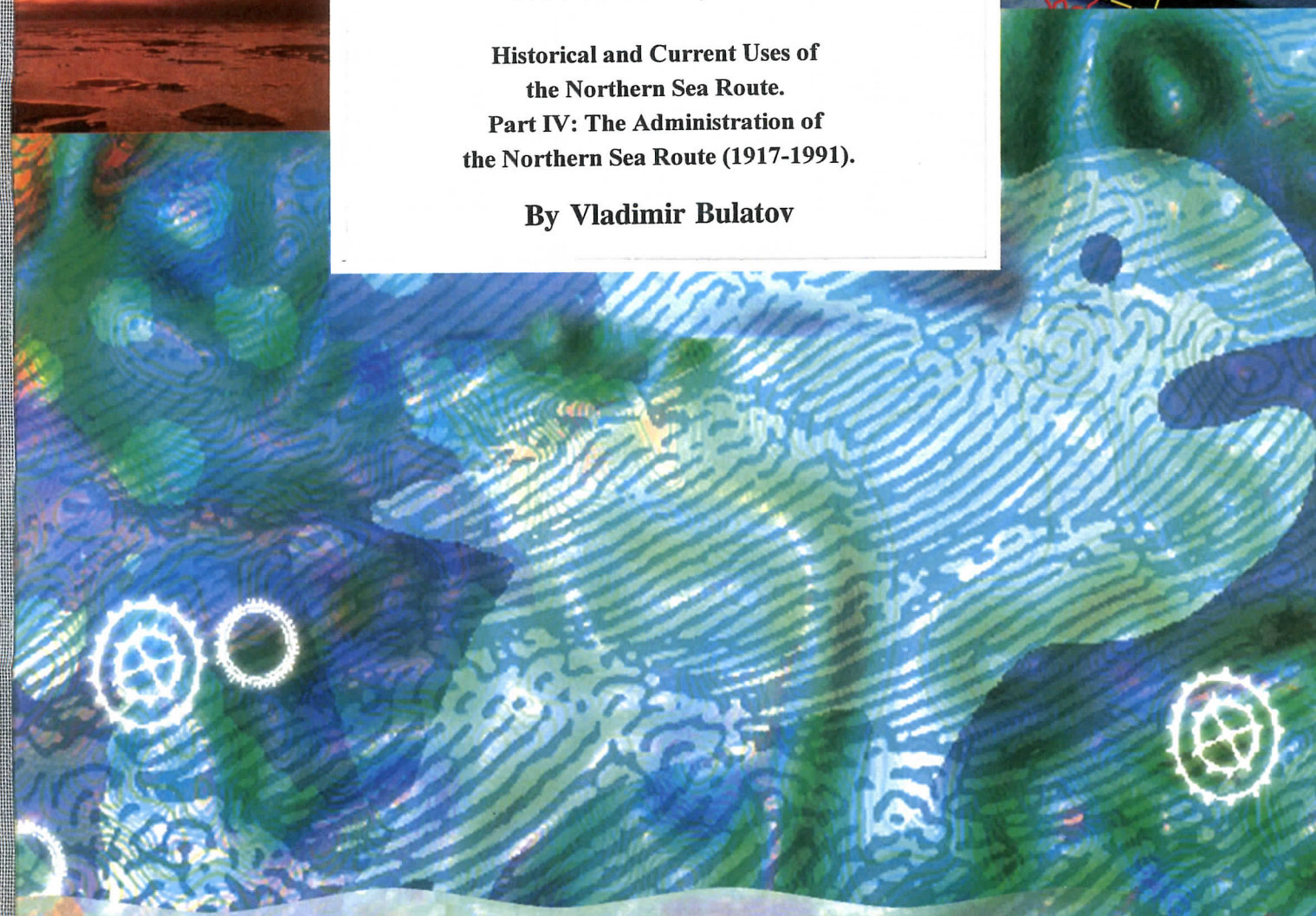
Historical and Current Uses of the Northern Sea Route. Part IV: The Administration of the Northern Sea Route (1917-1991).

By Vladimir Bulatov



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)

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship & Ocean Foundation, Japan

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Title:	**Historical and Current Uses of the Northern Sea Route. Part IV: The Administration of the Northern Sea Route (1917-1991).**
Author:	**Vladimir Bulatov**
Address:	The Pomor International University Prospekt Lomonosova 4 163 006 Arkhangelsk, 6 RUSSIA
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Reviewed by:	Professor William Barr, Department of Geography, University of Saskatchewan, Saskatoon, Saskatchewan, CANADA.

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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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PROGRAMME COORDINATORS

- **Yury Ivanov, CNIIMF**
  Kavalergardskaya Str.6
  St. Petersburg 193015, Russia
  Tel: 7 812 271 5633
  Fax: 7 812 274 3864
  Telex: 12 14 58 CNIMF SU
- **Willy Østreng, FNI**
  P.O. Box 326
  N-1324 Lysaker, Norway
  Tel: 47 67 11 19 00
  Fax: 47 67 11 19 10
  E-mail: sentralbord@fni.no
- **Ken-ichi Maruyama, SOF**
  Senpaku Shinko Building
  15-16 Toranomon 1-chome
  Minato-ku, Tokyo 105, Japan
  Tel: 81 3 3502 2371
  Fax: 81 3 3502 2033
  Telex: J 23704

HISTORICAL AND CURRENT USES OF THE NORTHERN SEA ROUTE

PART IV: THE ADMINISTRATION OF THE NORTHERN SEA ROUTE (1917-1991)

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PART FOUR

Vladimir N. Bulatov

4. THE ADMINISTRATION OF THE NORTHERN SEA ROUTE (1917-1991)

4.1. The Northern Sea Route during the first years of Soviet power.

In part 3 Jens Petter Nielsen concluded that the Kara Sea Route seemed to be ready for large-scale development before the October Revolution of 1917. However, the breakthrough for the route came only after the Revolution with the so-called Kara Barter Expeditions of the 1920s, organized by Russia's new Bolshevik Government and during the 1930s the Northern Sea Route for the first time expanded further eastwards. The Bolsheviks were helped by a warming climate, which resulted in many favourable ice years along the coast of Northern Siberia. At the same time there is little doubt that the Bolsheviks' general approach to the problems of the Arctic was crucial.

During the first years of Soviet power the new Government feverishly sought a way out of the country's serious political and economic crisis. In the course of the First World War and the Civil War which followed it, industry and transport systems had been destroyed, agriculture was in a state of neglect, and famine threatened. Radical measures were needed to find sources for the finance which was essential for the rebuilding of industry, transport and agriculture; to find an outlet for foreign trade onto the world market; and to supply the population, who had experienced terrible suffering during the war in European Russia, with Siberian grain.

And so the leaders of the Russian Communist Party and the new government (The Council of People's Commissars) very soon turned their attention to the northern and Siberian territories, whose natural riches they knew only too well from having served sentences as political exiles under the Tsar's autocracy. From the very first years of Soviet power, research was organised in

order to open up the natural riches of the north and transform the immediate prospects for the industrial development of that region of the country.

Among the immediate tasks was the creation of a reliable transport system (sea, river, rail, air and road) and to this end all the scientific forces of the Russian Republic were enlisted. As early as February 1918, only a few months after the October Revolution, the naval hydrographer K.K. Neupokoyev, who was an active participant in hydrographic work on the Northern Sea Route, suggested sending a comprehensive expedition to the western sector of the Northern Sea Route. This suggestion was approved by the authorities in Archangel, and forwarded to the Chief Hydrographic Administration. A thorough programme of scientific research was essential in order to ensure regular maritime communications between the ports of European Russia and the Siberian rivers.

Civic organisations in Archangel were also very much in support of the idea of a hydrographic expedition. An eloquent testimony to this is a letter of March 26th 1918 to the Arctic Ocean Flotilla from the Archangel Society for the Study of the Russian North, a voluntary society which had been founded in 1907 to promote the cause of Northern Russia.

> "... K.K. Neupokoyev's proposal is, thus, highly desirable and we must do our utmost to find the means to make possible the realisation of his idea. If it is not possible to obtain all the necessary funds from one Administration, then we must raise them..."[1]

As a result of Neupokoyev's initiative in June 1918 a plan was put before the Council of People's Commissars for the extensive study and opening-up of the Arctic. The proposal was supported by sailors, approved by the civil and military authorities of the North, and supported by the Chief Hydrographic Administration of the People's Commissariat for Naval Affairs. Lenin issued instructions to transfer the question of the expedition to a Commission consisting of representatives of the Commissariats of Trade and Industry and the Commissariat of Food Supplies.[2] On the 2nd of July 1918 he signed a decree allocating one million roubles to the People's Commissariat for

Naval Affairs, for the purposes of the Hydrographic Expedition.[3]

Thus the first decree on the Arctic to be issued by the Soviet Government was, in essence, a programme for its research and development. Unfortunately, this expedition was not carried out, due to the commencement of hostilities in the North and the establishment of an anti-Bolshevik government in Archangel. However, after the end of the Civil War and War of Intervention, research work in the Arctic was resumed with particular vigour. On the 4th of March 1920 a Government body - the Supreme Council of the National Economy (VSNKh) set up Sevekspeditsiya - the Northern Scientific-Industrial Expedition. It was directed to carry out various scientific research and trading work, and also to coordinate any research undertaken by other organisations in all areas north of the 60th parallel. One of the initiators of Sevekspeditsiya, the scientist R.L. Samoylovich, became its first Director. Among the members of the Scientific Council of the expedition were the President of the Russian Academy of Sciences A.P. Karpinskiy, the geologist academician A.E. Fersman, the ichthyologist Professor N.M. Knipovich, and the President of the Geographical Society Yu.M. Shokalskiy.[4]

In 1921 there were already 23 separate expeditions active in the North of European Russia, with a total of 400 members. New geological discoveries were not long in coming, especially on the Kola Peninsula: coal, copper, oil, fluorite, apatite...[5] The successes were so significant, that in March 1925 F.E. Dzerzhinskiy, the Chairman of VSNKh, signed a resolution transforming Sevekspeditsiya into the Institute for the Study of the North, later reorganised as the Arctic Scientific Research Institute (ANII).

A second Arctic scientific establishment, organised from Moscow, was Plavmornin (Floating Marine Research Institute), which was i.a. meant to resolve the urgent need for food in Soviet Russia by stimulating fisheries in the northern seas. A decree of the Soviet Government dated the 10th of March 1921 and signed by Lenin, stated that the Institute was created "with the aim of carrying out comprehensive and systematic research of the

northern seas, and of their islands and shores, which are now of important State significance".[6]

Departments of biology, hydrography, meteorology and geology were opened within the Institute. The prominent scientist, Professor Ivan Illarionovich Mesyatsev, one of the organisers of the Institute, was appointed as its permanent Head. The base for the Institute's expeditionary work was the city of Archangel.

The Institute's work is inextricably linked with the building of the first scientific expedition ship, the "Persey". A Government resolution provided for the hull of an unfinished Norwegian sealing ship to be handed over to the Institute. The building of the "Persey" took place under the direction of the outstanding Archangel master shipwright Vasiliy Fedorovich Gostyev. They worked round the clock, without sleep or rest, suffering from an acute shortage of raw materials, equipment, and tools. Nevertheless, their efforts produced what was for its day a first-class ship.[7]

The first long voyage of the "Persey" was in June-July 1923 on the route Archangel - Mezen - Kandalaksha - Archangel. The expedition was carried out in a very economical way. Because of the lack of funds for scientific work, the schooner carried cargo destined for organisations in Mezen and Kandalaksha. Payment for shipping this cargo covered all the scientific expenses. Valuable oceanographic research was carried out on the expedition particularly in the Gulf of Mezen. From then on, scientific cruises followed one after the other.[8]

The "Persey" served science for almost 20 years, ploughing through the waters of the Arctic seas. Eighty four scientific expeditions were carried out on her in the northern latitudes. Many famous scientists sailed in her - V.I. Vernadskiy, S.A. Zernov, V.V. Shuleykin, A.P. Vinogradov, N.N. Zubov, M.V. Klenova, and many more. The first captain of this illustrious ship was P.I. Burke, and the crew was made up of Pomors and sailors from Archangel.[9] The work of this floating Institute made a valuable contribution to the study of the seas, and laid a firm foundation for the further growth of Soviet oceanography. Research in meteorology, hydrography, hydrology, geology, biology

and ichthyology, carried out by scientists and members of the Institute, helped to accomplish many tasks pertaining to the national economy.

The study of the Arctic was also carried out by the Polar Commission and the Permanent Commission for the Study of the Natural Productive Forces of Russia (KYePS) of the Academy of Sciences. Much research work was carried out by the Northern Committee of the Russian Geographical Society, under the leadership of Yu. M. Shokalskiy. Other organisations also sent their own expeditions to the North.

The scope of scientific research was growing almost daily, and in May 1920, in Petrograd, the Russian Academy of Sciences held an extended conference on the study of the Northern seas. Among the resolutions was one on the resumption of hydrographic work in the north, and "as a matter of paramount importance for Russia", on the sea route to Siberia. This route should be equipped by the Chief Hydrographic Administration with various warning signs, from simple marker-buoys to radio stations, with the aim of making it into a safe route.[10]

The results were not long in coming. As early as 1918 two administrations (Ubeko-Sever and Ubeko-Sibir) had been set up under the Chief Hydrographic Administration to ensure the safety of navigation in the Arctic Ocean and its seas.[11] On the 29th of July 1920 the Soviet Government for the first time allocated a considerable amount of money to these organisations, altogether more than 40 million roubles.[12] On the 18th of April 1921 a further 12 1/2 million was granted for expenditure on ensuring the safety of navigation, and 15 million for carrying out hydrographic work in the Ob and Yenisey deltas.[13] A painstaking exploration of the course of the Northern Sea Route was started, from the straits of Novaya Zemlya to the ports at the mouths of the rivers Ob and Yenisey, sailing directions and charts were compiled, lighthouses appeared, and the channels and sandbars of rivers were provided with navigational signs.[14]

4.2 The economic significance of research in the northern seas

The first steps of the Soviet Government towards comprehensive research in the Arctic involved consideration not only of the Republic's needs at that particular point in time, but also of long-term prospects. It took into account the fact that wide-ranging research into the natural resources of the outlying northern regions was essential for the overall growth of the national economy in the long run. The study and opening-up of the Northern Sea Route was seen as one of Russia's important national problems. Siberia and the Russian Far East had to play a leading role in ensuring the supply of essential minerals, fuel, timber and other raw materials for industry. The need to develop the natural riches of the north-eastern regions would not only help to satisfy the internal demands of the State, but was also a source of exports. The large-scale export of Siberian raw materials onto the world market was seen as becoming an important item in State income, and its importance in the Russian Republic's budget grew as the ore-extracting industries developed.

For the time being, however, the Soviet Government concentrated its efforts on the resources of the northern part of European Russia because of its more convenient geographical location, and the existence of the railways which had been built prior to 1917. This meant that conditions were favourable for development, first of all of the fishing and timber resources as well as ore. The study and industrial development of the natural riches of the Kola Peninsula started in the 1920s. The world's biggest reserve of apatite - the best and cheapest raw material for phosphate fertilisers - was discovered by a detachment of Sevekspeditsiya, headed by A.Ye. Fersman in the region of the Khibin Massif.[15] Here Khibinogorsk (the present-day Kirovsk) was built during the third five-year plan. The Khibinogorsk apatite-nepheline enriching complex had a yearly output of two million tons of concentrated apatite. Two large complexes, "Severonikel" and "Kolstroy" were built during the same period.

Another central problem for the Soviet Government was fuel.

It was in this context that Lenin showed particular interest in the Ukhta region's oil deposits. Academician I.M. Gubkin has described in his work on Lenin's memoranda how Lenin was obliged to write to the Government on more than one occasion to bring home to them just what the Ukhta region represented. Early in the summer of 1918 a Geological Committee expedition was sent to Ukhta. I.M. Gubkin's optimistic predictions about the presence of oil in the Ukhta region were proved right.[16]

Exploitation of the timber resources in the European North was linked with their reduction in the central and southern parts of Russia. The most important regions for the industrial development of timber were the northern river basins (Severnaya Dvina, Vychegda, Pechora, and Onega), and these vast territories were linked with the Northern and Murman railways. The Karelian ASSR also became an important region for the timber industry.

On the 17th of August 1921 a large self-financing timber company was set up in the European North, the conglomerate "Severoles" (State Association of Timber Industries of the Northern and White Sea Regions)[17], and this made an important contribution to re-establishing the timber industry, and to increasing timber exports from the northern ports. By 1922 more than 420 thousand cubic meters of sawn-timber was being shipped for export out of Archangel and other northern ports. The Chairman of the Board of "Severoles", K.Kh. Danishevskiy, speaking at a Party Conference in Archangel, referred to the fact that the reserves lying in the vaults of Gosbank (State Bank) which guaranteed 50% of the issue of bank notes were deposits from "Severoles". The "Severoles", however, had decided that they should be used for the benefit of the Republic as a whole.[18] In 1921 timber exports from the European North earned a total of 5 million roubles, but within a few years it had reached 36 million.[19] Gradually the European North became the chief source of timber for export, and also supplied the central and southern regions of the Republic.

4.3 The first combined Arctic expedition

1920 saw the first combined Arctic expedition, to rescue the icebreaker "Solovey Budimirovich", originally a Canadian vessel which had been acquired by Russian authorities at the beginning of the First World War. Newly released material from the Naval archives and the archives of the Russian Academy of Sciences throws new light on this unusual expedition, which evoked a wide international response.

In the beginning of 1920, shortly before the Bolsheviks finally took control over Archangel, General Ye. K. Miller, the leader of the North-Russian anti-Bolshevik government sent "Solovey Budimirovich" under the command of John Rekstin, a British subject, from Archangel to Murmansk with military equipment and passengers. Before sailing westwards it was supposed to go to Cheshskaya Guba to pick up a load of fish and reindeer meat at Indiga. On board was also an experienced ice-captain, I.P. Anufriyev. However, the vessel was trapped by the ice and started drifting in the Kara Sea. On the 9th of March 1920, three weeks after the fall and flight of the North-Russian government, an alarming wireless message was received in Archangel from "Solovey Budimirovich". The message was as follows: "By utmost efforts can survive on provisions till July, and on fuel till June. Fear repetition of drift of Brusilov... Urgently request appeal to England, Norway in name of love of fellow men to equip rescue party. On behalf of 85 crew and passengers, Captain Rekstin, Captain Anufriyev."[20]

Despite the fact that the vessel had been dispatched by the White North-Russian Government the recently established Soviet authorities in Archangel took immediate action to rescue the people on board. The Soviet authorities also followed the request to call foreign assistance in the rescue operations, even if no appeal was sent to the British government, which only recently had withdrawn its troops from Northern Russia. However, on the 27th of March a telegram was sent from Archangel to Norway - to the Storting, Fridtjof Nansen and Otto Sverdrup, to the editors of the newspapers "Finmarksposten" and "Social-Demokraten", to

the Norwegian Geographical Society, and to "all and everyone", describing the calamitous situation of the people on the "Solovey Budimirovich" and the impossibility of mounting an effective rescue from Archangel due to the lack of powerful icebreakers and fuel.[21]

In Norway the representative of the Russian Academy of Sciences, Dr. L. L. Breitfuss, set off to see Otto Sverdrup, who, as we know, in 1914-1915 had taken part in the search for Brusilov's and Rusanov's lost expeditions. From Breitfuss' report to the Chief Hydrographic Administration we learn that on the 25th of April the icebreaker "Svyatogor" arrived in Bergen with an English crew. The leader of the expedition, Otto Sverdrup, completed the enormous task of re-manning the icebreaker with a Norwegian crew, and loading provisions and everything necessary for the voyage ahead. There was a crew of 135 sailors, Falck-Muus was appointed captain, and the complement of the expedition included two Norwegian pilots with reconnaissance planes.[22]

The rescue operation was three-pronged: simultaneously with the dispatch of the "Svyatogor" (later renamed "Krasin") to the Kara Sea, an expedition with reindeer loaded with provisions was organised from Obdorsk, and the ice-cutter "Kanada" (later the "Internatsional") was made ready in Archangel.[23] Nikolay Konstantinovich Mukalov was appointed commander of the ship, and the commissar was Prokopiy Timofeyevich Savelyev.[24]

On the 18th of June 1920 the Soviet icebreaker caught up with the "Svyatogor" in the Kara Sea. The meeting between the Soviet and Norwegian sailors was most warm. A contemporary report in the press organ of the Archangel Province Revolutionary Committee and Committee of the Russian Communist Party states that the Norwegian sailors gave a hearty welcome to the Russian sailors.[25] Shortly after this, they located and caught up with "Solovey Budimirovich". Breitfuss described this remarkable meeting:

> "19th June. A happy day. Towards the end of the first night watch we came alongside the "Solovey Budimirovich" to great cries of "hurrah" on both vessels. Two hours later the "Kanada" ("Internatsional") also came up and tied up on the vacant starboard side. It is difficult to relate the details of this joyful meeting. Captain Rekstin and some of

> the passengers came to us and requested Sverdrup and myself to go on board. There, in the passengers' lounge, some heartfelt words were spoken to Sverdrup and myself, and we were presented with curd cheese dumplings, as a substitute for bread and salt... To their good fortune, help arrived in good time, since the Norwegian doctor on board the "Svyatogor", Dr. Rytterager, concluded that in two or three weeks the greater part of the passengers and crew would have been taken ill with scurvy."[26]

The operation for the relief of the "Solovey Budimirovich" was widely reported in the Soviet press. In the period of the economic blockade against Soviet Russia this expedition was one of the first important links in official friendly relations between Soviet Russia and the Norwegian Government or with any Western government. The People's Commissar for Foreign Affairs, G.V. Chicherin, sent a telegram of thanks to Otto Sverdrup. The Norwegian Government also received a communication: "In the name of the Government of Russia we beg you to accept our most humble thanks for your energetic, humane, and disinterested assistance, which cannot fail to promote in the most decisive manner a resumption of friendly relations between our two Governments, bound throughout the centuries by the bonds of our close proximity".[27]

As has been pointed out by William Barr, the expedition to save "Solovey Budimirovich" was also the first Soviet arctic expedition of any kind, as the "Internatsional" was the first Soviet vessel to penetrate into the Kara Sea.[28] In the course of its voyage, this expedition collected significant material on meteorology, and on the temperature distribution at the water surface for different depths, and a considerable number of sea water samples were collected from various depths for chemical analysis. Finally, it brought back a large number of photographic and cinematographic images of Arctic nature, of the characteristics of the ice, and of the main events and daily life of the expedition.[29] "Solovey Budimirovich", soon renamed "Malygin", was to be active in the Arctic for many years.

4.4 In Siberia

The local authorities in Siberia took an active part in the work for the opening-up of the Northern Sea Route, and there is a continuity in this commitment through the changes of governments in the area. It is a fact that during the Russian Civil War Admiral A.V. Kolchak's White Siberian Government (1918-1920) tried to use the Northern Sea Route both for military and economic purposes.

B.A.Vilkitskiy, the former Head of the Arctic Ocean Expedition (see part 3, p. 68), who during the Civil War joined the White cause, advised Kolchak to use the Northern Sea Route for securing supplies for his own army. This idea was very well received by Kolchak (himself an old polyarnik) and his Siberian government, which also wanted to turn the Kara Sea Route into a trade route between "liberated" Siberia and Western Europe. A Committee for the Northern Sea Route was established by the Siberian Ministry for Trade and Industry, and from July 1919 it was headed by S.V.Vostrotin, the well-known Siberian liberal politician and proponent of the Northern Sea Route during the last years of Tsarist Russia (see part 3, p. 77). Even Jonas Lied, the Norwegian organizer of Kara Sea expeditions in the period 1912-1917, turned up in Kolchak's entourage. The British government declared its readiness to help organizing the route, and in March 1919 Jonas Lied set off from Omsk to the United States to pave the ground for the project there. However, very little came of these plans, basically because of the briefness of Kolchak's regime.[30]

In February 1920, after the fall of Kolchak's government, a Soviet Government resolution established the Siberian Revolutionary Committee (Sibrevkom) as the highest organ of Soviet power in Siberia. A telegram from the Sibrevkom to Lenin informed him that by the 2nd of April 1920 a government agency had been formed under its auspices to administer the Northern Sea Route. It was called the Committee of the Northern Sea Route (Komitet Severnogo Morskogo Puti). The Committee's tasks were, among other things, to organise barter, to establish trading relations between Siberia and foreign countries by using waterways through the mouths of the rivers Ob and Yenisey, to

investigate and improve these routes by scientific and practical means, to construct appropriate installations and establish wireless communications.[31]

The most important results of the work of the Committee of the Northern Sea Route should be seen as the opening of new ports in the Asian North - a new port in the Gulf of the Ob and the harbour at Igarka on the Yenisey; heavy investment in developing the shipment of freight via the mouths of the Siberian rivers and the Kara Sea; the design and construction of new freighters adapted for Northern navigation, and lowering shipping costs.

While on the subject of the Committee of the Northern Sea Route, we must mention the Yamal Expeditions. The Soviet Government decree of the 6th of April 1921 on the organisation of an expedition to survey the course of the Yamal channel reveals that the Bolshevik leadership regarded it as a matter of urgent necessity to create a Northern Sea Route from Siberia to Europe and the ports of the northern part of European Russia for the export of timber, grain, fish, meat, furs, animal fats, and other riches "on and beneath the surface of the earth..."[32] At the same time this decree indicates that the Soviet authorities were indeed doubtful whether the Kara Sea Route would become a viable route. As shown in part 3 there had been several earlier attempts to map the possibility of linking the western coast of the Yamal Peninsula, directly with the Ob, thus avoiding the Kara Sea itself.

This new Yamal expedition was no more successful than earlier attempts. By the beginning of August 1921 the members of the expedition had reached Omsk. There they were delayed, as the executives of Sibrevkom and the Committee of the Northern Sea Route, underestimating the importance of the expedition, did not give them the necessary assistance to advance further. On the 22nd of August the leader of the expedition, I.I. Elport, appealed to Lenin for help.[33] On the 4th of September 1921 Lenin sent a telegram to the Sibrevkom, ordering "urgent measures to stop delay by local authorities of Yamal Expedition in Omsk, and give full assistance in sending in battle formation to place of work".[34] On the 11th of September the Deputy Chairman of

Sibrevkom, S.Ye. Chutskayev, telegraphed Lenin, confirming that urgent measures had been taken towards dispatching the expedition.[35] The Yamal Polar Expedition collected valuable information on the little-studied Yenisey northlands and finished its work in January 1922.[36] However, it did not fulfill its main purpose, which was to survey the course of the Yamal channel. It is likely that this project had become less topical, since the Kara Sea Route by now had already been taken into regular use, thanks not least to the Siberian Committee of the Northern Sea Route.

4.5 The Kara barter expeditions of the 1920s

Hunger in Northern Russia in 1920 had turned the attention of the Soviet government to the Kara Sea Route, and it came to the rescue like a magic wand, enabling the country to emerge from a terrible crisis. The same year the first maritime expedition to Siberia (the "Kara Grain Expedition") was equipped. The polar captain M.V. Nikolayev was appointed leader of this expedition. It left Archangel on August 8 1920 consisting i.a. of the icebreaking steamers "Sedov", "Rusanov", "Sibiryakov" and "Malygin" - heading for the Yenisey. All these icebreaking freighters had been bought from Newfoundland by the Imperial Russian Government during the First World War.[37]

Despite difficult conditions the expedition returned safely to Archangel on October 3, and the foodstuffs it brought back saved the population of the northern provinces from inevitable hunger.[38] In 1921 the Soviet Government used the experience gained on the "Kara Grain Expedition" to organise a new navigation season. In addition to supplying Archangel Province with grain, the plan was to export Siberian raw materials and import industrial goods from the west through so-called barter (tovaro-obmen) operations eliminating the need for spending foreign currency. Only after a trade agreement had been concluded with Britain in March 1921, could the first of these barter operations be prepared.

On the 18th of March 1921 the Government passed a resolution

on the tonnage of the Kara Expedition.[39] On the 24th of March, at a Government session to consider a plan to set up a barter fund for the various rayons of the Republic, the question of preparations for the northern sea voyage came up again.[40] On the 27th of May a session of the Government, chaired by Lenin, heard a report by a member of the Board of the People's Commissariat of Foreign Trade on the organisation of the expedition and resolved to instruct the People's Commissariat for Communications immediately to contact Archangel and find out whether it was possible to equip vessels for departure on the Northern Expedition.[41]

Lenin's personal interest in expediting the matter undoubtedly affected results. The memoirs of V.A. Smolyaninov, Deputy Manager of Government business, show how anxious he was: "Question the facts, verify them. Verify them in person twice. Then call me on the direct line... Otherwise, I will not believe that the matter is safe". And again: "This is a matter of the utmost importance and urgency... Push it forward in every possible way..."[42] In mid-June of the same year the Soviet Government directed Arkos (the All-Russian Co-operative Society) to purchase five vessels with a tonnage of from 1,500 to 2,350 tons each. At the same time Arkos also bought the imported goods essential for Siberia. Approximately 9,000 tons of assorted freight was delivered to the ships within the appointed time, and all the vessels were equipped for ice navigation and fitted with wireless stations and electric light.

The vessels thus purchased all became part of the foreign detachment, and the Norwegian polar captain, Otto Sverdrup, was once more invited to lead a Russian expedition into the Kara Sea. The second or "native" detachment of the Kara Expedition gathered in Archangel. The organisation of the expedition was entrusted to the Administration of Marine Transport of the White Sea and Arctic Ocean (Belomortran).

On the 10th of August 1921 the people of Archangel gave the members of the Kara Expedition a warm send-off on their dangerous journey. The voyage was not an easy one and the sailors had to contend with fog, ice, and storms. They did succeed, however, to

reach their destination. The ships' crews and the Siberians worked like shock troops loading and unloading in the ports of Siberia. The expedition's return voyage was particularly difficult, and two vessels, the "Ob" and "Yenisey", sank in their battle with the elements.

Only on the 26th of September did the rest of the vessels return to Archangel, having completed their task. The sailors delivered over 400 thousand poods of grain to Archangel and Pechora. The joint newspaper of the Soviet Executive Committee of the Archangel Province and the Province Committee of the Russian Communist Party reported as follows: "The sailors of the Red Fleet carried out the task entrusted to them with honour. Despite the loss of two boats, they won a great new victory in the battle against famine".[43] Altogether the two detachments of the Kara Barter Expedition had delivered over 10 thousand tons of goods to Siberia, and had brought out about 14 thousand tons of assorted freight.[44]

The Government considered the results of the expedition on two separate occasions, and stressed that most intent and unabated attention should be devoted to the development of the Kara Barter Operations in the future. This entailed providing the expeditions with a reliable fleet of sufficient tonnage, replacing decommissioned vessels, increasing port construction, and improving the vessels' navigational and hydrographic services.

The improvement of hydrographic, port, radio and coastal services was given serious attention. The fact that specific matters connected with the preparation of the Kara Expedition of 1922 were considered on several occasions by the Government, shows that the expedition had become of considerable importance to the State. The Government appointed bodies to be responsible for the organisation and carrying out of expeditions, for fixing rates of barter for exports and imports, for procedures for receiving credits for payment in kind, and other matters.[45] In the years which followed the shipping route across the Kara Sea came to be used for large-scale import-export operations. The People's Commissar for Communications, F.E. Dzerzhinskiy (who was

at the same time the Head of the Soviet secret police - the Cheka), played an important role in organising the Kara Expeditions, after being dispatched to Siberia at the beginning of January 1922 as plenipotentiary representative of the Government.[46] From this time on the Kara Expeditions took place annually.

The organisation and conduct of the Kara Expedition of 1925 surpassed all expectations. The import and export cargoes came through for the first time undamaged and according to plan. For the first time, the ships were used to their full capacity. In spite of unfavourable ice conditions, the expedition completed a voyage of six thousand miles, and succeeded in carrying out the task entrusted to it.[47]

The costs of these imports of foreign goods to Siberia were fully covered by Siberian exports via the Kara Sea. In 1922 the Soviet Government passed a resolution on duty-free imports of goods to Siberia by sea.[48] The Academy of Sciences, the Chief Hydrographic Administration, the Geographical Society and also a large group made up of sailors, scientists, and leaders of society, took part in organizing and carrying out these expeditions. Over a period of 9 years (1920-1928) there were 62 voyages to the mouths of the rivers Ob and Yenisey, and only two vessels were lost in the 1921 navigation season.[49]

The results of the Kara Expeditions were significant. In 1921 exports totalled 4,877 tons, by 1928 they had increased to 17,107 tons; the corresponding figures for imports are 8,440 tons and 15,000 tons.[50] During this period 22.9 thousand tons of wheat were transported out of Siberia. To begin with the exports consisted chiefly of grain, but after 1924 timber became predominant and became the main article of export to Western Europe. The import from abroad of stock and equipment came to 66.7 thousand tons.[51]

The Kara Barter expeditions became the breakthrough for the Kara Sea Route. Suffice it to say that imports during these 9 years were nearly twice as much as had been imported to Siberia during the last forty years of Tsarist Russia. There was no longer any doubt that the Kara Sea Route was feasible, and a new

channel for international trade had been opened to Russia. It should be pointed out, however, that these expeditions occupied a very modest place in the country's overall balance of trade, only 10-12 million roubles in foreign currency earnings, as against 700 million roubles for the country as a whole. But little as it was, it contributed to reviving the economic life of Siberia. The goods acquired through the Kara Expeditions (agricultural machinery, electrical equipment, etc.) were distributed over a very wide area: the Urals, Siberia, Yakutiya, and the Far East. And Siberian timber found a direct outlet onto world markets.

The Kara Sea Route justified its existence in economic terms by the lower cost of exporting goods from Siberia when compared with transportation by rail. To take one example, the cost of transporting one ton of freight by rail from Novosibirsk to Leningrad and from there by sea to London came to 58 roubles 98 kopeks, whereas the total cost of transport from Novosibirsk to London via the Kara Sea was 44 roubles 67 kopeks.[52]

The Kara Expeditions left an outstanding mark in the history of the exploration and opening up of the Arctic, being the first stage in the implementation of the broader task of opening up the whole length of the Great Northern Sea Route. In the years from 1923 to 1931 there were also regular expeditionary voyages along the eastern leg of the Northern Sea Route - from Vladivostok westwards to Kolyma. Their main cargo was 350-400 tons of foodstuffs, and they returned with furs and other trade goods.[53]

The industrial development of this region, sometimes called "the Soviet Alaska" was in its beginning, and in the winter of 1931-32 the gold mines on the Kolyma started production. These mines were basically to be staffed by political prisoners and run by Dalstroy (Main Administration of Far East Construction), a department of NKVD which was to be in charge of all forced labour projects in the north-east of Siberia. In 1937 150,000 prisoners worked here, increasing, according to Robert Conquest, to 500,000 in the postwar period. The main gold deposits were to be found in the upper stretch of the Kolyma, south and west of Seimchan,

and geographically and organisationally the exploitation of Kolyma was centred on Magadan. The area was supplied with provisions and prisoners by transport ships via a route from Vladivostok to Nagayevo at the Sea of Okhotsk. Occasionally they also used the Northern Sea Route, passing through the Bering Strait to Ambarchik on the Lower Kolyma.[54]

4.6 Northern Railway or Northern Sea Route

In the late 19th and early 20th century the special problems with navigation in the Kara Sea had led to a series of projects, which aimed at establishing a direct land connection between Western Siberia and the Barents Sea, thus bypassing the troublesome Kara Sea (see part 3, pp. 15-16, 71-73). This idea once more came up after the October Revolution; the 1920s and 30s in Russia saw a stormy debate on the question of building railways in the North and Siberia. One of the initiators of this idea was the well-known Archangel artist Aleksandr Alekseyevich Borisov, an outstanding member of the so-called Kuindzhi school of Russian painters. While his contemporaries were painting the countryside around Moscow, the Russian midlands, the Ukraine, Borisov was the first painter in history to depict the Russian North, and that includes the Polar regions. In this way he opened a new chapter in the history of Russian art.[55]

However, there was more to A.A. Borisov than art. Lenin knew him personally, not just as an artist, but also as an important public figure. In the Kremlin Library there is a pamphlet written by Borisov entitled "The Ob-Murmansk Railway".[56] Borisov was a passionate patriot of the North, and having journeyed through the northern regions, he thought constantly about the railways which could provide outlets for the North and for Siberia. As early as 1912 he had presented the Tsarist Government with a project for a Great Northern Railway (Velikiy Severnyy Put). The project envisaged a main-line railway linking the three oceans - Arctic, Atlantic and Pacific - via the shortest direct route. Ostensibly this railway was vitally important for the economic development of the whole of Russia making possible the

development of the colossal natural resources of Northern Russia and Siberia.

Lenin and the Soviet government recognized the importance of this project, and Borisov and his group of fellow-thinkers launched themselves into action. A "Society for the Great Northern Route" was formed, with more than 200 members.[57] The first surveys were carried out, the sight-lines of the future route were taken, even architectural plans were drafted for stations and hotels. And yet again the idea was not put into practice. The main reason was probably the successful use of the Kara Sea Route, which for the time being made the Great Northern railway more or less superfluous. However, as the Russian economy grew stronger and the question came up of connecting the two extreme legs of the Northern Sea Route into a continuous through route, the building of the Great Northern Route was put back on the agenda, now clearly as an alternative to the Northern Sea Route. In the late 20s and early 30s, A.A. Borisov was to be heard in Leningrad, Archangel, and Velikiy Ustyug presenting reports on the construction of the Great Northern Railway.[58]

In August 1930 a interdepartmental meeting was held which recognised the feasibility of 18 versions of the railway. Preparations were made to publish a special journal entitled "The Great Northern Route". However in 1931 the railway project was harshly criticised at the All-Union Conference on the Distribution of Productive Forces in the North, organized by the State Planning Commission (Gosplan), for being too weak on technical-economical computations. The project was put aside, and instead the Party decided to develop the Northern Sea Route during the second five-year plan (1933-37). The controversy ended with the successful voyage of the "Sibiryakov" along the whole length of the Northern Sea Route in 1932, which put an end to further discussions. This decision was also dictated by the international situation. It became increasingly important to strengthen Russia's position in the Far East, where her possession was threatened by Japan. In 1932 the Soviet Pacific Fleet was created - in 1933 the Northern Naval Fleet. A.A. Borisov's grandiose idea became a reality only after his death.

The Northern railways which he foresaw were built in the pre-war years, and the Konosha-Vorkuta railway during the Second World War.

4.7 The Arctic archipelagoes and Soviet power

Even if the question of opening the Northern Sea Route was put on the agenda only a few months after the October Revolution, during the 1920s the efforts were mainly restricted to developing the Kara Sea Route. Further advance eastwards started only with the first five-year plans for the development of Soviet industry. The tremendous development of aviation during the First World War also created a new instrument for exploration of the Arctic, and aviation was to play an enormous role in the study and opening-up of the Northern Sea Route during the Soviet period.

In the first years of Soviet power, however, Soviet Russia lagged behind the Western countries in this respect. The Russians had no major aircraft industry, and this meant that they could not take part in possible discoveries of new land in the area of the North Pole, whereas foreign expeditions could become active in poorly explored Arctic areas belonging to the Soviet Union. In the beginning of 1926 four foreign air expeditions were being planned. Not all of them were carried out, but this year saw the first more or less successful flights to the North Pole, that of Richard Byrd and Roald Amundsen.[59].

No large land territories were found, but Amundsen's successful flight across the North Pole from Svalbard to Nome in Alaska, put the idea of a trans-Arctic air route on the agenda. An Arctic air route would necessitate the establishment of direction-finding stations, which posed a new threat to Soviet influence in the Arctic. As a result of this development it became all the more important to increase Soviet activity to counteract undesirable foreign interest in the Soviet Arctic. The Soviet Union joined the Aeroarctic (Association for the Exploration of the Arctic by Air), an international organization for flying in the Arctic, which was led by Fridtjof Nansen, but at the same time the Soviet government, following Canada's

example, on April 15 1926 declared the so-called Sector Principle, which meant that all territories north of the Soviet mainland between lines drawn to the North Pole from its western and eastern boundaries were to be considered Soviet territory.

However, 1928 was to become an even more important landmark in Soviet polar policies. The Italian polar explorer, Umberto Nobile prepared a flight with the airship "Italia" into less well-known areas of the Arctic. The purpose of the Italia Expedition was to carry out research connected to the establishment of an trans-Arctic route, but also to look for new, undiscovered islands. One of Nobile's targets was Severnaya Zemlya, the extent of which was not known to the Soviet Government. There was a risk that Nobile would land people in this area and claim land which should belong to the Soviet Union.

However, Nobile did not reach Severnaya Zemlya, and by the end of May 1928 came the news that "Italia" had crashed in the sea ice northeast of Svalbard. From several quarters rescue expeditions were dispatched northwards to save the Italian aeronauts. An airborne expedition led by Roald Amundsen disappeared in the Norwegian Sea, and the Soviet icebreaker "Krasin", which left Leningrad on the 16th of June, was destined to play the principal role in the rescue of the Italians. This expedition was led by the outstanding Soviet polyarnik, R.L. Samoylovich. The captain of the icebreaker was K.P. Egge and his first mate was the Pomor N.A. Ponomarev (later to become captain of the atomic powered "Lenin"). The famous polar pilot V.G. Chukhnovskiy was Head of air support on the icebreaker. By the beginning of July the "Krasin" was already within 60 miles of the Italians' base camp. After a brilliant flight by Chukhnovskiy in the unusually-named "Red Bear" they succeeded in establishing the exact location of the crash. On the 12th of July the "Krasin" got through the thick ice of northern Spitsbergen and rescued the people from the ice floe. The voyage of the "Krasin" won its crew world fame. There are many books, newspaper articles and films to remind us of these events.

Nobile's plans had posed a threat to Russian interests in the Arctic, while his rescue clearly demonstrated that the

Russians were after all in control. An important lesson was that the development of aviation had not made the icebreakers obsolete. But at the same time a small plane, based on board the "Krasin" had played a crucial role in determining the exact location of the crash. After the "Krasin" voyage the Bolshevik leaders paid more attention to the Arctic. On the 31st of July 1928 the Soviet Government issued a decree on intensifying scientific research in the USSR's Arctic domains.[60] In accordance with the provisions of this document, the Government Commission for the Arctic was set up, headed by S.S. Kamenev, the former Civil War commander-in-chief. Many distinguished Soviet academics worked on the staff of the Arctic Commission, among them A.E. Fersman, R.L. Samoylovich, V.Yu. Vize, I.I. Mesyatsev, the polar pilots B.G. Chukhnovskiy and M.S. Babushkin. The scope of the Commission's competence covered the establishment of new Polar shore stations, the building of planes, airships and ships, their use in northern latitudes, and the organisation of Arctic expeditions.

The Arctic Commission directed, united and co-ordinated the work of all the organisations which were involved in exploring and opening-up the Arctic, the Supreme Council for the National Economy (VSNKh), Organization for the Support of Defence, Aviation and Chemistry (Osoaviakhim), the Soviet Merchant Fleet, the Committee for the Exploration of the North, the Soviet branches of "Aeroarctic", and many others. The main activity of the Commission was to produce a five-year plan for scientific research. At its first session (on the 6th of September 1928) S.S. Kamenev told the members that: "The initial draft for all the matters which have been proposed must be drawn up within two weeks, with the exception of the work on Severnaya Zemlya, which can be dealt with later. This preliminary basis for the five-year plan should be submitted in outline only: but the first year must include specific estimates, so that the work proposed for the following year can be included in the 1928-29 estimates to ensure that the necessary facilities are granted".[61]

The five-year plan for scientific research in the Arctic was eventually drawn up and submitted to the State Planning

Commission (Gosplan) for approval only in February 1930.[62] This was the first ever comprehensive plan for scientific research in the Arctic, and it was included under a special heading - "Five-year Plan for the Study of the Arctic" - in the first five-year plan for the development of the National Economy of the USSR.[63] It envisaged the creation of a network of new radio and hydrometeorological stations on the coasts and islands of the Soviet Arctic, particularly on Franz Josef Land (Zemlya Frantsa-Iosifa), Mys Zhelaniya, Cape Chelyuskin (Mys Chelyuskina), Severnaya Zemlya, Lyakhovskiye Ostrova, Wrangel Island (Ostrov Vrangelya), and Cape Dezhnev. It also included proposals for research expeditions to Severnaya Zemlya and the Taymyr Peninsula.

The growth of the USSR's economic power brought with it favourable conditions for the solution of the most complex problem of the Arctic - the comprehensive opening-up of the Northern Sea Route. Thus from 1929 a new type of Arctic expedition was carried out, directed primarily at the creation of scientific stations - outposts of Soviet science in the Arctic. On the 5th of March 1929 the Government of the USSR approved a draft decree allocating the necessary funds for the voyage of the "Sedov" to Franz Josef Land.[64] "Our interest in this expedition was such," Otto Yulyevich Shmidt remarked later, "that not only did the Government not begrudge the funds for its organisation, but went so far as to name a member of the Government as its commander, in order to invest it with the intense political spirit which was at that point in time essential to the expedition."[65] The governing body of the northern area was particularly interested in the expedition, since a Government resolution had for the first time included Franz Josef Land in its territories and one expected protests from Norway.

Franz Josef Land was well within the Soviet sector, but strangely enough atlases published in Moscow as late as 1928 did not mark out Franz Josef Land as Soviet territory. On the basis of this fact the Dutch historian Pier Horensma suggests that it was not until the summer of 1928, in the wake of the Aeroarctic

conference in Leningrad that the Russians realized how important this archipelago may become.[66] Reactions in Norway to the Soviet claim on Franz Josef Land were agitated. The Norwegian sea mammal hunting in the area around these islands had been extensive, and Norwegian hunters were afraid of being expelled from the area. This led to a proposal that a Norwegian expedition be sent to Franz Josef Land to establish a meteorological station which would impede a Soviet takeover, while at the same time being useful for Norwegian weather forecasting.[67] The goal was to secure the right of the Norwegians to continue their traditional hunting industry in the area, but the Norwegian government was careful not to choose a policy of confrontation with the Soviet Union. It seems that Norwegian official circles were willing to accept Soviet sovereignty over Franz Josef Land, provided Norwegians would have the same right in economic activities; in other words that the Soviet government should accept the same limitations in their sovereignty as Norway had accepted in the Svalbard Treaty of 1920.[68]

One may suggest that one of the reasons for the hasty dispatch of the Soviet expedition to Franz Josef Land in 1929 was news of the Norwegian expedition going there. The Russians had nothing to fear, however, since the Norwegian expedition did not manage to reach Franz Josef Land because of heavy ice and the Soviet icebreakers once more proved their superiority. "Sedov" with the Pomor V.I. Voronin as captain, reached Franz Josef Land safely, and on the 30th of August the radio operator E.T. Krenkel broadcast this message: "Calling the world! Calling the world! This is the Soviet radio station on Franz Josef Land. The most northerly polar settlement ever opens tomorrow!"[69] On the 4th October Otto Shmidt presented a report on the expedition to Franz Josef Land at a session of the Government Commission for the Arctic. Its results were pronounced brilliant. The Arctic Commission passed a resolution on sending an expedition to Severnaya Zemlya in the following year.[70]

Prior to the expedition to Franz Josef Land quite a lot had already been done to secure Russian interests at the eastern border of the Soviet sector. In 1924 the Canadian occupants of

Wrangel Island had been removed by force (see part 2) and the Soviets hoisted their flag on the island. On a diplomatic level the affair was solved the same year when the British government during negotiations with the Soviet Union declared not to lay any claim to Wrangel Island. Two years later "Stavropol" landed five Russians there, together with some 60 Chukchi and Inuits from Chukhotka to bolster the Soviet claim on the island. The leader of this expedition was the former Red Army officer Georgiy Alekseyevich Ushakov (1901-1963), who for three years managed the first Soviet settlement there.

In 1929 the Arctic Commission organised a new expedition to Wrangel Island on the ice-cutter "Litke". A decree of the USSR Council of People's Commissars indicated that the forthcoming expedition was equipping itself for "both the consolidation and maintenance of the Soviet Polar winter station, and the necessary use of the island for hunting and scientific research".[71] The former Red Army partisan, A.I. Mineyev, was the leader of the replacement shift going to Wrangel Island. The scientific staff of the expedition included the geophysicist and meteorologist V.A. Berezkin, the hydrologist G.Ye. Ratmanov, the geomorphologist V.P. Kalyanov, and the zoologist P.V. Ushakov. In spite of difficult ice conditions the "Litke" managed to force its way through to Wrangel Island. A radio station, new living quarters and other buildings were soon put up on a spit bordering Bukhta Rodzhersa.

On the 15th of December 1929 G.A. Ushakov, the former Head of the Wrangel Island settlement, presented a report to a regular session of the Arctic Commission. The Commission recognised the great contribution of the polyarniks to the economic and scientific study of this northern island, and in a special telegram sent "warm greetings to the staff of the regular Polar winter station, who have stayed on to continue its work".[72]

In July 1930 the icebreaker "Sedov" once again set off for Franz Josef Land. The weather and ice conditions favoured the voyage. A week later the Chairman of the Arctic Commission, S.S. Kamenev, hailed the expedition on their exceptionally speedy attainment of the archipelago. But even as he spoke, the "Sedov"

was hurrying on to the final goal of the expedition - the former Nicholas IIs Land, renamed Severnaya Zemlya in 1926. A new island was discovered, and the members of the expedition named it "Ostrov Sergeya Kameneva" in honour of the Chairman of the Arctic Commission of the Council of People's Commissars, who had rendered Arctic explorers such indispensable services.[73]

Severnaya Zemlya was discovered by the Arctic Ocean Expedition in 1913, but the Soviet authorities still knew very little about this archipelago. The main purpose of the expedition was to establish the northerly and westerly extent of the landmass, whether is was a continuous body or a group of islands. The political motive for this project was obvious. Several earlier Soviet attempts to reach the area had failed. This time the Arctic Commission, instead of a big expedition chose a small self-contained party of only four men, eliminating the expenses of a ship wintering. The voyage proceeded smoothly, and four polyarniks were left behind on Severnaya Zemlya - the leader of the expedition G.A. Ushakov, N.N. Urvantsev, V.V. Khodov and S.P. Zhuravlev. Over the next two years and with minimal technical facilities they compiled the first map of the archipelago, which turned out to consist of four large islands, and a number of smaller ones, altogether 37.5 thousand square kilometres. To produce it Ushakov and his companions sledged some 5000 km, carrying a survey for some 2200 km of that distance. The survey was tied in to 17 astronomical fixes.

In the middle of August 1932 "Rusanov" arrived to bring Ushakov and his men back to civilisation, and to leave another group to continue the work of the base camp as a radio and meteorological station. Severnaya Zemlya had been explored and surveyed, and was now more firmly attached to the Soviet Union. The first map of the archipelago was published in Izvestiya on 16 october 1932. Later more sophisticated surveys have been carried out, but without producing major amendments to Urvantsev's map.[74]

4.8 The opening-up of the through route

The opening up of the Northern Sea Route became one of the main achievements of the five-year plans and the "building of socialism" in the USSR. In this connection it is difficult to overestimate the role of the Government Commission for the Arctic. Otto Shmidt wrote later

> "work in the Arctic was carried out on the basis of a plan, and for the first time exploration on land, on sea and in the air were brought together. The success of these systematic first steps, with the firm backing of the Soviet system, together with the concentration of all resources in the hands of the State, and the enormous enthusiasm of the working people, showed itself in the Arctic even more strikingly than in all other spheres of the building of socialism".[75]

The work of the Arctic Commission was also recognised in Government papers on the results of the fulfilment of the first five-year plan for the development of the national economy of the USSR. Decisive successes had been achieved in the opening up and utilisation of the river and sea routes of the Far North (the Lena, Indigirka, Kolyma and Khatanga river deltas). And there were enormous successes in the development of Arctic navigation. In 1932, approximately 170 thousand kilometres had been covered, which represented more than a five and a half fold increase compared with 1928. In addition Russian pilots were doing heroic work side by side with the icebreakers servicing the Kara Expeditions, as well as the expeditions to Severnaya Zemlya, Novaya Zemlya, Wrangel Island, etc.[76]

Fifteen years' experience of opening up the Arctic enabled the Soviet Government to perfect the structure of the economic and scientific institutions involved. The quest for an organisation capable of uniting all efforts in the opening-up of the Arctic started with the Chief Hydrographic Administration, moved on to the Committee of the Northern Sea Route attached to the Siberian Revolutionary Committee (Sibrevkom). With the national economy facing new tasks, and above all with the industrial development of the Ural-Siberian North and the expansion of exports, the Soviet Government founded in 1929, within the People's Commissariat of Foreign Trade

(Narkomvneshtorg) system, a joint-stock company known as Komseveroput (North Siberian State Joint-Stock Company for Transport and Industry).

The Komseveroput Joint-Stock Company continued the work of the Committee of the Northern Sea Route (which was now wound up), promoting the further development of shipping operations via the Kara Sea, increases in sea and river tonnage, the extension of the navigation season, and the introduction of aircraft as a means of continuous ice reconnaissance. The activities of the Komseveroput Joint-Stock Company contributed to the creation in the northern region of the Yenisey of a large-scale timber export industry with its centre at Igarka. The Komseveroput was then reorganised into the All-Union Association of the Committee of the Northern Route and then to the Government Commission for the Arctic, which first developed and then ensured the fulfilment of the first five-year plan for the scientific exploration of the USSR's Arctic possessions.

However, until 1932 the Soviet Union had no single State organisation under whose jurisdiction the direction of scientific research and economic work in the Arctic could come. These functions were carried out by a series of Central Directorates (Glavnyye komitety - Glavki), People's Commissariats, and scientific institutions. The Government Commission for the Arctic co-ordinated the work of these various bodies.

However, the special conditions involved in the study and opening up of the Arctic - its remoteness from industrial centres, the harsh climate, the lack of reliable transport links and of a sizeable permanent population - meant that there was a pressing need to create a unified State organisation for the Northern Sea Route. In 1931 one of the leaders of the Soviet Government, A.I. Mikoyan, arrived in Novosibirsk, where the administration of the Committee of the Northern Route had set up its headquarters. At a meeting of local leaders, he set out the Government's position on the need for an extensive programme of work to create a route from the Atlantic right through to the Pacific Ocean.[77]

During the 1920's attention in the north had largely been

focussed on the development of the Kara Sea Route, which constituted only the Western section of the Northern Sea Route. Now the time had come to proceed further. In the spring of 1932 the All-Union Arctic Institute at the request of the Arctic Commission prepared plans for a voyage on the icebreaker "Sibiryakov" to cover the whole length of the Northern Sea Route in one navigating season. The idea was supported by the Central Committee of the Party and the Government soon passed a resolution to carry out the expedition.[78]

The timing was not accidental. The Soviet Government had passed a resolution to the effect that the Soviet Union would participate in the forthcoming Second Polar Year (1932-1933), as Russia had taken part in the First Polar Year (1882-1883). The ship making the passage would operate as a mobile research station within the framework of the international research programme. The leader of the expedition, Otto Shmidt, devoted great attention to the selection of the scientific staff from among those wishing to take part. V.Yu. Vize was appointed as Director of the scientific program, and several leading members of the All-Union Arctic Institute were on the staff of the expedition, among them Ya.Ya. Gakkel, A.F. Laktionov, and P.P. Shirshov.

"Sibiryakov", named after the great Siberian promoter of arctic sailing, A.M.Sibiryakov (1849-1933), was an icebreaking steamer, not a first class icebreaker such as "Krasin", "Lenin" or "Yermak". It may seem strange that the vessel that was going to conquer the Northern Sea Route was one that was not designed to tackle heavy pack ice. On the other hand the authorities had to take other factors into consideration; such as coal consumption and steaming range, and the forecast for the 1932 season pointed in the direction of favourable ice. Otto Shmidt wanted to approach the Northern Sea Route from the north of Severnaya Zemlya, and on the morning of 14 August, "Sibiryakov" arrived at the camp of Ushakov and his companions on Ostrov Domashniy. N.N. Urvantsev gave the captain a copy of his map of Severnaya Zemlya, and it proved to be very useful when "Sibiryakov" rounded the north end of the archipelago.

The "Sibiryakov"'s crew had still considerable trials to face. On several occasions during the voyage, which lasted for more than two months, the propeller was damaged, for the first time on the evening of 22 August off the north-east coast of the Taymyr Peninsula. On September 10, when the ship was beyond Mys Onman, an even more ominous misfortune struck. Two heavy impacts shook the ship, and a few days later the propeller was lying on the bottom of the sea. "Sibiryakov" was totally deprived of motive power. But when the ship found itself helpless in the icy wastes, the sailors refused to surrender. They used the ice anchor and the windlass, they resorted to explosives, they put up a home-made sail, and the vessel moved forward.

At 2.45 pm on 1 October 1932, 66 days after leaving Archangel, "Sibiryakov" sailed out into the open waters of Bering Strait at 66 degrees 17'N 169 degrees 28'W. For the first time in the history of the struggle to open up the Northern Sea Route a ship had completed the voyage from Archangel to Vladivostok in a single navigating season.[79] V.Yu. Vize, scientific leader during the expedition and one of Russia's most prolific polar historians, pointed out that the voyage of "Sibiryakov" had proved that the Soviets were able to achieve what had been deemed impossible.[80]. However, the "Sibiryakov" voyage cannot be described as a complete success, since the choice of "Sibiryakov" rather than a first-class icebreaker in the end proved to be unwise. The next attempt, that of "Chelyuskin" in 1933 became a disaster (see below), and only the third attempt on a through traverse of the Northern Sea Route, that of "Fedor Litke" in 1934 can be characterised as an unqualified success.[81]

When Stalin heard that "Sibiryakov" had reached Bering Strait, he signed his famous salutation to those who had taken part in the expedition, and this was the first occasion on which he used the famous slogan that "there are no fortresses that Bolsheviks cannot storm": "The successes of your expedition, which has overcome incredible difficulties, show once again that there is no fortress which Bolshevik courage and organisation cannot storm".[82] The leaders and crew were heavily decorated and in December 1932 they all met in the Kremlin. The meeting was

attended by Government and Party leaders. The main theme of the meeting was a discussion of the results of this historic expedition, and the drawing up of plans for further work to develop the Northern Sea Route. Stalin addressed the meeting, and on behalf of the Politburo set out an extensive programme for the opening-up of the Northern Sea Route.

At a joint session of Party and Soviet Government leaders and the Board of Glavsevmorput Stalin set out his thoughts on creating a "Soviet-backed East-India Company" in the Arctic.[83] This presupposed that all economic, scientific and cultural activity in the North would be united in the hands of a single organisation. The decision was taken to create, under the Government of the USSR, the Chief Administration of the Northern Sea Route - an Arctic Central Directorate. A resolution of the Council of People's Commissars dated the 17th of December 1932 founded the Chief Administration of the Northern Sea Route (Glavsevmorput - GUSMP) attached to the USSR Council of People's Commissars and it was given the task "of pioneering a definitive Northern Sea Route from the White Sea to Bering Strait, of equipping this route, and of keeping it in good order and ensuring the safety of navigation on the route".[84]

Within a few days a resolution of the Soviet Government placed 16 maritime hydrometeorological stations and the All-Union Arctic Institute at the disposal of Glavsevmorput. All icebreakers were handed over to join its fleet. Some time later, all management and other functions of the Komseveroput Joint-Stock Company were also handed over. Otto Shmidt, the distinguished academic and member of many Arctic expeditions, became Director of the new Administration.

In July 1934 the USSR Council of People's Commissars and the Party Central Committee issued a decree "On measures for the development of the Northern Sea Route and the northern economy",[85] which envisaged a significant expansion of Glavsevmorput's functions. In accordance with a Parliamentary decree abolishing the Northern Committee, the Glavsevmorput or Arctic Central Directorate took over economic and cultural services for the regions of the Far North, which involved the

transfer to it of trade and procurement systems in a number of oblasts and republics, responsibility for the economy of the islands of the Arctic Ocean, and of prospecting and exploitation of minerals in the Arctic, and many other matters. This provided for the setting up of political departments directly subordinated to the Main Political Administration of Glavsevmorput, which would itself operate as a department of the Central Committee of the Party.[86] For the first time there was a section entitled "The Opening-up of the Soviet Arctic" in the Five-year Plan for the Development of the Soviet Economy, and this was, in effect, the Glavsevmorput plan for 1933-1937.[87]

On the 28th of November 1934 the distinctive features of this new institution were outlined at its next session by the Head of the Arctic Central Directorate, Otto Shmidt: "The distinctive feature of Glavsevmorput lies in the fact that we differ from a People's Commissariat since we include some elements from each of the 17 People's Commissariats. We are in some ways more akin to a Kray (regional administration), except that we have some of the functions of a Central Government organ, but do not incorporate all the functions of a Kray [...] The essence of it is that the whole of the North is to be treated as a single problem, based on the Northern Sea Route [...] The fundamental concept which would unify the economy of the North emerged as soon as it had been proved that a Northern Sea Route actually existed. This is also to be the basis for all Glavsevmorput's development. We are a fighting body and our task is to bring into being Northern economies based on the Northern Sea Route".[88]

Turning the Northern Sea Route into a normal working shipping route meant that the future prospects for its development and its economic base had to be worked out. A Bureau of Economic Research (Byuro Ekonomicheskikh Issledovaniy) was set up within the Glavsevmorput system expressly for this purpose. Two main directions of research were defined within the Bureau in its study of the problems of the development of the Northern Sea Route. The first was a study of the effect of the new shipping route on the development of productive capacity in its

various hinterlands, and the determining of ways of opening them up, and the scale on which this should be done, in accordance with the needs of the national economy of the USSR. The second dealt with questions concerning the economics of the Northern Sea Route as a shipping and transport enterprise, and included the setting of quotas for goods traffic, the economics of shipments, the work of the ports, determining quotas in general, and other such matters.[89]

According to estimates produced by the Bureau of Economic Research, the territories which formed the hinterland of the Northern Sea Route in terms of transport, including only the area east of the river Yenisey, had an area amounting to 2.5 million square kilometres with a population of 50 thousand. If all goods destined for these regions were shipped via the Northern Sea Route, there would be a saving of 40-50 million roubles a year. There were other things to be taken into account - less damage to goods in transit, faster delivery, and the possible eastward extension of the hinterland as far as Petropavlovsk. The Northern Sea Route had an important role to play in the opening up of regions rich in minerals and mines.[90]

From the first days of its existence, the board of Glavsevmorput turned all its attention to the organisation of a scientific expedition aboard the "Chelyuskin", in which it was proposed to repeat the voyage of the "Sibiryakov" along the whole of the Northern Sea Route. The proposal was supported by the Vice Chairman of the Council of People's Commissars V.V. Kuybyshev in his special memorandum of the 20th of March 1933 to the Party Central Committee.[91] The Government passed a resolution to carry out this expedition under the direction of Otto Shmidt. A.N. Bobrov, I.A. Kopusov, and I.L. Bayevskiy were appointed as his deputies, and the captain was V.I. Voronin. Events connected with this expedition had an exceptional influence on all future progress in the opening up of the Arctic, and were of great international importance.

But at the same time it should also be admitted that the vessel was not properly adapted for ice navigation, and that the expedition was hastily prepared and in many ways of a somewhat

adventurous character. On the 16th of July 1933 the "Chelyuskin" set out from Leningrad on its Arctic voyage, where it met with difficult weather and ice conditions. It still moved steadily forward week after week until, not far from Bering Strait, near the coast of Chukotka and already nearing its goal, the ship was beset and started to drift with the ice in the East-Siberian Sea.

It was a disaster. The second navigator, M.G. Markov, who was on watch at the time, described the loss of the "Chelyuskin" on the 13th of February 1934 in these words: "Devastation was all around us, when the stern reared up to show the rudder and propeller and then quickly vanished beneath the water. A hundred and four people were left stranded on the ice. Among them were ten women and two children".[92] For two months the crew of the "Chelyuskin" drifted on the ice floes. The Party and Government took effective measures to rescue them. Seven pilots - A.V. Lyapidevskiy, S.A. Levanevskiy, V.S. Molokov, N.P. Kamanin, M.T. Slepnev, I.V. Vodopyanov and V.D. Doronin, who all played a direct part in the rescue, were the first ever to be awarded the honorary title Hero of the Soviet Union, which was exclusively instituted to honour them. In difficult weather conditions, pilots airlifted all the polyarniks who were stranded on the ice floe.[93] Thus ended the epic of the "Chelyuskin" - a cruel drama, with the loss of the ship, the unprecedented calamity of a large group of polyarniks stranded among the Arctic ice, and a real triumph of the human spirit, which stood out for many years as the standard of courage and fortitude. So even if the "Chelyuskin" expedition was a catastrophe, the rescue operation was a brilliant success. It attracted attention abroad and led to a more positive attitude towards the Soviet Union for instance in Britain. And not the least, it created a positive atmosphere in the Soviet Union towards arctic sailing.

In 1934 the ice-cutter "Litke", which had failed to come to "Chelyuskin"'s rescue, was commissioned to make the first navigation from the Pacific to the Atlantic Ocean in a single season. "Litke" left Vladivostok on June 28 1934 and arrived in Murmansk on September 20, without serious incidents of any kind.

The ice conditions in the Chukchi Sea were more favourable than in 1932 and 1933, but the navigation along the coast of Chukotka was still complicated, not so much because of ice, as because of the lack of depth indications on the charts and the lack of navigation signs ashore.

From Cape Schmidt to Vilkitskiy Strait the voyage was relatively easy, and on August 22 "Litke" anchored at Cape Chelyuskin, where it met "Sibiryakov", which two years earlier had made the first single-season transit in the opposite direction. Further to the west the sea was free of ice until "Litke" reached Ostrov Russkiy. There they met quite extensive ice fields, which were difficult to outflank because of heavy fog. Only on September 2 did "Litke" reach Dickson Island, where it remained for twelve days to assist in the Kara operations. On September 17 the icecutter entered the Barents Sea through Yugorskiy Shar and reached Murmansk three days later.[94]

This was not only the first single-season navigation from east to west, it was also the first Soviet transit along the Northern Sea Route without damages or accidents. Having arrived in Murmansk the "Litke"'s crew received a telegram from Stalin and the Soviet leadership, congratulating them most cordially with the successful voyage. But just because of the lack of dramatic episodes the 1934 voyage of "Litke" was to be overshadowed by the voyages of "Sibiryakov" and "Chelyuskin".

In his telegram to the people onboard "Litke" Stalin had written: "In the glorious cruise of "Litke" we see a firm guarantee that the Arctic wilderness will soon be transformed into a Great Northern Route for our great socialist Fatherland". And, indeed, 1935 already saw the first large-scale shipments of goods via the Northern Sea Route. Over a hundred ships took part in the navigation season that year, delivering cargo to many points in the Arctic. The most outstanding events were the voyages of the freighters "Vanzetti" (Captain G.P. Byutner), "Iskra" (Captain V.F. Fedotov), "Anadyr" (Captain P.G. Milovzorov), and "Stalingrad" (Captain A.P. Melekhov), and the "Rabochiy" (Captain M.P. Panfilov) which sailed all the way from Archangel to the Kolyma and back.

Head of Glavsevmorput, Otto Shmidt, and the Head of the Political Administration, S.A. Bergavinov sent a memorandum to the Central Committee of the Party, where they stated that the task which was entrusted to Glavsevmorput by the Party and the Government, namely to start as from 1935 the normal and regular use of the Northern Sea Route by merchant shipping, had been carried out. In the Arctic navigation season which had just ended, the Government plan for the shipment of 204 thousand tons had been 113% overfulfilled ahead of schedule, without a single accident involving significant breakages.[95]

After the 1935 navigation season, the Directors of Glavsevmorput had good grounds for raising the question of transferring to the Northern Sea Route the principal freight traffic between the central regions of the country and Yakutiya and Chukotka. In this way, Glavsevmorput's success predetermined the further opening-up of the Northern Sea Route.

The 1936 navigating season was also very encouraging. In a report to the Party Central Committee and the USSR government dated the 2nd of November 1936, the Directors of Glavsevmorput, again wrote about the great successes of the Soviet polyarniks. In fact, the Arctic that year saw the completion of 160 sea and river voyages, and the maritime fleet transported 29.9 thousand tons of assorted industrial freight.[96] 1936 also saw the first transfer of naval vessels from the Baltic to the Far East. Otto Shmidt himself was appointed leader of this truly historical expedition, the fulfilment of an old dream in Russian naval circles. The destroyers "Voykov" and "Stalin" were accompanied by the tankers "Maykop", "Lok-Batan", the supply ship "Anadyr" and the ice-cutter "Litke". On July 30 the expedition appeared in the White Sea Gorlo, and already on September 20 the naval vessels went into Bering Strait.[97]

On the 25th of January 1936 a large group of polyarniks was welcomed to the Kremlin by the Vice Chairman of the USSR Council of People's Commissars, V.Ya. Chubar, N.K. Antipov, and the Secretary of the Central Committee of the Party, A.A. Andreyev. Summing up the results of the meeting, V.Ya. Chubar wished the workers of Glavsevmorput further success "in the battle for new

results, for new standards of work, for the economical and efficient expenditure of funds, for the best possible use of manpower, and of financial and material resources, and for further successes in the speedy development of those crucial spheres of activity, which the work of developing the socialist Arctic raises to a level worthy of the building of socialism".[98]

But times change, and by 1937 Glavsevmorput was to run into serious trouble. It had become a powerful Arctic Central Directorate with the following core organisations; the Political Administration, the Administration of the Arctic Fleet and Ports, the Administration of the River Fleet, the Administration of Polar Aviation, the Hydrographic Administration and the Mining and Geological Administration along with the conglomerate "Arktikrazvedka" (Arctic Prospecting).[99] 52 organisations and 87 different Expeditions were operating within its system. The number of workers employed in the Glavsevmorput system increased from 6,634 to 29,195.[100] On the 1st of May 1938 the Glavsevmorput system had 11 political departments and 15 detached Party organisers for Polar stations and other enterprises, all directly subordinated to the Political Administration.[101]

To all intents and purposes, Glavsevmorput was gradually changing into a semi-military bureaucracy. The political departments successfully integrated themselves into the system of civil administration Stalin had created, which now began to operate through centrally issued commands, directives and orders. Rigid centralised control of all aspects of civil and public life, working methods based on management by command, combined with the cult of Stalin, brought with it massive repression, and the creation of forced labour camps.

The Arctic was favoured with Stalin's special attention. He was present at the passing of all the important Party and Government resolutions on the opening-up of the Northern Sea Route, and several generations of Soviet youth were brought up on the heroic exploits of the Soviet polyarniks. The Soviet people followed with great delight and pride the legendary voyages of the icebreakers "Sibiryakov", "Chelyuskin" and

"Litke", and could name all the polar pilots - the first Heroes of the Soviet Union. The well-known pilot I.P. Mazuruk, who was also a Hero of the Soviet Union, later said of Stalin:

> "Stalin always understood with masterly ingenuity how to take advantage of the fruits of our work in the Arctic. Any meaningful event was used to his advantage. We, who had earned our decorations and medals with our blood, were rewarded generously, and with the help of these medals he blinded those who tried to discover what was really going on in the country. In this way the enthusiasm and the valour of our people, and especially the arctic explorers, camouflaged the criminal actions that were being carried out at an ever increasing rate."[102]

Things were happening in the Arctic of which the people as a whole were unaware, - unjustifiable risks, amateurism, and massive repression. They were the death knell for thousands of scientists, sailors, and polyarniks, and for tens of thousands of those condemned to "special resettlement" who were opening up the Arctic, but not of their own free will. All this was skilfully hidden in the ceremonial gatherings of polar heroes, in the celebrations in their honour.

4.9 Development of logistical support

4.9.1 Hydrometeorological stations

The creation of a network of hydrometeorological stations has a significant role in the study of the Arctic and they cover a vast area right up to the very highest latitudes. It is precisely in these all but uninhabited regions that the polar stations are the front lines of science. The work of Arctic scientists is to a significant degree based on the data from polar stations where regular observations are made.

Before the invention and introduction of automatic equipment, hydrometeorological stations were the only possible means of carrying out continuous observations, and until the October Revolution there were only about ten of these in the Far North. With the development of the Kara Barter Operations the first series of hydrometeorological stations was created. In 1920 a polar station began operating at the port of Ust-Yeniseysk, in

1923 a polar station and a geophysical observatory started up at Matochkin Shar on Novaya Zemlya, and in 1924 a polar station opened at Novyy Port (Gulf of the Ob). At the same time the polar stations on Dickson Island (founded in 1916), Vaygach and Yugorskiy Shar were refurbished, in fact virtually rebuilt from scratch. In 1925 work was resumed on the polar station on the Yamal Peninsula (Mare Sale) and also on stations set up in 1914 in Malyye Karmakuly on Novaya Zemlya. In 1928 a hydrometeorological station began operations at Mys Shalaurova (Ostrov Bolshoy Lyakhovskiy).[103]

In 1929 a polar station began operating at the port of Igarka.[104] In the same year, following the successful voyage of the steamship "Sedov" to Franz Josef Land, the most northerly polar station was built in Bukhta Tikhaya (Hooker Island). In 1930, on Ostrov Domashniy a polar station began working on the study of the northern regions of the Kara Sea. In 1931, a polar station began operating at the northernmost point of Novaya Zemlya - Mys Zhelaniya, and in the following year at Russkaya Gavan. In 1932 a station opened in each of Gydanskiy Peninsula, Cape Chelyuskin and Amderm.[105] In 1928 there were only 4 polar stations, by 1932 there were 15, and in 1937 in total there were 56 polar stations and wintering stations.[106] The network of polar stations burgeoned in the western sector of the Northern Sea Route. In 1932 stations were opened also on the rivers Kheta and Khatanga, at the bays of Tiksi and Nordvik, on Ostrov Chetyrekhstolbov (Medvezhi Ostrova), on Ostrov Kotelnyy, Cape Shmidt, and in the settlement of Uelep at Bering Strait.[107]

The management of polar stations was undertaken by the Administration of Polar Stations (Upravleniye Polyarnykh Stantsiy) of Glavsevmorput, and the scientific and methodological support was left to the Arctic Institute where results were processed and collated. In 1935 the Administration of Polar Stations drew up special instructions and a programme, stating that apart from the on-going work of servicing the Northern Sea Route, the network of hydrometeorological establishments and radio-stations should in addition take on the task of providing a scientific-operative service for the mainland. The air routes

deserved special attention, and the study and use of data already compiled from hydrometeorological observations should be addressed.[108]

During the drama of the "Chelyuskin" the pilots gained experience of landing on the drifting ice of the Arctic. As a result, the idea of establishing the first drifting station in the Arctic Ocean was conceived (1937).[109] The ice problems in the Kara, Laptev, East Siberian and Chukchi Seas, causing the great problems for navigation along the Northern Sea Route had to be studied in connection with the icedrift in the Arctic Ocean in general. The "Chelyuskin" drama had proved that it was indeed possible to camp and live on the ice, even if it was constantly moving. And such a camp could be established and evacuated by plane. So Otto Shmidt, the director of the Glavsevmorput, decided to fly experienced polyarniks to the area of the North Pole, and the first drifting station, "Severnyy Polyus-1" was established under the leadership of Ivan Dmitrievich Papanin. The first basic research programme of the hydrography and icedrift in the Arctic Ocean since Fridtjof Nansen's "Fram" expedition of 1893-1896 - had started.[110]

In the years to come special attention was given to the creation of the "Severnyy Polyus" drifting stations and to airborne high latitude expeditions with landings on ice at various points of the Arctic Ocean. Taking into account the particular character of Arctic ice, portable scientific instruments, specialised equipment, and food rations were devised. Later on, automatic radiometeorological drifting stations and radio beacons were used successfully.

From 1936 onwards, regular sea-going expeditions called "Ice Patrols" were carried out, and their aim was to collect data on the ice, as well as hydrometeorological data, and transmit it to the headquarters of Arctic marine operations for the compilation of forecasts.[111] The results of observations from hydrometeorological stations were published regularly in the "Yearbooks of Meteorological Observations" and data were given up to and including 1940. At the same time, the results of aerological and actinometric observations made at polar stations

were also published. From 1936 the Arctic Institute began issuing a special series entitled "Data on the Climatology of Polar Regions of the USSR" (16 volumes were published). These works were very important for the compilation of weather forecasts. [112]

The rapid development of an observation network in the Arctic made possible the creation of polar meteorological offices by the 1930s. They supplied ships and planes with weather forecasts, but also carried out a great deal of research work on the study of cyclone activity in the Arctic, the regional characteristics of synoptic processes in its various regions and the peculiarities of the Polar Front. They studied the causes of gales and blizzards, the reasons for the icing of aeroplanes and a host of other important meteorological questions concerning the Arctic.[113]

Research into the dissemination of radio-waves played an important practical role in the resolution of problems concerning the reliability of radio communications at polar stations. With the appearance of large radio-centres with radio links, specialist manuals were issued for the selection of working short-wave frequencies in the Arctic and they began compiling radio forecasts.[114] Relying on the network of hydrometeorological stations, the polar scientists were able to make an important contribution to the development of navigation, aviation and industrial development in the Arctic.

4.9.2 Icebreakers

In the research and development of the Northern Sea Route, a leading role was played by icebreakers, ice reconnaissance and the scientific support of marine navigation. During the 1920s icebreakers and ice strengthened vessels were successfully used for seal hunting, in scientific expeditions and also in the Kara Barter Expeditions.

The Director of the Government Commission for the Arctic S.S. Kamenev in 1929 wrote a feature for the newspaper "Izvestiya VTsIK" entitled "New Methods of Working", in which he noted: "The

Kara Sea must be a sea along which we will be able to navigate. We export raw materials abroad via this sea; today it is timber, tomorrow we can expect much else. Hitherto, each time we have wanted to sail in this sea we have had to organise special expeditions even for the passage of single ships. Next year the number of ships is sure to double, if not treble... The service of icebreakers has clearly shown that the idea of overcoming the Arctic elements by using icebreakers has been prematurely buried". [115]

In the early 1930s Russia had three steam-powered icebreakers at its disposal: the "Yermak", the "Krasin", and the "Lenin" each having about 10 thousand h.p. capacity, and the ice-cutter "Litke" of 7 thousand h.p.. Glavsevmorput approached the Government with a proposal for the construction of new icebreakers. In 1934 this question was the subject of a special Government discussion. The short-sighted decision was taken to build steam-powered icebreakers, even though at the same time in Sweden the first diesel-electric icebreaker was being built, which possessed high manoeuvrability and flexibility. It is strange that the leading academician on ship construction, A.N. Krylov, came out with a categorical condemnation of electric power.[116] On the instructions of the Government, special construction bureaux were set up for the design of icebreakers and icebreaker-freighters. While they were working on improving the effectiveness of icebreakers, Soviet scientists were publishing many papers on the theory and practice of icebreaker construction. The outstanding papers were those of academician Yu.A. Shimanskiy, professor P.M. Nogid, engineers M.K. Tarshits, A.Ya. Sukhorukov and many others.[117]

In 1938, the first Soviet-built icebreaker the "Stalin" was brought into service. It was steam-powered and of 10 thousand h.p.. In 1939-1941 three more icebreakers of this type were built.[118] These icebreakers were very similar to the icebreaker "Krasin" in their technical specifications. It is true that there were quite a few improvements in the design: an increase in their fuel economy due to the more efficient use of steam; by altering the shape of the bow and enlarging the dimensions of the hull the

new vessels retained their icebreaking properties while still carrying large stocks of coal; the crew's living and working conditions improved significantly and there was a laboratory for the scientists.

4.9.3 Aviation

The first attempt to use an aeroplane in the Arctic was made twenty years earlier (in 1913) from ships of the Arctic Ocean Hydrographic Expedition which failed due to the break-up of the plane. In August 1914, the pilot Ya.I. Nagurskiy, in a hydroplane, was the first to fly several times round the Novaya Zemlya region trying to locate Sedov's expedition (see part 3, p. 81). He later wrote in his memoirs: "my polar experience has led me to believe that, in spite of the difficulties, it is possible to fly in the Arctic. And if this is so, then it is quite logical to contend that by using planes people will finally reach the Pole and other hitherto inaccessible regions".[119]

Naguskiy's prediction proved true, yet for two decades to come, aviation's main contribution to Arctic exploration was highly improved ice reconnaissance for ships. In 1918 the Chief Hydrographic Administration sent a memorandum to the Administration of the Air Fleet: "the main obstacle to sailing in the Arctic Ocean basin is the ice, which ought be made a subject for detailed research and observation... Observations from the coast do not provide a wide enough picture of the ice distribution, and therefore it is advisable to enlist the services of aviation, which in this case could prove invaluable".[120]

In August 1924 the pilot B.G. Chukhnovskiy made a number of flights in a hydroplane to identify a suitable route for ships of the Kara Barter Expedition. The first attempt proved successful or even brilliant and the sailors acknowledged the advantages of the plane which had enabled the ice distribution over a wide area of sea to be ascertained.[121] In 1925 the pilots B.G. Chukhnovskiy and O.A. Kalvitsa flew from Leningrad to Novaya Zemlya via Archangel. This was the first long-haul

flight in the history of the Arctic, and it was the first in a series of memorable polar flights. They carried out ice reconnaissance, charted the relief of the region and photographed the shores of Novaya Zemlya.[122] The Hydrographic Administration once more noted: "Pilots accomplished many successful flights over the Kara Sea, providing ice reconnaissance, and thanks to this there was comprehensive information on the state of the ice, which was made use of by the ships of the Kara Barter Expedition".[123] In 1927 the air expedition under the leadership of G.D.Krasinskiy was carried out. They established connection with the polyarniks on Wrangel Island og provided them with provisions and assisted the first navigation of the vessel "Kolyma" from Vladivostok to the estuary of Lena, studying the conditions for flights in difficult available areas of the river Lena, from Yakutsk to Irkutsk.[124]

However, B.G. Chukhnovskiy's and M.S. Babushkin's finest hour was their part in the rescue of Umberto Nobile's Arctic expedition in 1928. These brilliant pilots showed convincingly the great potential of planes in the Arctic. A year thereafter the question of using aviation in the Arctic was discussed at three special sessions of the Government Commission for the Arctic.[125] S.S. Kamenev wrote in an article entitled "For the Attention of Civil Aviation": "At the present time the question obviously arises of including the use of aviation in our five-year construction plan. The year ahead presents several categorical demands which could be clearly met by the use of aeroplanes and would further the implementation of the five-year plan for the Arctic".[126]

As it transpired, the course undertaken by the Arctic Commission on the use of aviation was the correct one. One should include among the most notable of the early events in polar aviation the surveying of the Chukotka peninsula from a SSSR-N-4 plane in 1932-33.[127] In 1933 an administration of polar aviation was created within Glavsevmorput's system, which brought together all the various disparate aviation facilities in the North. Its remit included the development of Arctic air space, which also encompassed the study and use of air routes and

airbases, the operational servicing of ship escorting, also meeting the needs of industrial enterprises and scientific-research institutions.[128]

New airlines and airbases were set up during these years. By 1937, the following airlines had begun to operate on a regular basis: the "Ob-line" (Tyumen-Obdorsk, a distance of 2,415 km), the "Yenisey-line"(Krasnoyarsk-Dickson, a distance of 7,539 km), the "Lena-line" (Yakutsk-Tiksi, distance 3,251 km), and the "Pacific-line" (Komsomolsk-Anadyr-Wrangel Island). In 1935 polar airlines carried 250 passengers and 401 tons of cargo, and by 1936 - 6,307 passengers and 1,603 tons of industrial goods.[129]

In February 1933, as a result of the pressing needs of the North, the Government passed a decree on the comprehensive development of polar aviation which provided the Arctic route with a new type of Soviet plane, the "R-6". Responsibility for its production was given to the Central Directorate of the Aviation Industry (Glavaviaprom).[130]

4.9.4 The ten years after the "Chelyuskin"

Substantial amounts were earmarked for capital construction in connection with the development of the Northern Sea Route. The amount allocated from the State budget under this heading rose from 33 million roubles in 1933 to 106 million roubles in 1935. Some of Glavsevmorput's main capital projects in 1935 were: 4 "Krasin"-class icebreakers, 2 diesel-electric icebreakers, 2 ice-strengthened steam freighters, a ship-repair yard in Murmansk, an aircraft-repair works and a hydroaviation base in Krasnoyarsk, and a central radio station in Moscow.[131]

Of the total capital investment allocated to Glavsevmorput between 1938 and 1942, 684 million roubles, or approximately 4/5, was directly assigned to the transport infrastructure. Four new icebreakers were commissioned, to double the strength of the icebreaker fleet, and the building of ship-repair yards in Murmansk and other Arctic ports was continued.

In 1938 and 1939 an economic basis for the construction of

ports at Dickson, Tiksi, and Provideniya was established on the basis of a study of the future prospects for the development of the Arctic hinterland, the turnover of goods, and estimates of the work envisaged for each of the ports. A special planning organisation, "Arktikproyekt", was created under Glavsevmorput to carry out the planning of individual construction projects, including the Arctic ports, industrial enterprises, and urban settlements.[132] Later, planning was carried out by "Soyuzmorniiproyekt" of the Ministry of the Sea Fleet.

In 1929-1931 a solution was found to the technical problems of designing a universal icebreaking vessel which would combine the necessary specifications for autonomous navigation in the Arctic and the needs of a hydrographic ship. Well-known ship building experts were brought in at the design stage: N.Ye. Putov, V.V. Semenov-Tyan-Shanskiy, K.I. Bokhanevich, P.I. Titov and many other academics and ship-builders.[133] The new vessels were built in Leningrad during 1934-1937 and were named the "Okean", the "Okhotsk" and the "Murman". For the convenience of the hydrographic, hydrobiological and hydrological work on board, the entire stern section of the deck was made totally separate from the superstructure and the deck machinery. These vessels differed from the earlier steamships in their incomparably better working and living conditions and their improved equipment.

The "Okean" and the "Okhotsk" had their polar baptism in 1937. Within a single summer they mastered the route from Leningrad round the Scandinavian peninsula to Murmansk, and thence via the Northern Sea Route to Vladivostok. The famous hydrographer A.M. Lavrov headed this voyage.[134] In 1944 the icebreakers "Severnyy Veter" and "Severnyy Polyus" appeared on the Northern Sea Route, given by the USA to the Soviet Union through lend-lease for temporary use. Familiarisation with this technology during 8 Arctic navigation seasons was extremely useful, since these icebreakers were fitted with a range of innovations (diesel-electric power, an improved wiring layout of the propeller screws, and a completely welded body made out of high-tensile steel). The experience gained from working on these icebreakers was then used during the design of later additions

to the icebreaker fleet.[135]

The long-haul flights of planes in high Arctic latitudes were among the heroic pages in the history of Soviet aviation: the flight of V.S. Molokov along the entire length of the Northern Sea Route (1936);[136] the trans-continental flight of S.A. Levanevskiy[137]; the non-stop flight via high latitudes from Moscow to the Far East of V.P. Chkalov[138]; the non-stop transpolar flights from Moscow to America via the North Pole of V.P. Chkalov and M.N. Gromov[139]; and the flight and crash of the passenger-freight airliner from Moscow to America via the North Pole under the command of S.A. Levanevskiy.[140] In 1941, there were three landings by an "N-169" plane in the region of the Pole of Relativity (the captain was I.I Cherevichnyy, and the Head of the scientific group was Ya. S. Libin). During these landings, scientists from the Archangel Institute made depth measurements for the first time in this area and carried out short-term hydrometeorological and geographical observations.[141]

During the second half of the thirties, special airbases were set up at a series of locations in the Arctic - Dickson Island, Cape Chelyuskin, Bukhta Tiksi, and Cape Shmidt. Since there were few land-based airstrips in the Arctic in the pre-war years, there were certain basic prerequisites for ice reconnaissance, among them the ability to make safe long-haul flights over the ice, precise aero-navigation equipment, and the capability for float planes to land on the sea and on unprepared airstrips.

From 1929 to 1942, "Dornier-Wal" flying boats were used for ice reconnaissance, and the Russian-American aircraft designer Igor Sikorskiy's amphibious plane was successfully used from 1938. This particular plane suited the purpose in that it could take off from water and land on dry land and vice versa. In the 1940s the polyarniks also had at their disposal MP-7 flying boats, with a wide range and large freight carrying capacity, and also KM-2 sea planes.[142]

The scientific basis of air ice reconnaissance in Arctic seas improved year by year. In the early years, flights were made

mainly along a set route following a ship. The pilots carried out ice reconnaissance themselves, and later hydrologists worked alongside the plane's crew. In 1939 polar airmen began carrying out ice reconnaissance in the winter, and in the 1940s they started the practice of dropping message bags onto ships from planes, with ice charts and recommended routes.

During navigation through areas where there were heavy ice conditions, a system of barraging the planes was used to guide ships and icebreakers. The method whereby the sea ice or a section of it is surveyed by quadrats became widespread, and it was on this basis that the best route for a convoy of ships was selected. In the early sixties a phototelegraphic method of transmitting an ice chart to ships and icebreakers was introduced into the practice of ice reconnaissance.

This was the period when the art of ice reconnaissance grew and was perfected. Air pilots, navigators and scientists worked jointly on the collation of ice observations and symbols. The first symbols representing characteristics of ice were devised in 1935 by the Inter-Departmental Bureau of Long-Term Ice Forecasting, and as a result these were considerably improved. Ice reconnaissance came under the umbrella of a single scientific-operative body: The Ice Service of the Arctic Institute, which analysed all the collected data.[143]

From 1943 the LI-2 plane was used for ice reconnaissance and dominated the field. In the 1950s other planes also came to be used: the IL-12 and subsequently the IL-14. In recent years helicopters have been used successfully in ice reconnaissance. The greatest innovation in ice reconnaissance has been the "Toros" side-looking airborne radar. This piece of equipment has enabled a plan view of the ice sheet to be compiled for a 75 km wide area irrespective of time of day or weather.[144]

The importance of aviation is enormous as it is only with its help that it has become possible to solve the grandiose problem of studying and mastering the Northern Sea Route.

4.10 Economic development along the Northern Sea Route

The successful opening-up of the western sector of the Northern Sea Route and the Kara operations meant that work could be started on building new cities and ports. Industrial construction in the North was carried out through comprehensive territorial industrial complexes, which were created once auxiliary enterprises such as energy supply, food supply depots, housing for the workers, etc. had grown up around the primary objectives. The building of Igarka began in 1929. Never in the history of town planning had a city with a population of thousands been built in the permafrost zone, beyond the Arctic Circle. 1930 saw building work start on the first three-frame sawmill in Igarka. By early 1932 three five-frame sawmills with an output of 25 to 30 thousand standards of timber were operating in this northern city.[145]

Igarka became one of the "great building sites of socialism" in the Arctic, but at the same time a place of exile for the first victims of Stalinist repression. The building of this city was directly linked with the collectivisation of agriculture. The journal "Sovetskaya Arktika" reported in 1936 that: "Igarka is now home to resettled labourers and their families, the majority of whom are, for the first time in their lives, participating in honest, non-exploitative labour".[146] In another article on the building of Igarka the story is told of Zinoviy Chuchalin, "once a kulak, who thanks to the workers on the collective farm of his rural settlement in Igarka, has been re-forged in the last two years into a member of the proletariat. He worked as an unskilled labourer. This year he has been promoted to brigade leader".[147] It was not just the labour and enthusiasm of polyarniks and northerners which built this city beyond the Arctic Circle, but also the sweat and blood of thousands of innocent people, falsely convicted in the years of the Stalinist repression.

The forced labour of victims of Stalin's purges played an important role in the creation and growth of these large-scale industrial enterprises in the North. The industrialisation of Norilsk also started during the 1930s. Its first product was

coal, followed by metals. The next industrial centre to spring up was the Asiatic Northern Conglomerate (Aziatskiy Severotrest) of Glavsevmorput, "Nordvikstroy", in Khatanga, which provided the country with salt, oil and coal. Thanks to the development of the Northern Sea Route, there was rapid industrial growth in Yakutiya, Kolyma, and Magadan (see p. 18). In the first two years of its existence the Arctic Central Directorate oversaw the building of the Norilsk mining and metallurgical works, and this was followed by the founding of a special organisation, "Norilskstroy". Tens of thousands of people, rounded up from all parts of the country, built the metallurgical industrial complex and the city in a snowy waste. Among the prisoners were the explorer of Severnaya Zemlya and one of the actual discoverers of the nickel deposits at Norilsk, the distinguished geologist N.N. Urvantsev, one of the first General Secretaries of the Komsomol A. Milchakov, the famous writers and political commentators Aleksey Garri and Evgeniy Ryabchikov, the Kalmyk National Poet David Kugultinov, the National Artist of the USSR Georgiy Zhzhenov...[148]

Other victims of Stalin's terror were a series of personalities connected to Glavsevmorput: N.I.Pakhomov, People's Commissar for Sea and River Transport, S.A. Bergavinov, Political Commissar of the Glavsevmorput, N.N.Kuzmin, leader of the Archangel Territorial Management of the Glavsevmorput, R.L.Samoylovich, Director of the Arctic Institute, and B.V.Lavrov, who built the industrial plants at Igarka and Nordvikstroy. NKVD, the secret police, showed no mercy, not even for the heroes of the "Chelyuskin". Of these, A.N.Bobrov, I.Ya. Bayesk and P.M. Khymyznikov were arrested; they were later executed or died in jail.[149] Thousands of those who built the Norilsk Prison Camp (Norilsklag) were worked to death, or died of starvation or scurvy, and many were shot.

In this reign of darkness there were a few bright spots. We must mention Avraamiy Pavlovich Zavenyagin, a leading figure in Soviet industry and the Director of the Norilsk complex, and the part he played in saving the lives of hundreds of specialist workers.

> "The Director hadn't been at the site where they were building this industrial complex beyond the Arctic Circle for a week, before he ordered the setting up of something that was unheard of in those days, and even now - a planning department with more than 600(!) workers. It would be hard to overestimate its role in the building of the complex, but it was certainly a "safe harbour" for the experts working in it."[150]

In 1966 the newspaper "Pravda" wrote of A.P. Zavenyagin: "He saved a lot of people... It was not just personal philanthropy. He gave courage to the weak, gave self-esteem to people in despair, and made everyone believe in the importance of their work. He gave people the greatest thing that it was in his power to give - an aim in life".[151]

4.11 Glavsevmorput under heavy criticism

During the 1930s Glavsevmorput had developed into "a veritable Arctic Empire" (Richard Vaughan): it had taken control of all economic development in Siberia north of 62° north and had become a state within the state.[152] The expansion of Glavsevmorput's functions during the 1930s was reflected in the size and structure of its budget. In the first five years of its existence, from 1933-1937, it was allocated a total of 922 million roubles from the State budget, and its yearly financing increased from 18 million roubles in 1933 to 400 million roubles in 1937. However, the management structure in the Arctic was cumbersome, difficult to direct, and came into conflict with the system for managing the country's production which was now fully-developed. But the chief problem was that it was not conducive to the speedy fulfilment of its main task - the opening-up of the Northern Sea Route.

The failure of the 1937 navigation season holds a special place in the history of the Northern Sea Route. 26 out of 64 Arctic freighters and icebreakers were frozen in, among them three powerful icebreakers, "Krasin", "Lenin" and "Litke". The targets for the shipment of freight were not met. The leaders' choice of personnel for the maritime operations had been unsatisfactory in both the western and eastern sectors. They had

neither appropriate training nor experience. The ice forecasts were inaccurate. The Arctic and merchant fleet was not properly fitted out for the navigation season, the ships did not have a full supply of coal for the route, and the ice reconnaissance planes were diverted from August 1937, that is, at the height of the navigation season, to the search for S.A. Levanevskiy's plane, which had vanished in the Central Arctic (see p. 49). Many of the leaders of Glavsevmorput had been distracted by preparations for the expedition to the North Pole in May 1937 to put into operation the first drift station.

The vessels forced to overwinter were distributed in the following way: "Litke", "Mossovet", "Uritskiy", "Pravda", "Krestyanin" and "Molokov" were ice-bound at the south-eastern extremity of Ostrov Bolshevik. In the western part of Laptev Sea "Lenin", "Tovarishch Stalin", "Ilmen", "Rabochiy", "Dikson" and "Kamchadal" were drifting, and on January 23 1938 "Rabochiy" sank. "Krasin" was standing in Bukhta Kozhevnikova - and at the estuary of Olenek - the motor-boat "Smolnyy". At the Belkovskiy Island "Sadko", "Sedov" and "Malygin" were drifting, and later they were carried by the ice into the Arctic Ocean. At Dickson Island six freighters overwintered with timber from Igarka. In Bukhta Tikhaya on Franz Josef Land stood the steamers "Proletariy" and "Roshal", as well as the icebreaking steamer "Rusanov". By the beginning of the 1938 season all these vessels were freed from the ice, not the least thanks to the efforts of the icebeaker "Yermak", "the grandfather of the icebreaking fleet", under the command of M. Ya. Sorokin. During the 1938 season "Yermak" covered 13,000 nautical miles and freed 17 vessels from the ice.[153]

In a USSR Government decree dated the 28th March of 1938, the basic causes of the failure of the 1937 navigation season were pointed out: "Poor organisation in the work of Glavsevmorput, complacency and arrogance".[154] In August 1938 the Government of the USSR once again debated the question: "On improving the work of Glavsevmorput". The errors were admitted, and a Government decree set out ways of correcting them, and directed the attention of Glavsevmorput to implementing its main

task - that of transforming the Northern Sea Route into a reliable and fully operational shipping route.[155]

The catastrophe of 1937 shook the administration of the Northern Sea Route to its core. Following this decree the process was put into reverse - Glavsevmorput was divided into smaller units, and freed of its peripheral functions. On the 29th of August 1938 a resolution was passed by the Economic Council of the USSR Government: "On the transfer of enterprises of Glavsevmorput to other organisations".[156] The distribution networks were handed over to the People's Commissariat of Trade (Narkomtorg), Tsentrosoyuz (Central Union of Consumer Associations of the USSR) and Dalstroy, which was a department of the NKVD; the collective and animal husbandry farms went to the RSFSR People's Commissariat of Agriculture - Narkomzem); the fisheries and fish-canning factories were transferred to the People's Commissariat of Fishing Industries (Narkompishcheprom); the Archangel Oblispolkom (Regional Executive Committee) took over responsibility for all economic activities on the island of Kolguyev; the fur procurement offices and various other functions were transferred to Tsentrosoyuz and Dalstroy. In accordance with the Government decree and a series of further resolutions, economic and cultural services for the peoples of the North were entrusted to the local organs of Soviet power.[157] Otto Shmidt was relieved of his duties and went on to work in the USSR Academy of Sciences. The famous Soviet polyarnik Ivan Papanin, the leader of the first drifting station, who, while on the North Pole in May 1937 had hung a picture of Stalin on the wall of his tent, was appointed the new Head of Glavsevmorput.[158]

However, the reorganisation of Glavsevmorput and the quite justified criticism of the inadequacies in its work did not affect the authority of the Polar Central Directorate. Glavsevmorput's importance in the eyes of the Party Central Committee and the Soviet Government was not diminished. The XVIII Party Congress, held in March 1939, set the Soviet polyarniks a specific task: "By the end of the third five-year plan, to make the Northern Sea Route into a normal working shipping route, providing a reliable and stable link with the Far East".[159]

This resolution became the basis for Glavsevmorput's further operations.

The Arctic navigation season of 1939 was remarkable. Its organisation and execution followed a precisely defined system, with new methods of aerial reconnaissance, icebreaker escorts, and wide use of long-term and short-term synoptic forecasts and other scientific material.[160] These measures meant that the ships were fully loaded on the return voyage, and there was high-quality processing of cargo in the base ports of Archangel and Murmansk. 34 ships took part in the 1939 navigation season, of which 27 were engaged in the Kara operations. Altogether, 119.5 thousand tons of assorted freight were carried on the Northern Sea Route, which represented a 118.1% overfulfilment of the plan.[161]

During this period a great deal of work was done to ensure the safety of Arctic shipping - an essential prerequisite for the opening-up of the Northern Sea Route. When the "Sibiryakov" made its voyage along the whole length of the route, there was not a single lighthouse, but by the start of the 1939 navigation season there were already 11 lighthouses and 315 beacons. The Hydrographic Administration of Glavsevmorput had published sailing directions and over 60 charts covering the Arctic seas from Novaya Zemlya to Bering Strait.[162]

The last pre-war navigation season (1940) showed clearly how much Glavsevmorput had achieved towards implementing the Party's directive to make the Northern Sea Route into a normal working shipping route. 27 freighters took part in the navigation season. Freight operations on the Northern Sea Route reached a total of half a million tons. The increase in freight traffic over the six years that the main Arctic shipping route had been in use was almost 26%.

Various Government organisations began to conclude that Glavsevmorput had carried out its task, and could now be disbanded. However, the Central Committee of the Party steadfastly condemned this position, and what is more, Stalin stated that "... there is still insufficient freight being shipped along the Northern Sea Route, and it must be increased

at least 5-6 times". In order to carry out this task, it was essential not to disband Glavsevmorput, but to strengthen it by all possible means.[163]

On the 12th of December 1940 the Central Committee and the Government passed a resolution aimed at further improvement in Glavsevmorput's operations. This resolution proposed that Glavsevmorput's main purpose should be changed from expeditionary voyages to systematic navigation throughout the whole length of the Northern Sea Route. For this task to be fulfilled, the People's Commissariat for the Shipbuilding Industry undertook to design and build several powerful icebreakers of between 30 and 45 thousand h.p. The plan was to bring the number of sea-going ships in the Arctic to not less than 40 units by the 1943 navigation season.[164]

4.12 The Northern Sea Route during the Second World War

However, the plans for a far-reaching programme of development for the Arctic and the Northern Sea Route were fated not to be fulfilled. Nazi-Germany's attack interrupted the peaceful construction of the Soviet polyarniks and left these plans for peaceful construction in ruins. However, the Glavsevmorput was still a fundamental force in the Far North, and as such was called upon together with the Northern Naval Fleet to organise the defence of the Arctic seas and coasts.

The Soviet Government turned Glavsevmorput into a military organisation, and subordinated its activities to the main task - the defeat of the enemy. The leaders of Glavsevmorput, the polar captains, pilots and other groups of polyarniks were given military ranks. Many polyarniks were also called up into the Red Army and Navy. The Head of polar aviation at Glavsevmorput M.I. Shevelev left for military service in the Long-Range Air Command (ADD), the Head of the Mining and Geological Administration V.I. Belozerskiy was appointed Divisional Commander, the polar captains V.I. Voronin, P.A. Ponomarev, A.A. Kacharava, M.G. Markov, and N.I. Khromtsov became ship's Commanders, and the pilots M.V. Vodopyanov and I.P. Mazuruk were called up into the

Air Force.

During the war the Northern Sea Route became an important transport link, along which military and domestic trans-shipments were made. Certain types of armaments of Russia's war-time allies were also supplied via this route. To facilitate Arctic navigation the whole of the Northern Sea Route was divided into a western and an eastern sector. The boundary of the western sector was decided by agreement as being from the Barents Sea to the Arctic port of Tiksi, and that of the eastern sector from Tiksi to the Pacific Ocean. In each sector the headquarters of naval operations was responsible for the passage of ships.

Archangel and Murmansk were the chief ports of the western sector. On the 15th of October 1941 the Head of Glavsevmorput (attached to the Council of Peoples' Commissars of the USSR), I.D. Papanin, was summoned to the State Committee for Defence. At this meeting Stalin remarked that "the port of Archangel has and will have in the near future a particularly important role". [165] On that very same day the decision was made to appoint Papanin as plenipotentiary of the State Committee for Defence on transport in the North.[166] On the 17th of October 1941 Papanin arrived in the maritime capital. The headquarters of the plenipotentiary of the State Committee for Defence were allocated special accommodation in the House of Soviets in Archangel which was equipped with every means of communication. The headquarters were staffed with the help of the local Party, Councils and military organisations.[167]

A.A. Afanasyev, the first deputy minister of the Sea Fleet, was appointed to the State Committee for Defence as plenipotentiary for trans-shipments in the Far East.[168] From the very beginning of the War there were some crucial questions relating to the evacuation of the most valuable mining plant from the Arctic Front zone. Ships of the Northern Sea Fleet brought out mining plant of the Soviet coal concession "Arktikugol" (in Spitsbergen) and stocks of mined coal. On the 29th of August 1941 a passenger ship arrived in Archangel escorted by the British cruiser "Nigeria" and three destroyers. It was on these ships that the Soviet miners sailed from the island of

Spitsbergen.[169]

Dismantled plant from the conglomerates "Severonikel" and "Guzhdostroy", together with raw materials for Norilskstroy, were shipped out to Archangel via the ports of Kandalaksha, Kem and Belomorsk. In the period from the 5th July to the 8th October alone, some 100 thousand tons of evacuated plant and 97 thousand workers were moved out of Kandalaksha.[170] In the 1941 navigation season, in accordance with the State plan, 16 ships set off from Archangel for the Barents Sea. The steam ships "Pinega", the "Uzbekistan", the "Shchors" and the diesel ship "Clara Zetkin" delivered to Dudinka the dismantled plant from the Monchegorsk copper nickel complex for the Norilsk nickel factory.[171] Thanks to people's selfless work, the "Small Metallurgical Factory" in Norilsk was producing its first nickel by April 1942. Within a year, in March-April 1943, the construction of a large electrolyte section was underway.[172]

On the 31st of August 1941 the first convoy of allied ships appeared in Archangel at the Severnaya Dvina dock, which included 6 British freighters, 2 torpedo-boats, 3 escort ships and 4 mine-sweepers. The ships carried cargoes of planes and mines. The overall responsibility for servicing these foreign ships fell to P.I. Dikiy, the deputy director of the commercial port. Immediately after unloading, the assembly of hurricanes began, which was complicated by the lack of sophisticated assembly equipment. This had to be hastily manufactured in Archangel factories.[173]

The unloading of the first convoy of allied ships exposed the shortcomings of the port of Archangel in the speedy processing of military cargo. Once again, on the 29th of July 1941 the Province Committee of the Party (Obkom) and the Province Executive Committee (Oblispolkom) turned to the Council of Peoples Commissars of the USSR and People's Commissariat of Communications with a request that funds should be allocated to the construction of a railway line from the port of Bakaritsa to the port of Ekonomiya.[174]

The Soviet Government and the State Committee for Defence passed decrees, making provision for a wide programme of

construction work in the port.[175] Some 30 assorted cranes and a great deal of other equipment were transferred to Archangel from Leningrad, Murmansk, Pechora and other ports. It was also planned to rebuild quays, warehouses and link routes to Bakaritsa and Ekonomiya. Rails, timber and other material were earmarked for the needs of the port.

So far we have only described the very first arrival of a convoy of allied ships. In 1941-45, 42 allied naval convoys arrived in Murmansk and Archangel, and 36 left Russia for Great Britain and the USA. Out of 813 shipments made by convoys to Russian ports under lend-lease, 58 were sunk by the enemy. In the opposite direction 717 freighters left Russia - two of which sank. During the passage of the northern allied convoys more than 20 allied warships were sunk by the enemy. Losses to the German fleet during this time were: 2 battleships, 3 destroyers, 27 submarines, and a large number of planes.

During the war years the Allies placed in Russia more than 22,000 aeroplanes, nearly 13,000 tanks, hundreds of thousands of vehicles, a great deal of other military equipment, armaments, and provisions - totalling 11 billion (US), 260 million, 344 thousand dollars.[176] During the Cold War this aid to the Soviet Union from its war-time Allies did not feature in the pages of the history of the convoys. Soviet readers knew nothing of the bravery of the sailors from Britain, USA, Norway, Canada, France and Poland. It is only thanks to the fundamental changes in international politics that the true history of the Arctic convoys has been brought to light. Only now do Russian readers know of the legendary Norwegian motor vessel "Arthur" and its fearless captain Leif Larsen, who throughout the War supplied the allies with invaluable information on the German fleet, and who inundated Norwegian ports with intelligence agents and saboteurs, and in October 1942 with two torpedoes went into single armed combat with the giant German battleship "Tirpitz".[177]

The shipment of food and fuel to polar stations and northern ports played a significant role. On the whole, Arctic navigation in the western sector of the Northern Sea Route ran smoothly.[178] So did the navigation in the eastern sector. More

than 67 thousand tons of cargo were transported on ten freighters. This represented 138.8% of the Plan.[179] Nevertheless, it could have been more. Thus the board of Glavsevmorput sent the Party Central Committee a special memorandum "On the use of the Northern Sea Route for military trans-shipments during the navigation season of 1942". In it was stated: "With the icebreaker services at our disposal the Northern Sea Route will be using no more than 1/3 of its carrying capacity".[180] It was proposed to exploit the Arctic route more effectively for the transport of strategic raw materials equipment and all necessary goods for the Urals, Siberia and Far Eastern regions of the country. The Party Central Committee upheld Glavsevmorput's proposal and freight turnover along the Northern Sea Route increased year by year.

The real strength of the Northern Sea Route was its icebreaker fleet. The Nazi military command from the very first days of the War attempted with all its might to sink Soviet icebreakers. The 9th of August 1941 turned out to be one of the hardest for the crews of the "Lenin" and the "Stalin", when an enemy force numbering 70 planes carried out a raid on the port of Murmansk. Soviet fighters led a sustained air battle with the German planes, but some of them managed nevertheless to penetrate to the docks. Three planes targeted the "Lenin". By means of a brave manoeuvre, Captain N.I. Khromov saved the vessel from a direct hit. Although the ship was holed up to 80 times, it was already back in service by the 15th of August after repairs and it set about carrying out its crucial commands tasks.[181] The attempt by the Germans to sink other Soviet icebreakers also failed.

From the beginning of hostilities the German military-naval command sent submarines to the Barents Sea with the aim of hindering the movement of Soviet freighters navigating along the Northern Sea Route. To confuse the enemy, precautions were taken along the whole of the Arctic route: ships did not follow their usual routes, at night they sailed without lights, and in fog and bad weather without audible signals. Radio stations only received incoming messages. Many navigational safety measures were

dropped.

Nazi Germany also made use of surface ships to disrupt Arctic transport. Thus, in 1942, they began operation "Wunderland". The heavy cruiser "Admiral Scheer" was sent to the Arctic to sink Soviet merchant vessels. However, the operation ended in failure. Looking back on these events, the commander of the Northern Fleet, Admiral A.G. Golovko, later wrote: "I salute the bravery and heroism of the polyarniks - the crew and staff of the scientific station on board the "Sibiryakov", the crew of the "Dezhnev" and the "Revolyutsioner", the artillerymen and dockers of Dickson - they all fulfilled their duty as Soviet patriots. The rebuff they meted out to the German raid, wrecked the Nazis' plans".[182]

The supply of essentials to many of the enterprises of the North, Siberia and the Far East, to polar stations and Arctic islands depended on the Northern Sea Route. Sailors, dockers and polyarniks carried out their assigned tasks with honour. Suffice it to say that the icebreakers of Glavsevmorput alone escorted 815 ships with 2.3 million tons of cargo to the ports of Siberia and the Far East.[183]

Goods supplied by the Allies were shipped along the Eastern sector of the Northern Sea Route. From 1942 onwards, Soviet freighters loaded with imported cargo began to arrive at Bukhta Provideniya from the American ports of San Francisco and Seattle, and in that year 23 voyages were made and 64 thousand tons of freight were delivered.[184]

The Northern Sea Route played a great role in supplying all essentials to eastern parts of the country, especially Yakutiya. During the War years, the Yakutian ASSR obtained more than 50% of its goods via the Northern Sea Route.[185] This released the Trans-Siberian railway line for the transport of military equipment. The construction of port-based industrial enterprises in the Arctic was not curtailed during the war years, and geological prospecting was carried out extensively. In 1941 a coal mine was built in Bukhta Ugolnaya, Anadyr Bay. Later, deposits of borehole coal were mined at the mouth of the river Sogo, and a salt mine in Nordvik began operating.

Thanks to this, the Arctic fleet obtained supplementary fuel supplies and salt was available for the needs of the Norilsk complex and for those of the fishing industry of Kamchatka Oblast. In the Yana river basin and the Pevek region tin was mined, as were other minerals and these were mainly shipped out via the Northern Sea Route.[186] Northerners toiled with all their might during these hard times in all branches of the national economy of Archangel Oblast. Many factories turned out defence products: weapons, bombs, mines, grenades, wind-sledges [i.e. snowmobiles driven by wind], military clothing and footwear etc.

The Archangel ship repairers carried out a large amount of work. The shipyard "Krasnaya Kuznitsa" played a particularly important role in converting merchant ships into naval ones, in the repair of warships, and in the output of defence production. In 1942 this workers' collective completed various contracts amounting to a total of 3,903 thousand rubles, which represented 130% over and above planned commissions. In that year northerners overhauled 34 warships of the White Sea Fleet to a high standard of work. The comments of Russia's war-time allies eloquently witnessed the selfless efforts of the workers and staff of "Krasnaya Kuznitsa". A senior British officer in a memorandum to the commander of the White Sea naval fleet remarked: "...Almost every naval vessel that arrived in port required some or other repair. Many ships [...] were in need of major repairs. In each case the work was carried out and completed quickly, moreover the standard of repair was first class satisfying all requirements[...]"[187]

From the very first days of the War, Murmansk Oblast entered into the military arena and it became the right flank of the Soviet-German Front. The Germans put great efforts into this area. The front-line and the regions around it came under continuous enemy air attack. Murmansk and its inhabitants had a particularly hard time. During the war years the city suffered 792 air raids, was hit by 4,100 high explosives and more than 181 thousand incendiary bombs. Three quarters of the housing stock was demolished. The Nazis bombed the commercial port 56 times,

and inflicted 40 air raids on the fishing port.[188] Under those difficult conditions of the front, Murmansk lived, fought and by its heroic work brought victory closer. It is not surprising that one of the foreign journalists visiting Murmansk in 1943 wrote: "You have to be Russian to remain here... If peace ever comes, then let it come more quickly to the people of Murmansk. They deserve it".[189]

Murmansk not only defended itself, but also set up the production of armaments, the repair of warships, and received and processed ships carrying vital domestic cargo at its port. On the 28th of August 1941 the Murmansk Obkom of the Communist Party passed a resolution "on the establishment of mortar, mine and grenade production in Murmansk Oblast". Great difficulties had to be overcome in order to carry out this resolution. Until the War, the Kola Peninsula had no defence industry. Its enterprises had no experience in casting steel. There were no blueprints, equipment, or the necessary grades of metal. In Glavsevmorput's ship repair yard, some 200 pieces of machinery had to be constructed in order to set up the production of armaments.[190]

During the Great Patriotic War the Murmansk dockers unloaded 250 ships and processed more than 2 million tons of military and domestic cargo, which represented a quarter of the cargo which reached our country by sea.[191] The work of the scientists and other staff of scientific institutions should be noted. In the first year of the War, a large number of Glavsevmorput's polyarniks were evacuated to Krasnoyarsk. The highly competent scientific group of the Arctic Institute was relocated here for the purposes of the 1942 navigation season. The Institute's expeditions carried out scientific research throughout the War.

The character of the hydrometeorological service was transformed. The method of forecasting had to be changed, since the availability of scientific data from the deep-sea section of the North Atlantic was curtailed. Soviet scientists set up an ice forecasting service based on Soviet data. Soviet hydrologists and weather forecasters discovered indices which allowed them to

compile forecasts without foreign data, based on a "reduced chart".

The polyarniks worked selflessly during the period of Arctic navigation at the polar stations and in the so-called "temporary polar field stations", and provided aircraft and ships in the Arctic with summaries of operations on ice conditions and the weather.[192] Already in 1936 military vessels "Voykov" and "Stalin" had been transferred from the European part of Russia to the Far East by way of the Northern Sea Route (see pp. 38-39). During the war years the Northern Sea Route was again used successfully for the passage of warships. In 1942, for the first time in the history of the Navy, within one navigation season a detachment of warships sailed from Vladivostok to Polyarnyy, which included the flagship "Baku", the destroyers "Razumnyy" and "Razyarennyy". Captain of the First Rank V.N. Obukhov led the detachment, and the overall direction of ice operations was undertaken by the Deputy Head of Glavsevmorput M.P. Belousov.[193]

This expedition, named the "Special Purpose Expedition" (EON-18) set out from Vladivostok on the 15th of July 1942. Glavsevmorput's icebreakers the "Mikoyan", the "Stalin" and the "Krasin" escorted the warships through the ice. The hull of the torpedo boats was protected from the ice by a special construction in the form of wood and metal "overcoats" built by Engineer-Captain A.I. Dubravin. The polar air-pilot I.I. Cherevichnyy displayed great skill in searching for leads through the ice.

On the 14th of October 1942 EON-18 safely entered Kola Bay after 923 sailing hours at an average speed of 8 knots, having covered 7,327 miles which included some 1,000 miles in ice. [194] The successful passage of ships of the Pacific Fleet along the Northern Sea Route convincingly demonstrated the potential for a wide range of manoeuvres by ships from the Soviet Navy.

Included in the number of important operations carried out during the War on the Northern Sea Route, one must mention the transfer of river ships from the Pechora to the Ob. In July-August 1943 a convoy of 15 river tug-boats safely reached

Novyy Port in stormy conditions. This difficult operation was commanded by Captain of the First Rank A.K. Yevseyev.[195]

One of the bright pages in the history of northern navigation during the war years was the convoy "AB-55". In September 1943, by order of the Supreme High Command, 15 freighters located in the Kara Sea were kept for overwintering at the port of Dickson. Only the icebreakers "Stalin" and "Litke" were made ready for escort out of the Arctic, the bare minimum for operations in the White Sea. Due to the threat from submarines during the passage of the icebreakers, it was proposed to set up safeguards using warships from the Northern Naval Fleet. The convoy received the code name "AB-55" (Arctic-White Sea-55). Responsibility for carrying out this important national task fell to the commander of the Northern Fleet Vice-Admiral A.G. Golovko, who, along with a group of field-rank officers, directed operations from Archangel. The direct command of the icebreakers and their export operations was given to the commander of the White Sea naval flotilla, Rear Admiral S.G. Kucherov.[196] He also hastily flew out to Dickson.

Convoy "AB-55" was successful. In a report on the fulfilment of the Government's mission, it was noted that during their time at sea the ships sailed 2,600 miles, of which 1,600 were in ice. The warships inflicted on the enemy significant losses - two submarines were definitely sunk, and possibly one if not two sustained damage.[197]

The attempt of the enemy to destroy Soviet icebreakers and export freighters did not succeed. The war demanded of Soviet sailors and polyarniks enormous reserves of strength, and the ability to work in extreme conditions. Suffice it to say that the volume of freight alone shipped along the Northern Sea Route increased from 1940 to 1945 by 64.6%. Moreover, as a result of changes in the direction and structure of freight transportation, its volume, in ton-miles, increased significantly more, i.e. by 150%, than the volume of freight in tons.[198]

The assault of Nazi Germany on the USSR cut short the expansion of the Northern Sea Route. Planned operations were postponed to more favourable times or were significantly

curtailed. Arctic expeditions were recalled and, in the light of the demands of the naval war command, the tasks of the sea fleet, and those of the trawling, fishing and icebreaker fleets were re-appraised, as were also polar aviation, ship building schedules, ship repair yards and other enterprises.

Soviet icebreakers played a uniquely vital role in White Sea freight shipping, winter-spring operations in Strait of La Pérouse and along the whole of the Northern Sea Route. Thanks to the bravery and heroism of the Soviet sailors, the enemy were unable to put more than a single icebreaking freighter out of action; the "Sibiryakov" was sunk by enemy action and in addition the "Malygin" and "Sadko" were sunk by accident during the Second World War. The restructuring of Glavsevmorput activities in the new situation speeded up the conversion of the North's industry onto a war footing, and led to the successful import of armaments, thus strengthening the role of the Northern Sea Route, which during the War became our country's impregnable bastion, a lifeline for many distant regions of the European North, Siberia and the Far East.

TRAFFIC ALONG THE NORTHERN SEA ROUTE IN WARTIME: 1941-1944

Year	Number of transport vessels	Traffic volume (ths. tons)
1941	44	165.6
1942	47	177.5
1943	47	298.3
1944	61	375.9
Total	199	1017.3

Source: Y.Ivanov et al., INSROP Project IV.1.1 "Historical and Current Use of the Northern Sea Route", St Petersburg 1994, p.15.

4.13 The post-war period

In 1940 the Bureau of Economic Research of the Glavsevmorput was

reorganised, and became the Economics Department of the Arctic Scientific Research Institute (EKO ANII). It attracted many great economic scientists to its staff, among them the academicians V.N. Obraztsov, S.G. Strumilin, and N.N. Nekrasov, and Professor A.Ye. Probst.

While the War was still going on, the Board of Glavsevmorput set EKO ANII the task of working out the prospects for the development of the Northern Sea Route in the post-war period. A report was prepared on "The outlook for Glavsevmorput's activities in 1944". This examined a wide range of questions: the results of Glavsevmorput's activities to date; ways of developing the economies of the Northern Sea Route's hinterlands in the Asian north; the possibility of international links in the exploitation of the Northern Sea Route (a question first studied by the Institute of World Economics of the USSR Academy of Sciences); the prospects for the construction of new transport infrastructure in the North in relation to the Northern Sea Route. The need for post-war development of the timber industry in the Angara, Yenisey and Ob river basins was also discussed, as was the need for increased output of minerals in the Asian north, the prospects for transit shipments via the Northern Sea Route, the need to build powerful diesel-powered icebreakers of 25-30 thousand h.p., the creation of an ice-class merchant fleet, and many other questions.

After the end of the War the Soviet people were faced with the task of rebuilding the national economy and converting it to peaceful ends. During the war years the national economy of the European North suffered greatly. For example, the damage inflicted on Murmansk Oblast alone amounted to 920 million rubles. The losses sustained by the Arctic transport fleet, the polar ports and stations were keenly felt. It is not possible to measure human losses. Thousands of sailors died at the fronts and did not return from their military duties in the transportation of military cargo and goods for the national economy.

It was up to the hard workers of the Arctic basin to rebuild the damaged war economy and at the same time begin an active offensive on the Arctic from all fronts - training, navigation,

development of coastal industries, the construction of new ports, enterprises, and an extensive political and cultural programme of education with the population of the Far North. The North's industry expanded rapidly, entering on its post-war phase in two stages. In the first post-war five-year plan, production was re-established principally in the European North where the aim was to reach the pre-war level. The years of the fifth five-year plan were characterised by the further development of the national economy both in industry and transport. A new phase began in 1957 - the rapid expansion of industry initiated by organisations of the Sovnarkhozy (Councils of National Economy) of Archangel, Murmansk, Tyumen, Krasnoyarsk, Yakutsk and Magadan. A new organisational structure for industry and administration enabled more effective use of natural resources.

Already during the war years, by special decree of the Government dated the 7th of August 1944, the geological-prospecting conglomerate "Arktikrazvedka" was established attached to the Mining and Geological Administration of Glavsevmorput.[199] In 1948, by decree of the Council of Ministers of the USSR, a scientific-research institute of the geology of the Arctic was set up in Leningrad, and was part of Glavsevmorput's system.[200]

On the 14th of July 1950 a decree of the Council of Ministers of the USSR was passed obliging Gosplan and the Academy of Sciences to draw up and present for approval a wide ranging plan of measures for the development of the Ural-Pechora coal and metallurgical base. This resolution predetermined the creation of a new coal and metallurgical base which was of prime importance to the development of the production forces of the polar regions.[201a]

There was a great deal of industrial construction in the city of Norilsk, where more than 20 enterprises were set up, the most important being the A.P. Zavenyagin Norilsk Mining Company which started up in the war years. With each year the mining of nickel, cobalt, coal and copper increased. After Nikita Khrushchev's so-called "secret" speech at the 20th Party Congress in 1956, where he denounced some aspects of the Stalinist

repression and introduced a period of destalinization, it was no longer possible to go on using forced-labour in the Arctic, and Norilsk and other mining enterprises in the North had to change to recruit paid workers and introduce new machinery. In the long run the prospects of the Norilsk mines were not very bright, but the situation changed when during the 1960s director V.Yu.Dolgikh carried through an intensive geological survey of the area and new and rich veins of ore were discovered.[201b)

In the post-war years the tin mining industry was set up in the north of Yakutiya. The Yana-Indigirka region and Kolyma with its gold mining industry became, along with the mines of Aldan, the largest industrial centre in the east of the USSR. The development of the diamond industry in the Vilyuy region was of special significance. In 1956 the country received its first batch of Yakut diamonds.

A great deal of work was carried out on the construction and enlargement of the port of Igarka on the Yenisey. By 1945 the Igarka timber complex began processing timber for export, and the first consignment was exported in 1947. In 1948 the timber complex provided the country with 44.5 thousand cubic metres of sawn timber over and above the plan. In 1956 three large timber processing complexes were already in operation in Igarka and they produced 10% of the entire sawn timber production of Krasnoyarskiy Kray.[202]

Already from 1957 the Northern Sea Route together with the extensive river system on the mainland had a real economic impact over a vast area. Thanks to this mining enterprises could be set up in the silent wide open spaces of the North, where coal, non-ferrous metals and minerals were exploited. There were significant changes of direction in the flow of freight, and this also affected the Asian north (particularly the north east). In particular, the coming of the railways to the navigable reaches of the river Lena (Osetrovo) brought with it trans-shipment via this river to the basins of the rivers Yana, Indigirka, and Kolyma, and regions of the Arctic coasts. For cargo en route from the European parts of Russia, the shipping costs by the direct sea route via Archangel were still slightly lower in comparison

with sending them via Osetrovo and the river Lena transit route.

A calculation of comparative shipping costs from European Russia, the Urals, and Siberia to the Soviet Far East and north-east by the three available routes: the Northern Sea Route, the Southern Sea Route through the Suez Canal (for European goods) and the route via the Siberian railway and then by sea to the destination (Sakhalin, Kamchatka, and Magadan Oblasts) is revealing. It shows that for all types of freight, whether originating in European Russia (from the Moscow region northwards), the Urals or Siberia, shipping costs via the Northern Sea Route were lower than for any of the other possible combinations, and this was true for all destinations right up to Korsakov (Sakhalin). This meant that Magadan, Kamchatka and Sakhalin Oblasts all came into the Northern Sea Route's sphere of influence, as far as European goods were concerned.

The Economics Department of the Arctic and Antarctic Scientific Research Institute (EKO ANII) analysed the statistical data for 1953 and 1954 on deliveries of freight to these regions from European Russia, the Urals and Siberia. It concluded that, taking into account the seasonal nature of shipping via the Northern Sea Route, it would have been more economic to send 300 thousand more tons of freight via the direct sea route in the years in question, if there had been enough freighters and icebreakers.[203]

Together with the expansion of major construction in the North, the demand for Lena timber increased and its production of processed timber grew from a million cubic metres during the War to over three million cubic metres in 1955.[204] In this connection the Northern Sea Route was to grow more important since it had to be used to supply these regions with a large number of essential economic goods. The annual supply of goods and passengers to the polar stations, the maintenance of the Yenisey transport organisation, trans-shipments to Khatanga, Olenek, Yana and Indigirka - these were far from the full list of shipments made by the transport fleet along the Northern Sea Route during the post-war years.[205]

In the 1940s and 50s timber freighters of pre-war construction, and also ships of the type "Andizhan", "Elton", and "Liberty" constituted the basis of the transport fleet. The Archangel and Murmansk ship repair yards carried out really heroic work on repairing and restoring sea-going ships which were damaged during the Second World War. The refitting of the "Tbilisi" was a memorable landmark in the life of the workers at the Archangel shipyard "Krasnaya Kuznitsa". The ship had been torpedoed in the bow by a German submarine. Another ship of the same type, which had worked heroically on sea routes, sustained damage mainly in the stern and was lost. And so they had the clever idea of creating a vessel out of two ships. This experiment, unprecedented in the history of ship repair, was carried out by the workforce of the body-welding section. An excellent ship left the dock. The "Tbilisi" sailed the Arctic for a long time. It transported thousands of tons of industrial goods as part of the Murmansk Shipping Company.[206]

New ships were built of the standard class: the "Captain Gastello" (1945), the "Donbass" (1952), the "Saltykov-Shchedrin" (1952), and "Stavropol" (1953).[207] In 1955 the Northern Shipping Company (Archangel) received three Finnish-built timber freighters of three thousand tons displacement. In all, trans-shipments of freight along the Northern Sea Route increased in tonnage by 81% in the sixth five-year plan [which in actual fact lasted only three years (1956-1958), before being succeeded by a new seven-year plan (1959-1965)]. The main task of the Northern Shipping Company was transporting Pechora coal from the port of Naryan-Mar to the ports of Murmansk and Archangel, and shipping timber from the northern ports of Archangel, Igarka, Umba, Onega and Mezen. Thus Archangel remained the major staging post for Arctic freight.[208]

4.13.1 The Expedition for Special Maritime Conveying of River Ships

The post-war development of Siberia and the Far East necessitated among other things the exploitation of its river system

stretching from south to north. But the problem was how to provide the Ob, Yenisey, Irtysh, Lena and other rivers with the necessary fleet.

There were two ways of getting river ships from the west to the east - by railroad in a dismantled state and then reassembled, or ferrying them via the Northern Sea Route, an operation which had been carried out successfully in 1905 and again in 1914. It was quite obvious that the second method, though very difficult from the point of view of sailing conditions, was more economical, and on the 24th of April 1948 the Council of Ministers of the USSR passed a resolution "on the transfer of ships of the USSR Ministry of the River Fleet for the 1949 navigation season on the Ob and Yenisey". It was left to Glavsevmorput to render assistance to the convoy by providing ice reconnaissance vessels.[209] Shortly afterwards the Arctic Expedition was set up to carry out preparatory work and to recruit northern sailors for the transfer of ships. It later acquired the name "Expedition for Special Maritime Conveying of River Ships".[210]

Included in the 1949 expedition were modern motor vessels, tug-boats, metal barges, lighters and dredging gear. In May 1949 the USSR Ministry of the River Fleet confirmed the appointment of F.V. Nayanov as leader of the expedition, which left Archangel on the 6th August 1949.[211] In the severe Arctic conditions, sailing in fog and ice, the expedition successfully reached the appointed destination.[212] In the post-war history of the Northern Sea Route the passage of low-tonnage fishing vessels from west to east also played an important role. The transit of these ships was necessary because the USSR's fishing industry had incurred heavy costs during the transfer of ships to the Far East along the Southern Sea Route. In the event, the seiners and trawlers had arrived at the Pacific Ocean too late and had not been able to take part in the autumn fishing season. Opening-up the Northern Sea Route enabled the problem to be resolved successfully.

The first passage of fishing vessels along the Northern Sea Route was accomplished during the navigation season of 1951, when

53 ships reached the Pacific Ocean from Murmansk escorted by icebreakers.[213] In 1955 ferrying of fishing trawlers was again carried out along Arctic seas to Petropavlovsk-Kamchatskiy. Navigation through ice was very difficult. The sailors, who were in the main students from the Leningrad and Klayped naval colleges, passed this difficult test with flying colours. The young Komsomol crews of seiners No. 819 and No. 827 excelled themselves in this task.[214] Later on, the mass ferrying of fishing vessels and river ships along Arctic seas became an annual event.

4.13.2 Scientific research in the post-war period

After the end of the War, the polar stations, which had been abandoned and damaged by the Germans, resumed their work. Scientific research in the seas of the Arctic Ocean and its Eurasian coast was restarted with renewed vigour, and scientific expeditions were organised in the Soviet Arctic. By 1946, polyarniks had carried out the first post-war comprehensive oceanographic expedition aboard the icebreaker "Severnyy Veter", whose aim was the study of so-called high latitude variations of the Northern Sea Route.[215]

Good results were obtained from the airborne expedition "Sever", which carried out comprehensive scientific studies of huge areas of the Arctic Basin. This work was accomplished mainly with the aid of aircraft which landed on the ice. The first post-war expedition of 1948 with aircraft belonging to the polar aviation produced one unexpected result: the discovery of a giant submarine ridge, dissecting the Arctic Ocean into two parts, east and west. These discoveries by Soviet polar scientists led to changes in previously held ideas about the Arctic Ocean.

The Arctic Scientific Research Institute played a leading role in scientific research of the Arctic. Many young people were attracted to scientific work. In 1952 alone, out of the Institute's total number of researchers 40% were Komsomols working along the Northern Sea Route and on expeditions.[216] To open up the whole of the Northern Sea Route and to meet the

demands made on the weather service, long-term weather forecasts were resumed on the scientific drifting stations. In 1950 the drifting station "Severnyy Polyus-2" was set up under the direction of M.M. Somov. In 1954 two polar stations were simultaneously opened, and they were "Severnyy Polyus-3" (Director A.F. Treshnikov) and "Severnyy Polyus-4" (Director Ye.N. Tolstikov).

The work of the drifting polar stations in the Arctic was very extensive. In the space of only three years (1954-57) Soviet drifting stations carried out more than 25 thousand meteorological observations, sent out more than 8 thousand radio-sondes and pilot-balloons, made some 40 thousand measurements of water temperature and more than 3 thousand depth measurements.[217] The first reliable chart of the deep waters of the central part of the Arctic was compiled. In 1954 the activities of the Arctic Scientific Research Institute were discussed at a meeting of the Praesidium of the USSR Academy of Sciences. It was noted that in the post-war years Soviet scientists made some remarkable discoveries in the Central Arctic, notably, the vast submarine ridge, which dissected the Arctic Ocean. The Praesidium of the USSR Academy of Sciences accepted the proposal made by the Arctic Scientific Research Institute to confer the name of M.V. Lomonosov on the ridge.[218]

In 1955 the ice cutter "Litke" left on a scientific mission with an expedition from the Arctic Institute on board (the expedition's leader was L.L. Balakshin and the captain was V.I. Potashnikov). The scientists successfully carried out oceanographical studies in the region of the continental shelf. A new record for unescorted navigation northwards from Franz Josef Land was achieved during the expedition.[219]

As a result of long term scientific investigations, Soviet polar researchers discovered an underwater mountainous region consisting of the Lomonosov, Mendeleyev and Gakkel ridges and other elevations, separating these ridges with vast hollows and depressions. This discovery was rightfully acknowledged by the world's scientific community to be one of the most remarkable

discoveries of the 20th century.

In the post-war period the opening-up of the Arctic proceeded at a swift pace. The volume of freight trans-shipments along the Northern Sea Route in 1957 increased by four times in comparison with 1940, and with 1932 by 16 times.[220] December 1957 was the 25th anniversary of Glavsevmorput. The Party Central Committee and the USSR Council of Ministers addressed all polyarniks in a letter which clearly spelt out new tasks: "[...] to work on opening up the Far North, expand and improve transport links and turn the Northern Sea Route into a route for the mass transportation of goods for the national economy".[221] Under Stalin the slogan had been to develop the Northern Sea Route into a "normally functioning route", now the new Party leader N.S. Khrushchev wanted to turn it into "a route for mass transportation". In order to fulfill this goal organizational changes had to be carried out, new and better ships and icebreakers had to be put into service.

4.13.3 Development of logistical base

In 1953 the Glavsevmorput had been reduced to become merely the Arctic shipping division of the Ministry of the Merchant Fleet, and four years later the ships in Glavsevmorput's possession were transferred to two shipping companies, the Murmansk Shipping Company, based at Murmansk, and the Far Eastern Shipping Company, based at Vladivostok. The structure and functions of Glavsevmorput were further changed with the restructuring of the work of the whole Ministry of the Sea Fleet. As a result the Murmansk and Far Eastern Shipping Companies along with the whole of the merchant and icebreaker fleets were handed over to Glavflot, the Arctic sea ports to the appropriate shipping companies of the USSR Ministry of the Sea Fleet. Various ministries and departments took over organisations previously included in the structure of Glavsevmorput: Arktikugol, Arktikproyekt, the Institute of the Geology of the Arctic, and a little later the Administration of Polar Aviation together with all its Arctic aerodromes.[222] The main function of

Glavsevmorput became the overall management of the work of the icebreaker fleet in the Arctic, coordinating the activities of the shipping companies, the departments and organisations in the preparation and operation of Arctic navigation.

Since the end of the War many towns, ports and polar stations damaged in the War had been rebuilt, and new research projects initiated. The scientific-research laboratory of the Arctic Institute was set up, where more efficient icebreaker hull shapes were devised in a special tank simulating natural ice conditions. The construction bureaux worked on the modernisation of out-dated icebreakers and the creation of new ones.[223] During the 1950s, as a result of their work, steam-powered icebreakers like "Krasin" and "Stalin" began running on liquid fuel. A quite new stage in the development of Soviet maritime transport began. For the most part this consisted of a speeding up of scientific and technical progress in all areas of the economy; the technological re-equipment of the material base of industry, large-scale replenishment of the fleet, its radical renovation and comprehensive mechanisation and automation on ships and in ports, new techniques and technology in ship repairing.

During these years, there was intensive renovation of the Arctic fleet. Because of its obsolete steam-powered icebreakers, and because of the increase in the volume of trans-shipments to the Arctic and also the year-round navigation in frozen non-Arctic seas, from 1960 the USSR ordered "Moskva"-class diesel-electric icebreakers of 26 thousand h.p. from Finland. These icebreakers proved their worth in escorting ships to Arctic seas. They could be used almost the whole year round: after their duties in the Arctic, they escorted ships in the Baltic and Okhotsk Seas.

From 1961 onwards "Amguena"-class ships began to be used in the operating of the Arctic route. These ice strengthened ships constituted the basis of the transport fleet in the Arctic. In addition to them, in the following years further ice strengthened ships were built of the type "Volgales", "Igarkales", "Povenets", "Pioner", and motor vessels "Baskunchak", "Samotlor", "Dmitriy

Donskoy" and others. Many of them went to augment the fleets of the Murmansk and Northern shipping companies. The increase in the power and strength of the ships' hulls enabled their gradual increase in speed through ice. This fact led to the greater carrying capacity of the merchant fleet in the Arctic.

The world's first atomic powered icebreaker "Lenin", of 44 thousand h.p., took part in the 1960 Arctic navigation season. Its first captain was P.A. Ponomarev. The construction of the icebreaker became an important landmark in the development of the Northern Sea Route. The Central Committee of the Communist Party and the USSR Council of Ministers, in an address to all those involved in building the world's first atomic icebreaker noted: "The icebreaker "Lenin" surpasses all existing icebreakers through its power and potential length of navigation. The building of the atomic icebreaker opens up new possibilities in the exploitation of the Soviet Arctic's riches and the further development of the national economy of our country's northern regions."[224]

The atomic vessel "Lenin" operated successfully in the Arctic, and demonstrated that an icebreaker of this class had a high ice navigation capacity and good manoeuvrability in difficult ice conditions. The main virtue of the atomic icebreaker is its unlimited fuel autonomy compared with ordinary icebreakers - which is vital in ice navigation. The "Lenin" often facilitated the success of marine operations in the Arctic. At the Bureau of the Murmansk Obkom of the Party the new icebreaker merited special discussion. In a resolution of the Bureau it was noted that the operation of the atomic icebreaker on the Northern Sea Route had led to a 2.5-fold increase in the speed of escorting the freighters and to a decrease in the incidence of damage to escorted freighters. In relation to the ever-increasing volume of industrial goods being shipped along the Northern Sea Route, the Bureau of the Murmansk Obkom came to the conclusion that delivery could be assured "only with a powerful icebreaker transport fleet... and there is a great demand for the construction of new ships with atomic power capacity which proved themselves so well in navigating along the Northern Sea

Route."[225]

A repair base plays a key role in the successful running of the operation. In this connection, the Bureau of the Murmansk Obkom considered the question of setting up in Murmansk a ship repair base for atomic powered vessels and for the training of personnel.[226] These issues were later resolved by the Party. It was decided to strengthen the capacity of sea ports, to set up specialised, highly mechanised loading and unloading of containers, and continue work on improving water routes in the eastern regions of the country.[227]

In the 1970s the Soviet Union placed further orders in Finland for icebreakers. From 1974 to 1976 three diesel-electric icebreakers of the class "Yermak" were built of 41,000 h.p. In the summer navigation season of 1976 the diesel-electric icebreaker "Kapitan Sorokin" of 22,000 h.p. appeared for the first time on the Arctic route. It was built for use in areas of restricted depth. In the following years three icebreakers of this class were built. Icebreakers of the class "Yermak" and "Kapitan Sorokin" operated successfully both on Arctic routes and in frozen non-Arctic seas.[228] The existence of a powerful icebreaker fleet and modern freighters enabled the year-round navigation of the western sector of the Arctic.

The Kara Sea is to the north surrounded by several archipelagoes, Novaya Zemlya, Franz Josef Land and Severnaya Zemlya, which usually prevent heavy multi-year pack ice from the central Arctic from penetrating into it. The eastern sector of the Northern Sea Route is, to the contrary, more or less open to the north and has not this kind of protection. In the East Siberian Sea heavy ice-fields often develop and when they remain close to the coast during the summer time navigation becomes very difficult. 1965 and 1979 are known to have been difficult years, as well as 1983, which was particularly trying. It can have been the worst season in a hundred years. Due to heavy and long-lasting southerly winds pack ice was pushed southward into the East-Siberian Sea and in several places blocked the passage along the coast.

Many ships were locked in the ice, and the situation was

even worse than in 1937. As many as 70 ships can have been ice-bound, though a number of 40 or 50 is more likely. Many put the blame on the Arctic Institute in Leningrad for not having anticipated the situation in due time. Others blamed the freight consignors for not having made the cargoes ready on time, which resulted in delayed departures. The situation in the East-Siberian Sea became a major news item, and in this respect it resembles "Chelyuskin's" drift in the Chukchi Sea 50 years earlier. One freighter, Nina Sagaydak, was crushed by the ice and sank on October 7, and many other ships were damaged. Eventually three atomic icebreakers, "Leonid Brezhnev", "Sibir" and "Lenin" arrived from the western sector of the Northern Sea Route and came to their rescue. In October the ice-bound ships were freed from the ice and could soon return to the Bering Sea.[229] The nuclear icebreakers returned via the southern route to Murmansk, having once more proved their superiority.

4.13.4 Winter navigation

Sea transport underwent a particularly significant development from 1970. The growth of large industrial centres in the Arctic from the 1960s to 1980s brought with it an abrupt rise in the economic importance of the Northern Sea Route. It was in this context that the merchant fleet was given the task of extending the Arctic navigation season. The distinctive feature of this process was the way in which it was achieved by stages along the various stretches of the route.

The importance of freight transport for the A.P. Zavenyagin Norilsk metallurgical complex, located on the lower reaches of the Yenisey river, highlighted the fact that the transport needs of this complex made it a special case. The accumulated experience of winter navigation together with scientific support enabled the first experimental voyage to be made to Dudinka. The first experimental voyage was that of the diesel-electric "Gizhika" in November and early December of 1970, escorted by the icebreaker "Lenin" through the Kara Sea, and by the icebreaker "Kapitan Belousov" on the river section. This voyage demonstrated

that sailings at that season were in fact possible.[230]

The following year there were plans for a convoy of ships to follow the same route. The purpose of the experimental navigation of 1971 was to obtain more reliable data on the possible use of freighters of various types for the trans-shipment of freight for the Norilsk metallurgical complex and the use of icebreakers to escort ships through the ice of the Kara Sea and the river Yenisey in the difficult hydrometeorological conditions of the polar night.

For these trans-shipments, groups of six freighters were selected - the motor vessels "Pechenga", "Vostok-5", "Pargolovo" from the Northern Shipping Company, and the electric-diesel ships "Kuybyshevges", "Gizhiga", and "Lena" from the Murmansk Arctic Shipping Company. These were escorted by the icebreakers "Lenin", "Murmansk", and "Kapitan Melekhov". As a result of the experimental navigation by these ships during November-December 1971, the navigation period along the route of the Karskiye Vorota (the Kara gates) to Dudinka was extended by 57 days in comparison with the average period and by 22 days in comparison with 1970.[231] Due to the extension of the navigation period to the port of Dudinka alone the state economy received 0.5 billion (US) rubles.[232]

From 1972 the extended navigation to Dudinka became a regular feature. The northern sailors similarly mastered the frozen route to Tiksi and Khatanga. As a result, by the autumn and winter of 1977 there were already some tens of vessels involved in shipments to Dudinka, with a seven-fold increase in capacity over 1971, which represented 20% of the volume of summer shipments. With this increase in volume, shipping costs for Arctic freight in the autumn-winter period experienced a 2.5 fold decrease. However, over the period 1971 to 1977 the average ratio to summer shipments was 40%. This meant that with the extension of the autumn-winter navigation season, average shipping costs on the Dudinka route gradually increased.[233]

When the natural gas fields on the Yamal Peninsula came into production during the 1970s, the question of experimental winter sailings to the caretaker shifts of gas workers stationed in

Kharasavey Rayon became a pressing problem. In April 1976 the diesel-electric "Pavel Ponomarev" escorted by the atomic powered "Lenin" made the first winter delivery of assorted materials and equipment to the gas workers. In 1978 the volume of shipments to Yamal was 15 times greater than in 1976.[234] The Yamal winter operations were an important landmark in the history of Arctic navigation, in as much as they proved the possibility of organising large-scale winter deliveries of freight to other points in the Arctic.

Transport communications were also developed and improved in the Far East. The Far Eastern Shipping Company handled the transport of supplies to points in the eastern Arctic, to Chukotka, Kamchatka, the coast of Primorskiy Kray and shipments in the direction of Magadan, also the delivery of products of Dalryba, the fishing company in Vladivostok, together with passenger transport. There was success in the Far Eastern basin in organising year-round navigation to the ports of the Sea of Okhotsk and the Tatarskiy Proliv, and in mastering the passage of ships throughout the winter into the ports of Vanino and Nagayevo.[235]

4.13.5 New methods of unloading ships

The need to supply goods to geological-prospecting parties and to the first construction workers on the coast beyond the Arctic circle forced the sailors to find new methods of unloading ships. The most effective became the method of unloading onto an "ice mooring". The idea of an "ice mooring" was conceived in 1956 in Antarctica. In 1957 it was reinstituted by northern sailors in the Pechora Sea. Sailors linked up with the hydrometeorological service, measured the ice thickness and made depth measurements. The first ships embarked on winter navigation to Varandey. The results were impressive. Geologists gained a whole year. Previously, they had received goods in the summer when the tundra turned into an inaccessible marsh. Nowadays, all the derrick equipment can be carried along a winter road to the appointed place and work can begin. The economic effect of this new method

can be measured in hundreds of thousands of rubles. In 1976 geologists were supplied with 46 thousand tons of industrial goods. The 1980 plan for the Northern Shipping Company for the delivery of supplies using "ice moorings" amounted to 130 thousand tons.[236]

This transport operation continued in more organised fashion following a decree of the Minister of the Sea Fleet (May 1982) "On measures to ensure the delivery of goods of the Ministry of Geology of the RSFSR to locations in the Barents and Kara Seas".[237] Sailors also successfully mastered the delivery of large diameter pipes from Western European countries to Siberia for Soviet gas pipelines. Experimental voyages of the motor vessels "Zolotitsa" and "Petrovskiy" to Obskaya Guba led to the end of the need for frequent trans-shipments and to losses of imported products, and led to a reduction in their transportation time, and also to the freeing-up of a large number of railway goods wagons. The 25th Party Congress passed a resolution on the construction of the Sayan-Shushen hydro-electric station, the largest in the world. 28 Leningrad enterprises signed an agreement for cooperation with construction firms of Siberia. On this document was also the signature of the crew of the motor-vessel "Sovetskaya Yakutiya" who delivered in 1979 the driving wheel of a turbine from the docks of the Leningrad metallurgical factory to Divnogorsk. This unusual experiment became good practice experience for northern sailors.[238]

The voyage of the icebreaker "Vasiliy Pronchishchev" was very complicated when it brought the floating electric power station "Severnoye Siyaniye" to Pevek. The towing of reinforced concrete sections, floating cranes and dredgers was highly successful. The sailors of the Northern Shipping Company carried out their patriotic duties in transporting a large diameter pipe from Western European ports to the construction workers of the Urengoy-Uzhgorod gas pipeline. 95 thousand tons of pipe were delivered to the new port in 38 trips.

As for the port of Archangel, it is many years since it has not operated the whole year round. In the middle of winter ships leave for ice moorings with supplies for geologists, arrive at

the city with imported goods, and once more set off loaded up with export saw-timber, cardboard and cellulose.[239]

In order to improve conditions and increase the productivity of sailors in delivering goods to the unsupplied shores of the White, Barents and Kara Seas, totally new means of transport were devised: self-propelling hulks, hulks, platforms on air cushions with amphibious towings, tractors with detachable bodies, and also a specialised ship-supplier "Vavchuga". Many of these means of transport were built or rebuilt in the Archangel factories "Krasnaya Kuznitsa" and "Layskom".[240]

FREIGHT TRAFFIC ALONG THE ARCTIC SEA ROUTES 1933-1992

Year	Traffic volume (ths. t)
1933	130.2
1934	134.4
1935	176.4
1936	201.5
1937	187.4
1938	194.0
1939	237.0
1940	225
1941	165.6
1942	177.5
1943	298.3
1944	375.9
1945	444.1
1950	500.0
1955	632.0
1960	962.5
1965	1455.1
1970	2980.1
1975	4073.6
1980	4592.4
1985	6181.3
1987	6578.8
1990	5510.5

1991	4801.6
1992	3614.2

Source: Y.Ivanov et al., INSROP Project IV.1.1 "Historical and Current Use of the Northern Sea Route", St Petersburg 1994, p. 20.

4.14 The evolution of ecological thinking as applied to the Northern Sea Route

The end, even if it is noble, does not always justify the means. The latest missions of the polyarniks, geologists, oil and gas workers, and soldiers were embellished with high-sounding Party slogans. This was what the Soviet programme of opening up and researching the Arctic consisted of. But in actual fact the conquering heroes were tossed aside like so many common or garden time servers, and the attitude of mind was destructive of the environment, which was for many years not given the slightest thought.

In 1984 the Government of the USA passed the "Arctic Research and Policy Act 1984" which was aimed at producing a consistent national policy in the Arctic Ocean. This defined government aims, and emphasised priorities by setting up a statutory Research Commission to consider all proposals. Norway also provides an example of good environmental management, with its record of protecting the purity of fjord and river waters, the vast stretches of Lapland tundra, and the rich fish and animal wildlife.

The picture in the Russian Arctic is quite different, and altogether lamentable. The shores of the Arctic Ocean are littered with a veritable barrier many meters wide, made up of rotting timber for which our industries failed to find a use. Rusting machinery and millions of contaminated oil drums lie abandoned on the Arctic islands and mainland. To this day the technology and machinery to either make use of or remove these left-overs of "civilisation" have not been found. In many places the tundra is badly scarred where the soil has been eroded. Around polar towns, settlements and stations there lie mountains of slag and coal waste. The lakes and rivers shine with an

iridescent slick, and their waters carry oil out into the Arctic Ocean. Oil pollution in the northern seas is destroying wildlife, fish and plants, and the steps which are being taken to clean up the waters are insignificant to say the least. And in recent years we have also seen the cataclysmic effects of acid rain, with fish, sea mammals and land animals dying on a massive scale.

The waste products emitted by the Nikel and Monchegorsk metallurgical complexes are a source of massive atmospheric pollution and there are many other such industrial enterprises in Murmansk and Archangel Oblasts. Another source of atmospheric pollution is the nuclear test site on Novaya Zemlya. The islands of Novaya Zemlya were designated as a nuclear test site in 1954. From 1957 nuclear devices were exploded in the atmosphere, on the ground and under water. In all there have been 132 nuclear explosions, among them, on the 30th October 1961, the biggest explosion the world has ever known, when a 58 megaton nuclear device was exploded in the atmosphere. Since 1963 there have been only underground tests.

41 underground tests have been carried out in the Northern Test Site since then, and all to a greater or lesser extent resulted in the release into the atmosphere of a certain amount of radioactive inert gases which the prevailing winds have carried into the north-eastern sectors of the Arctic.[241] A dangerous lack of safeguards for nuclear and radioactive materials on atomic facilities and ships in the Arctic region adds to the serious ecological consequences.

Safe storage of radioactive waste is becoming an acute problem, and several thousand tons have already accumulated. The question of what to do with power installations, which have come to the end of their useful life, has not been properly resolved. It is no accident that in 1990 the Taymyr District Council of People's Deputies banned the latest nuclear-powered icebreakers, "Taymyr" and "Vaygach" from the Yenisey river.[242] A pressure group calling itself "Ekologiya Severa" (Ecology of the North) has been formed in Archangel Oblast and it has sent out a special appeal: "The "Ekologiya Severa" association supports the USSR Supreme Soviet's decree of the 27th of November 1989 "On urgent

measures for an ecological clean-up of the country" and the Soviet-Finnish declaration of the 26th of October 1989, in which the two countries agreed on fuller use of the means at their disposal to protect and restore the Arctic ecosystem".

This pressure group, together with other organisations and movements, is doing all it can to make the protection of the natural, historical and cultural environment of those who live in the North a matter of prime importance for representatives of all generations; for everyone, regardless of their convictions or beliefs.

4.15 To the North Pole

The scientific-practical experimental voyage of the atomic icebreaker "Arktika" to the North Pole in 1977 was an historic event in the experience of Soviet navigation and in opening up the Arctic. The overall command of operations was handled by the Minister of the Sea Fleet, T.B. Guzhenko, who was based on board the "Arktika". The icebreaker was commanded by Yu.S. Kuchiyev. The Head of the Administration of the Northern Sea Route, K.N. Chubakov, a large group of specialist crew, members of the Arctic and Antarctic Scientific Research Institute, and the builders of the icebreaker took direct part on board ship in sorting out scientific and technical problems.[243]

This important voyage lasted a little less than two weeks. Multi-year packice was overcome and the atomic vessel "Arktika" reached the top of the planet. This happened on the 17th of August 1977 at four o'clock Moscow time. For the first time in the history of seafaring, a surface ship reached the Earth's North Geographical Pole. "Arktika"'s voyage was accomplished when it returned to Murmansk on the 23rd August 1977. Over a period of 13 days and nights, the icebreaker had covered 3,852 miles, 1,300 of which were in ice. The main purpose of the experiment was to test the possibility of navigating through high latitudes in the vast region of the Arctic Ocean, and to test out the reliability of equipment manufactured by Soviet ship builders, and this was achieved.[244]

During the voyage, they obtained scientific data on the Arctic Ocean, its ice cover, and the way in which the mechanics of the icebreaker worked in heavy ice. During this experimental voyage the training of modern seafarers and polyarniks, their qualifications, moral qualities, steadfastness and courage were put to the test. In a letter from the Central Committee of the Communist Party of the USSR to the members of the expedition to the North Pole were the following words:"You have fulfilled an important dream of Soviet Russian Arctic researchers, which our people have had for many centuries, and continued the good work of using the peaceful atom in the interests of developing the national economy for the good of the Soviet people".[245] The staff of the atomic icebreaker "Arktika" were decorated with the Order of the October Revolution.

Following on from the "Arktika", at the end of May 1978, the atomic icebreaker "Sibir" (Captain V.K. Kochetkov) set off along the high latitude route with one freighter. They sailed round the north of Novaya Zemlya, the Severnaya Zemlya archipelago and New-Siberian Islands (Novosibirskiye Ostrova), and overcame the ice of five seas. On the 13th of June, after 18 days, the atomic vessel escorted the ship into the open waters of the Chukchi Sea near Mys Serdtse-Kamen. Difficult ice conditions, especially in the East Siberian Sea, were greatly compensated for by the reduction in the length of the route (by 2,100 km) in comparison with the usual route ships followed along the Northern Sea Route.[246]

4.16 Conclusion

It goes without saying that shipping freight in the Arctic is more expensive than on ordinary shipping routes, due to the need for icebreakers, special ice-strengthened ships, ice reconnaissance and other safety measures. The economics of ice navigation in the Arctic cannot be considered in isolation from the whole range of complex problems which are being resolved there. The criteria for assessing the viability of developing the Northern Sea Route was always the impact that it would have on

the national economy, and the total profit in real terms that Russia would derive from the Arctic.

It is thanks to the Northern Sea Route that so many important national aims were achieved in so short a space of time: the industrial exploitation of the polymetalic ores of Norilsk, the mining of valuable minerals in Chukotka, the export of timber from the Yenisey and Lena river basins, and multi-disciplinary Arctic research, including extensive geological surveying of Arctic resources. In recent years Russia's very own oil industry has begun operating for the first time in the Arctic. On the 15th of August 1987, the tanker "Nefterudovoz-56" left Ostrov Kolguyev and headed for Kandalaksha, carrying on board 2,700 tons of Arctic oil.[247]

More than 65 years have passed since Glavsevmorput was set up. Since then seafaring in the Arctic has been through several phases, and the administration of the Northern Sea Route has changed accordingly. In the beginning of the 1960s the Ministry of Civil Aviation took over aviation along the Northern Sea Route, and the Polar Stations were handed over to the hydrology and meteorology committee of the Council of Ministers. There was little left for the Glavsevmorput to do, and the organization was in actual fact liquidated in 1964. However, in 1970 it reappeared as a department of the Ministry of the Merchant Marine: as Richard Vaughan has pointed out, it was no more called the "the Chief Administration of the Northern Sea Route", only the "Administration of the Northern Sea Route".

This gradual downgrading of the administration of the Northern Sea Route, does not, of course, indicate that the Northern Sea Route had been reduced in importance. On the contrary, it resulted from the fact that it was becoming an integral part of Soviet economy. Life in Russia is already unthinkable without the Arctic and the Northern Sea Route. When the Soviet Union was dissolved in 1991, the Administration of the Northern Sea Route was transferred to the department of the Ministry of Transport of the Russian Federation.[248]

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Claes Lykke Ragner,
INSROP Programme Secretary,
The Fridtjof Nansen Institute,
P.O. Box 326,
N-1324 Lysaker,
Norway.

26 April, '97

Dear Dr. Ragner,

My apologies for the delay in responding to the revised version of Bulatov's material on *The Soviet period (1917-1991)*. I did not expect to see this material again, and I had certainly not set aside any time for a re-examinatgion of it.

I still find that there is an excessive emphasis on the administration and politics of the NSR and not enough on operational aspects. But I guess you knew you were taking that risk when you invited Bulatov to write it, given the focus of his book.

I shall not itemize all the cases of peculiar (sometimes incomprehensible) English; I assume that your editors will take care of that.

I am rather surprised that some of my more important suggestions for improvement have not been implemented. For example almost 5 pages are still devoted to the Northern Railway (pp. 18-23). Since nothing came of this plan, surely two lines would suffice, if it needed to be mentioned at all.

On the other side, there are gaping holes in the coverage of important operations. There is no mention of *Fedor Litke*'s first successful one-season through-passage in 1934. The coverage of the 1937 disaster (p. 54) is extremely meagre for an event that shook the administration of the Northern Sea Route to its core. And the 1983 disaster, which forced the planners to rethink their schedule and aims completely, is not even mentioned.

In conclusion, I think there are still serious weaknesses in this report; I guess it is your judgement call as to whether it should be sent back to be rewritten (possibly by another author), or whether the time constraints dictate that you publish it as it now stands. My own preference would be for the former course of action. Of course one possible escape route, is to change the title -- and make it clear that administration of the NSR, rather than operational aspects, is the major focus.

Yours sincerely,

William Barr,
Professor and ~~Head~~

Department of Geography, University of Saskatchewan
9 Campus Drive, Saskatoon SK S7N 5A5 Canada Telephone: (306) 966-5654 Facsimile: (306) 966-5680

REPLY TO WILLIAM BARR

Date: 5 August 1997

Dear professor Barr.

After consultation with Vladimir Bulatov I have revised part IV of "Historical and Current Uses of the Northern Sea Route" according to the comments you gave in your letter of April 26, 1997. The language has been scanned and, more importantly, following your suggestion the title has been changed to reflect the fact that the main concern in professor Bulatov's paper is the political and administrative aspects of the history of the Northern Sea Route.

Fedor Litke's through-passage along the Northern Sea Route in 1934 has received more attention in the new version of the report, and the disastrous year of 1937 has been described in greater detail. A new passage has been inserted on the calamitous season of 1983. Through these additions the operational aspects of the report have been strengthened, at least to a certain degree.

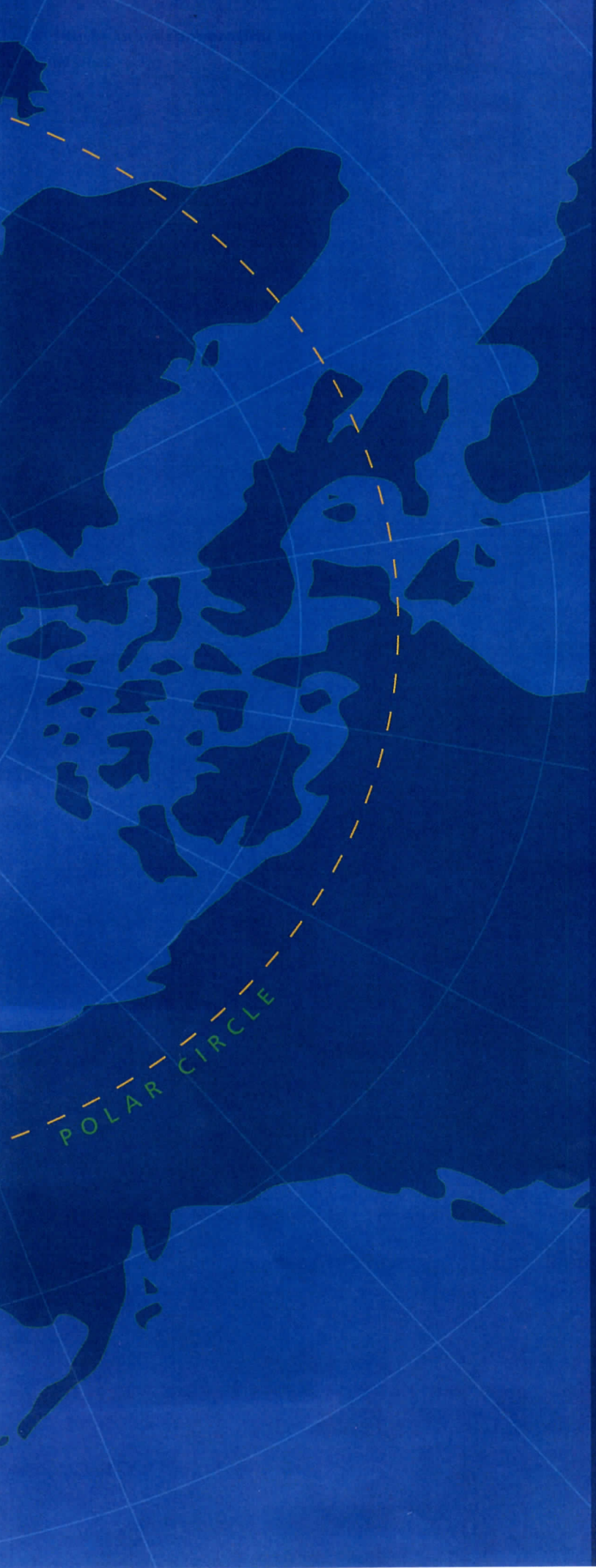
Your comment on the Northern Railway is fully justified. Too much attention was devoted to this project in earlier versions of the report, especially when we take into consideration that nothing came of it. In the new version the discussion of this project has been shortened by one half and only 2,5 pages have been retained. We still hesitate to remove the section on the Northern Railway completely, because this project represented an alternative to a grand-scale development of the Northern Sea Route. On this point there is a clear continuity to the pre-revolutionary period, when different railway projects were put forward as alternatives to the development of the Kara Sea Route (see part III, pp. 71-73). These alternatives clearly played a role in the decision-making process, even if many of them were dropped in the end.

Finally I want to thank you for your very fruitful and constructive review, which have helped a lot in improving the report.

Jens Petter Nielsen

Jens Petter Nielsen

FACULTY OF SOCIAL SCIENCE (SVF)
Department of History (IHI)
University of Tromsø, N-9037 Tromsø Norway, telephones + 47 77 64 40 00 / + 47 77 64 42 94, telefax + 47 77 64 57 90
Jens Petter Nielsen, telephone extension + 47 77 64 43 54, electronic mail jenspn@isv.uit.no



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