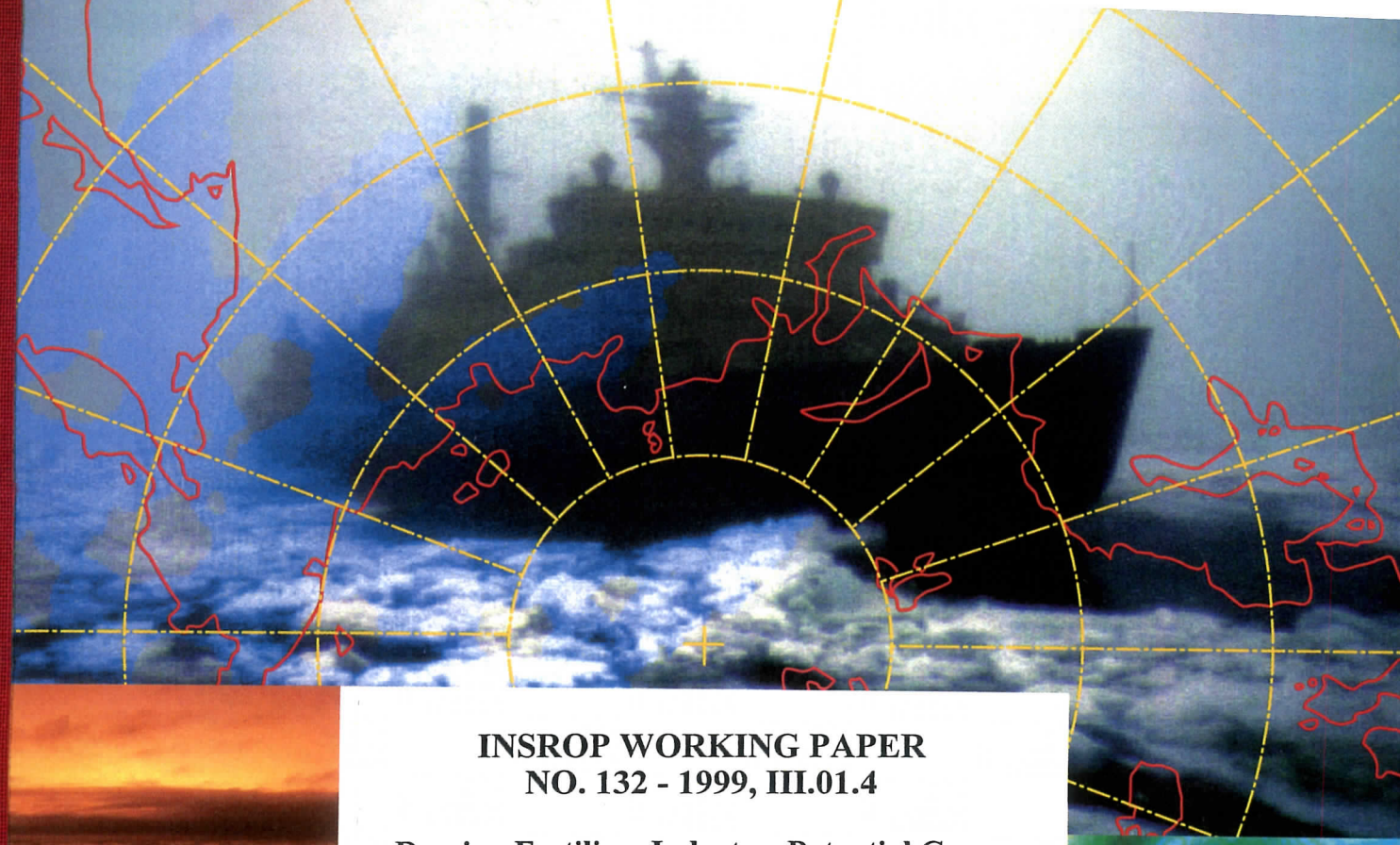
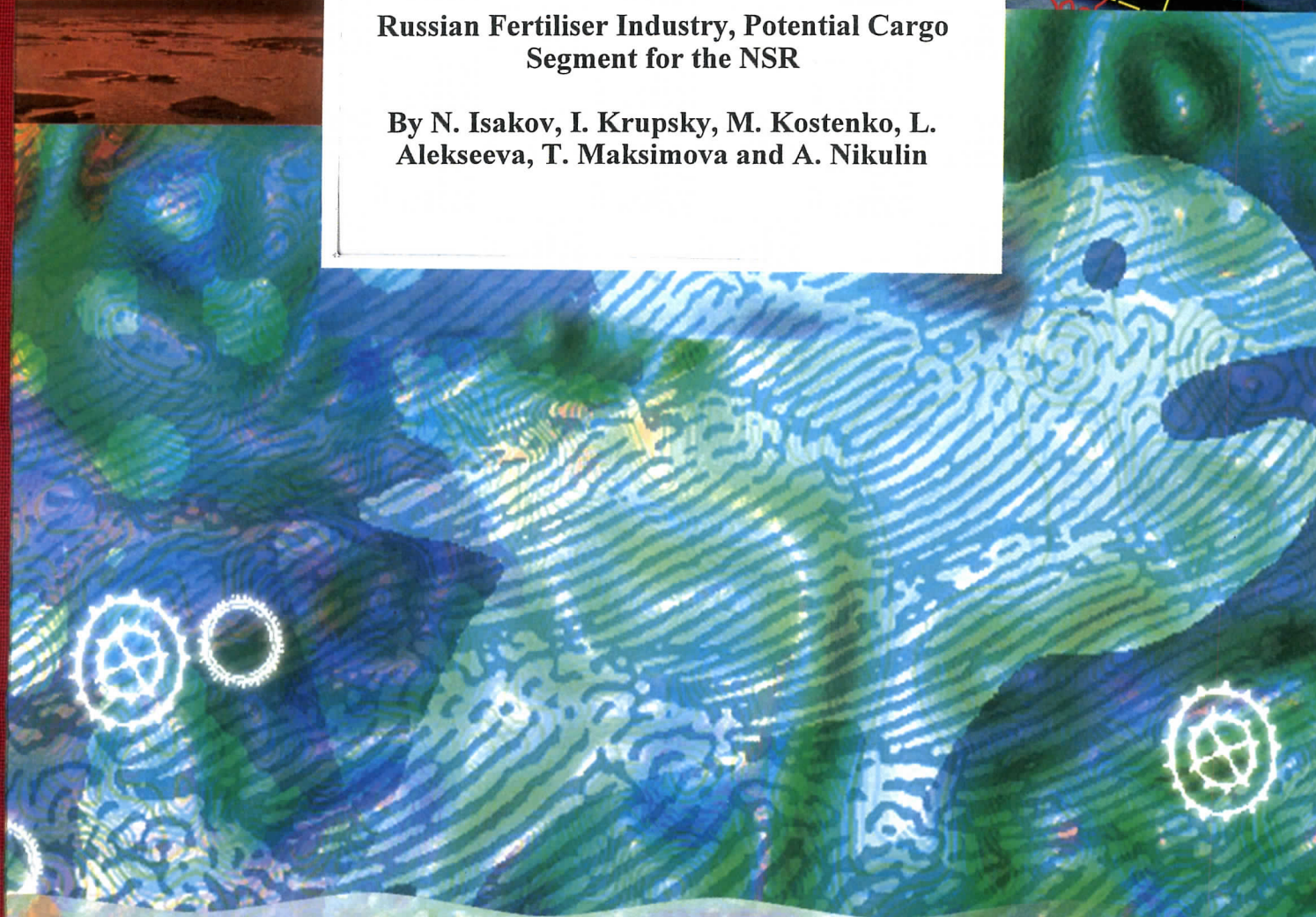


INSROP WORKING PAPER NO. 132 - 1999, III.01.4

Russian Fertiliser Industry, Potential Cargo Segment for the NSR

By N. Isakov, I. Krupsky, M. Kostenko, L. Alekseeva, T. Maksimova and A. Nikulin



INSROP International Northern Sea Route Programme

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Project III.01.4.: The Russian Fertiliser Industry, Potential Cargo Segment for the NSR.

Supervisor: Yury M. Ivanov

Title: **The Russian Fertiliser Industry, Potential Cargo Segment for the NSR. Russian Part.**

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What is an INSROP Working Paper and how to handle it:

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.

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FOREWORD – INSROP WORKING PAPER

The objectives in developing the Project III.01.4 "Production of Mineral Fertilizers in Russia, Future Cargo Flows Through the NSR" are:

- estimation of production outputs of the mineral fertilizers for individual world regions and economic regions of Russia;
- estimation of demands for the mineral fertilizers in individual countries;
- determination of the export potential of Russia and transport links with the consuming countries;
- substantiation of the cargo flows to be moved mainly through the NSR and determination of volumes to be recommended for transportation along the NSR during the Arctic navigation season;
- proposals for development of the transportation systems and improvement in the mineral fertilizer traffic along the NSR.

CONTENTS

1. INTRODUCTION

Utilization of the organic, chemical and mineral fertilizers on a scientific basis makes it possible to achieve presently such growth rates of the agricultural production out put, which outstrip growth of the population in the whole world.

In the long run, such growth in the agricultural production, out put, considering development of all the productive lands, can support life of abt.12 to 15 billions of persons on our planet (1).

The present Project III.01.4 "Production of Mineral Fertilizers in Russia, Future Cargo Flows trough the NSR" deals with production development of the mineral fertilizers manufactured by the Russian enterprises in the internal division of labour and first of all with the countries of the South -East Asia (SAE) an analysis of the export transportation of goods from the major Russian Producers to the SAE countries and an estimation of the feasibility of diverting a portion of the goods to the NSR has been made in the Project.

The former USSR was one of the world's leading producers and consumers of mineral fertilizers. In 1991 the USSR's shares in world output of nitrogen, phosphorous and potash fertilizers accounted for 15.5%, 21% and 33%, respectively.

The total capacities of the former USSR for production of mineral fertilizers were estimated at 36.25 m. t of nutriments, including those of nitrogen grade at 14.8 m. t (N), phosphate grade - at 10.5 m. t (P_2O_5) and potash grade - at 10.95 m. t (K_2O). About a half of these capacities are available in Russia: the Russian shares in fertilizer production capacities are as follows: 54% for nitrogen fertilizers, 47% for phosphate fertilizers and 51.6% for potash fertilizers.

Besides Russia, Considerable capacities in production of nitrogen fertilizers are available in Ukraine, and as regards phosphate fertilizers - Uzbekistan. The capacities for production of potash fertilizers are about evenly divided between Russia and Byelorussia.

More than 50% of the USSR's fertilizer output were produced in Russia. An unprecedented production level of the mineral fertilizers was reached in 1988 when about 36 m. t of nutriments, including 15.8 m. t of nitrogen grade (V), 9.0 m. t of phosphate grade (P_2O_5) and 11/2 m. t of potash grade (K_2O), were produced. Since 1982 the production output began to out down and such a situation lasted up to and including 1994.

An analysis has been made within the framework of the Project to investigate production of these products in Russia during transitional period of perfecting the economic reforms.

Regional of the transport links between the Producers of the mineral fertilizers in Russia and Sea ports and delivery of the fertilizers to the Consumers in individual countries has been made based on the detailed information on carload shipments during 1996.

An analysis of transportation of the mineral fertilizers during the first half-year of 1998 has confirmed steadiness of the transport links examined in 1996 and there are not strong grounds for their alteration in the immediate future till 2000-2005 (2).

2. BACKGROUND

The mineral fertilizer since the very beginning of their utilization (1820-1830 s) include three basis groups: nitrogenous, phosphate and potash fertilizers which are steadily improved and sophisticated in terms of individual fertilizer grades.

Structure of the world consumption of the fertilizers, in terms of their basic grades, is characterized by the following date (%%): nitrogen fertilizers - 56.2, phosphate fertilizers - 26.4, potash fertilizers - 17.4.

The Table 1 gives consumption of the mineral fertilizers in the major world's regions during 1992-1994. The Table has been compiled from the IFA data as for 01.01.1995.

Table 1.

Consumption of mineral fertilizers in the major world's regions
in m tons, on the nutriment basis

	1992/93 (1992)	1993/94 (1993)	Alteration 1993/1992, %	1994/95 (1994)	Alteration 1994/1995, %
Western Europe	17100	17094	0	17066	0
Eastern Europe	2943	2904	-1	3237	+11
FUS countries	11881	7758	-35	5415	-30
North America	21285	22712	+7	22073	-3
Latin America	7850	8462	+8	8915	+5
Oceania	1980	2088	+5	1978	-5
Africa	2514	2684	+7	2823	+5
Middle East	5703	5804	+2	5336	-8
Southern Asia	15566	15802	+2	16420	+4
Eastern Asia	8468	8713	+3	8864	+2
Socialist Asia	30465	26251	-14	27358	+4
World in total	125754	120272	-4	119485	-1

According to FAO, Europe accounts almost for 30% of the world output of mineral fertilizers. The total utilization of solid fertilizers in Europe is characterized by an increased, as compared with other regions, proportion of the more expensive mixed and phosphorous fertilizers.

Analyzing the situation on the world market of chemical and mineral fertilizers the newspaper "Handelsblatt" reports that in the Asian countries the companies of the industry are expecting in the coming years two-figure growth rates of demand which have been made virtually impossible on the controlled agricultural markets of the EC countries.

In Europe, according to the companies, in 1996 sales of fertilizers after 6 years of steady decline have increased by about 3% as compared with 1995 whereas according to the earlier forecast they should decrease to the same extent.

FAO forecast an increase in demand for the fertilizers, being distributed throughout the regions (in m tons, on the nutriment basis):

	1989	1993	1998
Asian-Pacific Region (APR)	47.8	55.7	61.9
North America	19.9	20.6	21.3
East Europe and CIS	37.3	16.4	20.1
West Europe	22.3	16.5	16.0
Africa, Middle East	6.7	8.2	10.2
Total	**134.0**	**117.4**	**129.5**

The basic raw material for the fertilizers is ammonia, the most generally employed grade of fertilizers is carbamide.

According to the US Ministry of Interior, Ammonia is produced in more than 80 countries. In 1996, the world output of this product increased only slightly as compared to 1995 and amounted to about 97.5 m. t (from here on all the figures are on the nitrogen basis). About 24% of the total production output were accounted for by China. The share of the Asian countries in 1996 represented 39%. The share of the USA and Canada in world production output of ammonia was equal to 19%. The FSU countries accounted for

12%, West Europe - 9%, Middle and East - 6%, Latin America - 6%.

According to forecast of the experts from "SRI Consulting" (USA) demand for the ammonia on the world market in the long run will continue to increase. In 2000 consummation of this product is expected to be high as 109.7 m t.

The world export of ammonia in 1996 showed a slight increase as compared to the preceding year and amounted to 10.9 m t.

The world output of carbamide in 1996 has raised by 4% as compared to 1995, that is up to 43 m t.

According to FIA, the world exports of carbamide in 1996 were at the 1995 level: 11.2 m. t. In 1996 the Asian countries accounted for 53% of the world exports of carbamide. Imports of this product into China in 1996 came to 2.9 m. t which were equivalent to 27% of the world imports.

Characteristic features of the foreign trade in carbamide are given in Table 2. Table 3 gives the quantities of carbamide handled by the major importers.

Except for the formed USSR, about the same quantity of carbamide is delivered for export by the Middle East countries (22.3%) including: Saudi Arabia (8.4% of the world exports), Qatar (4.0%), Kuwait (3.2%).

The Major competitors to Russia in production and export of carbamide are also Ukraine, North America, South-East Asia.

Among the phosphate fertilizers, the greatest importance in the world trade is attached to diammophos which account for 45.5%.

Table 2.

Major exporters of carbamide

(ths. t of N)

Regions and countries	1991	1992	1993	1994	% in 1994
Former USSR	**2777**	**2997**	**2701**	**2755**	**27.4**
Incl. Russia		1514	1273	1465	14.5
Ukraine		1103	1192	1092	10.9
Middle East	**1172**	**1317**	**1797**	**2243**	**22.3**
North America	**1148**	**1049**	**1048**	**1264**	**12.6**
incl. Canada	655	629	745	845	8.4
West Europe	**913**	**1117**	**1072**	**985**	**9.8**
incl. Holland	446	482	417	382	3.8
South. East Asia	-	-	-	**1056**	**10.6**
incl. Indonesia	818	613	695	738	7.3

Major importers of carbamide (ths. t of N) Table 3.

Regions and countries	1992	1993	1994
Asia, including	**5697.8**	**4610.3**	**4817.3**
China	3286.6	1579.7	1605.6
India	837.8	1106.4	1259.7
Vietnam	505.6	640.4	797.4
North America	**934.9**	**1503.8**	**1553.1**
West Europe	**1089.7**	**987.2**	**1457.3**
Latin America	**692.5**	**1042.2**	**1072.9**

The major exporters of diammophos:

	ths. t of P_2O_5(1993)
USA	3376.6
Morocco	816.5
Tunis	320.6
Jordan	241.3
USA	241.9

USA are the biggest exporter of diammophos in the world; this country accounts for 70% of all the deliveries of this fertilizer grade to the world market.

Volumes of diammophos exported in 1997 from Tunisia amounted to 761.1 ths. t, of which more than 80% were exported to Western Europe and abt. 5% - to Asia.

In total, the diammophos sales volume has decreased in 1996 by 7.4% as compared to 1995.

The Major importers of diammophos:

	ths.. t of P_2O_5(1993)
China	1111.7
India	703.1
Pakistan	464.6.

Potassium chloride

According to "Fertilizer Focus" output of the potassium chloride produced by a Jordan Company "Arab Potash Co." ("APC") in 1997 amounted to 1.43 m. t (in the mass of commodities), which were completely exported to the Asian countries: abt. 74%, West European countries: abt. 16%, other countries: abt. 10%.

CONCLUSION

In 1998 (according to FIA forecast) the world demand for the mineral fertilizers is estimated at 129.5 m t.

The structure of the world consumption of the fertilizers, in terms of their basic grades, is characterized by the following data (%): nitrogen fertilizers: 56.2, phosphate fertilizers: 26.4, potash fertilizers: 17.4.

The world output of ammonia runs to abt. 100 m. t. About 24% of the total production output were accounted for by China. The share of the Asia countries in 1996 has represented 39%. The share of USA and Canada in the world output of ammonia was equal to 19%. The FSU countries in 1996 accounted for 12%, Western Europe - 9%, Middle East - 6%, Latin America - 6%.

Towards 2000 consumption of the ammonia will increase and come to 109.7 m. t.

Russia is one of the major world exporters of mineral fertilizers, first of all, the nitrogen and potash grades. According to forecast, in 1998 the exported volumes of the nitrogen fertilizers from Russia will amount to about 8 m. t, and of the potash fertilizers - to abt. 3.8 m.t.

In the Asia countries Companies of the industry are expecting in the coming years two-figure growth rates of the demand for mineral fertilizers. In recent years the Korean Republic becomes one of the major world consumers of fertilizers (per ha).

The world exports of ammonia in 1996 increased only slightly as compared to 1995 and amounted to 10.9 m. t.

The world output of carbamide in 1996 raised by 4% as compared with 1995 + that is up to 43 m. t.

According to FIA, the world exports of carbamide in 1996 were at the 1995 level: 11.2 m. t. In 1996 the Asian countries accounted for 53% of the world exports of carbamide. Imports of this product into China in 1996 came to 2.9 m. t which were equivalent to 27% of the world imports.

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3. ANALYSIS OF THE CURRENT SITUATION IN PRODUCTION OF FERTILIZERS IN RUSSIA AND CIS

The facilities for producing fertilizers in Russia are located predominantly in the European part of the country and encompass about 30 enterprises and associations.

The major Russian producers and exporters of fertilizers (in terms of the product grades) are listed in Table 4.

Fig. 1 illustrates location of the fertilizer Producers in Russia. Fig. 1a presents the SEA countries importing the Russian chemical and mineral fertilizers.

The results of mineral fertilizer industry activities in Russia during 1994 have shown, that further decline in ammonia and fertilizer production was experienced in 194. So, production output of the mineral fertilizers cut down in total from 9805.3 ths. t of nutriments in 1993 down to 8337.5 ths. t, that is by about 16%, while production output of the ammonia curtailed by 10.7%: from 9900 ths.. t down to 8838 ths.. t. Production output of the individual fertilizer grades decreased, as well.

The degree of utilization of the mineral fertilizer production capacities in 1994 came in total to 42.5%, as it relates to nitrogen fertilizers it came to 48.1%, potash fertilizers - to 4.1%. The lowest mark of decline was observed for the degree of utilization of the phosphorous fertilizers production capacities: in 1994 its was so low as 31.8%. Accordingly, the degree of utilization of the capacities for production of sulphuric acid was as low as 45.9% and of apatite concentrate - 43.6%.

During the period of economic recession demand for the main kinds of mineral fertilizers on the domestic market was decreased significantly. Decline in exports on the domestic market was an important impetus to development of export. So, during 1993-1995 (see p. 27 of the project) the exports increased by 39 % in physical indicators and by 98 % in cost indicators.

Coincidentally with the increase in exports a rise in domestic prices took place which fostered decrease in export profitability. The tendency for further strengthening for the non-tariff barriers on the side of fertilizer consumers complicates still further state of

the Russian exporters. Protectionism was manifested in allocating the fertilizer imports from Russia to the West Europe and China, imposing obstacles to delivery of fertilizers, forcing on Russia limitations to carbamide export.

The following internal factors were also instrumental in decline of the fertilizer production capacity:

- high inflation level, escalation of prices and tariff rates for services (in particular, expenses for fuel and electric power increased in 1995 by 5%, for transport by 3.7 % with a tendency for further increase);
- excessive tax pressure on the Manufacturers;
- unsatisfactory state of the basic production assets at the renewal factor being 3-4 times lower than the technically and economically substandard level, etc.

It is worth noting also the fact that in early 1990 s use of nitrogen grade fertilizers in the countries of the central Europe was reduced significantly. A slight stabilization of the nitrogen fertilizers consumer's market is recently observed in Poland. Czech Republic and Hungary. However in the southern parts of the Central Europe the situation continues to remain unfavourable, e.g. in Romania and Bulgaria.

Utilization of production of the ammonia factories in the Central Europe comes presently to about 65 % against 50 % in 1992. However if in Romania it does not exceed 35 %, in Poland it amounts almost to 80 %.

Thus, the utilization of production capacities of the fertilizer manufacturers in Russia is characterized by the common tendencies of the world market and stabilized generally by the export potential.

However, the results of the mineral fertilizer industry activities during 1995 are indicative of a notable revival in production of all the basic product grades. A comparison between the output of basic products during 1995 and their output during the similar period in 1994 is given in Table 5.

Output of the basic fertilizers produced by phosphate industry in 1993-1995 is shown in Table 5.

Table 4.

Russian producers of chemical and mineral fertilizers

(in terms of product grades)

Product grade	Shippers
Carbamide	Nitrogen Fertilizer Factory (Berezniki), "Togliattiazot", "KBSHazot", "Minudobreniya" (st. Osentsy, Sverdlovsk Region), Perm Mineral Fertilizer Factory, Industrial Association "Azot" (st. Severnaya, Moscow Region)
Potassium Chloride	Joint-Stock Company "Uralmash", Joint-Stock Company "Uralkaly", Joint-Stock Company "Silvinit" (Solikamsk)
Ammonium Nitrate Nitroammophos	Joint-Stock Company "Azot" (st. Severnaya, Moscow Region), Kirovo-Chepetsk, Integrated chemical Works, Close Joint-Stock Company "Kuybyshevazot", "Kuybyshevfosfor" of Industrial Association "Minudobreniya" (Meleuz), Industrial Association "Korund" (Dzerzhinsk), Novgorod Industrial Association "Azot", Joint-Stock Company "Azot" (Nevinnomyssk), Joint-Stock Company "Minudobreniya (Rossosh)
Ammonium Sulphate	Industrial Association "Azot" (st. Severnaya, Moscow Region), Industrial Association "Korund" (Dzerzhinsk), Cherepovets IMW, Public Joint-Stock Company "KBSHazot", Gubakha By-Product Coke Plant (Gubakha, Sverdlovsk Region), Nizhni Tagil IMW, Orsk-Khalilovo IMW, Magnitogorsk IMW, Kuznetsk IMW, Kemerovo By-Product Coke Plant, Moscow By-Product Coke Plant of Public Joint-Stock Company "Krasny Molot", Shchokino Industrial Association "Azot"
Ammophos Superphosphate	Industrial Association "Minudobreniya" (Moscow Railway), Industrial Association "Fosforit" (Kingisepp)
Nitroammophos	Joint Venture "Vneshtradeinv" (Nevinnomyssk)
Diammophos	Industrial Association "Ammophos"

Output of basic products in 1994 and 1995

Table 5.

(in ths., t)

Products	1994 (report)	1995 (report)	%% 1995/1994
Nitrogen fertilizers, 100% N	4129.0	4855.7	117.6
Phosphate fertilizers			
100% P_2O (incl. Phosphate rock meal)	1715.9	1933.3	112.7
Potash fertilizers, 100% K_2O	2492.6	2824.4	113.3
Fertilizers in total	**8337.5**	**9618.4**	**115.3**
Ammonia	8837.5	9658.4	103.3
Caprolactam	136.3	164.6	120.8
Sulphuric acid	6340.0	6942.6	109.5
Apatite concentrate	2973.3	3916.3	111.5

Yearly output of the mineral fertilizers increased by 15.3%, including output of nitrogen fertilizers which increased by 17.6%, phosphate fertilizers - by 12.7% and potash fertilizers - by 13.3%.

Output of mineral fertilizers in Russia in 1986 – 1995 is given in Fig. 2.

Data on the production capacities and outputs of individual mineral fertilizer grades in Russia in 1993-1995 are given in Fig.3.

Nitrogen Fertilizers.

Capacities for the production of ammonia over the period in question will be within the range between 21221 and 19941 ths. t (nitrogen). Construction of new ammonia facilities at the Novomendeleyevskaya and Meleuz sites is now under consideration, but the decision has not yet taken and these capacities have been neglected in our calculations.

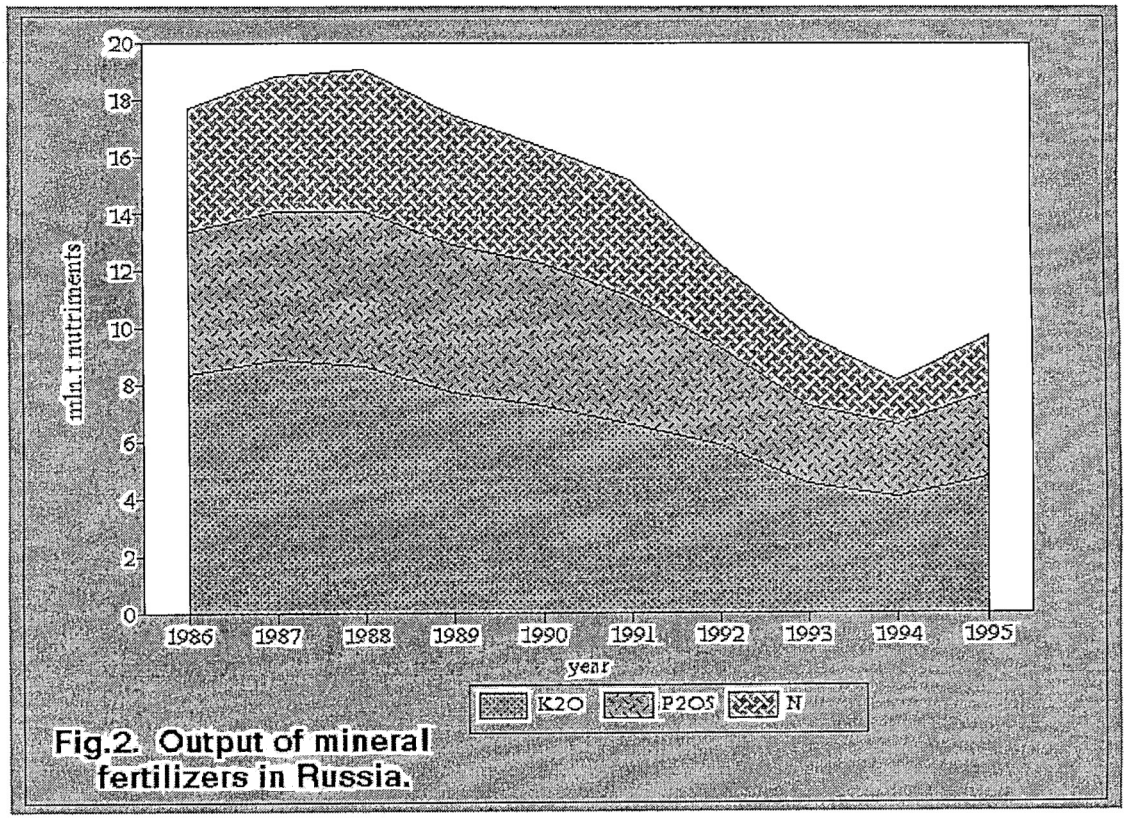

Fig.2. Output of mineral fertilizers in Russia.

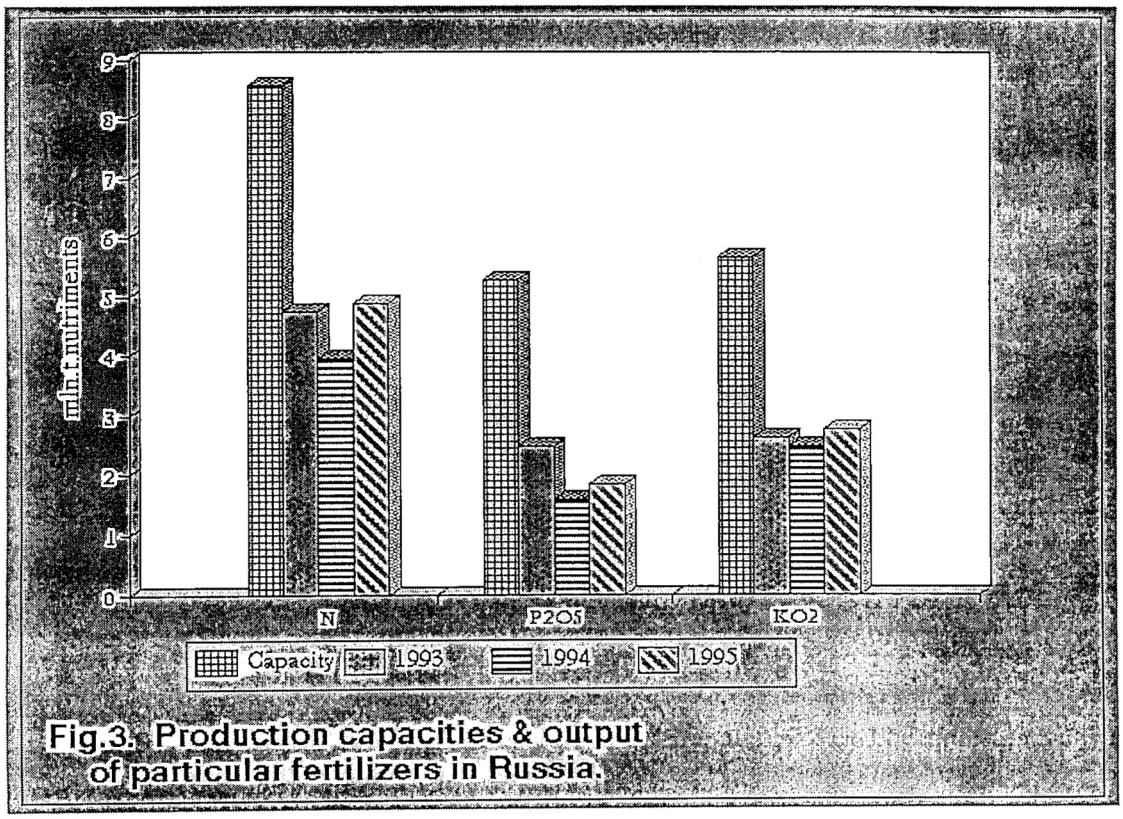

Fig.3. Production capacities & output of particular fertilizers in Russia.

According to the statistic date in 1995 the capacities for the production of ammonia in the CIS were used to 56%. It is expected that the degree of capacities utilization will increase gradually and towards the end of the decade will run to 65%. Demand for the nitrogen fertilizers will increase by 1.4 times and be as great as 3462 ths. t (pessimistic forecast). The surplus will fall from 7200 down to 3672 ths. t of nitrogen.

Fig. 4 gives a time history of the basic nitrogen fertilizers output in Russia in 1993 – 1995.

Potash fertilizers.

The potash fertilizers are predominantly represented by KCl. The capacities for the production of potash fertilizers in Russia amount to 5652.3 ths. t of K_2O. They are mainly concentrated in two enterprises: Joint Stock Company "Uralkaly" (Berezniki) and Joint Stock Company "Silvinit" (Solikamsk).

The production output of potash fertilizers in Russia decreased as compared with 1991 by 1.6 times (Fig.5). In 1995 production output of KCl increased by 13.3%.

Outputs of ammonia and nitrogen fertilizers in Russia in 1993-1995 are shown in Table 6.

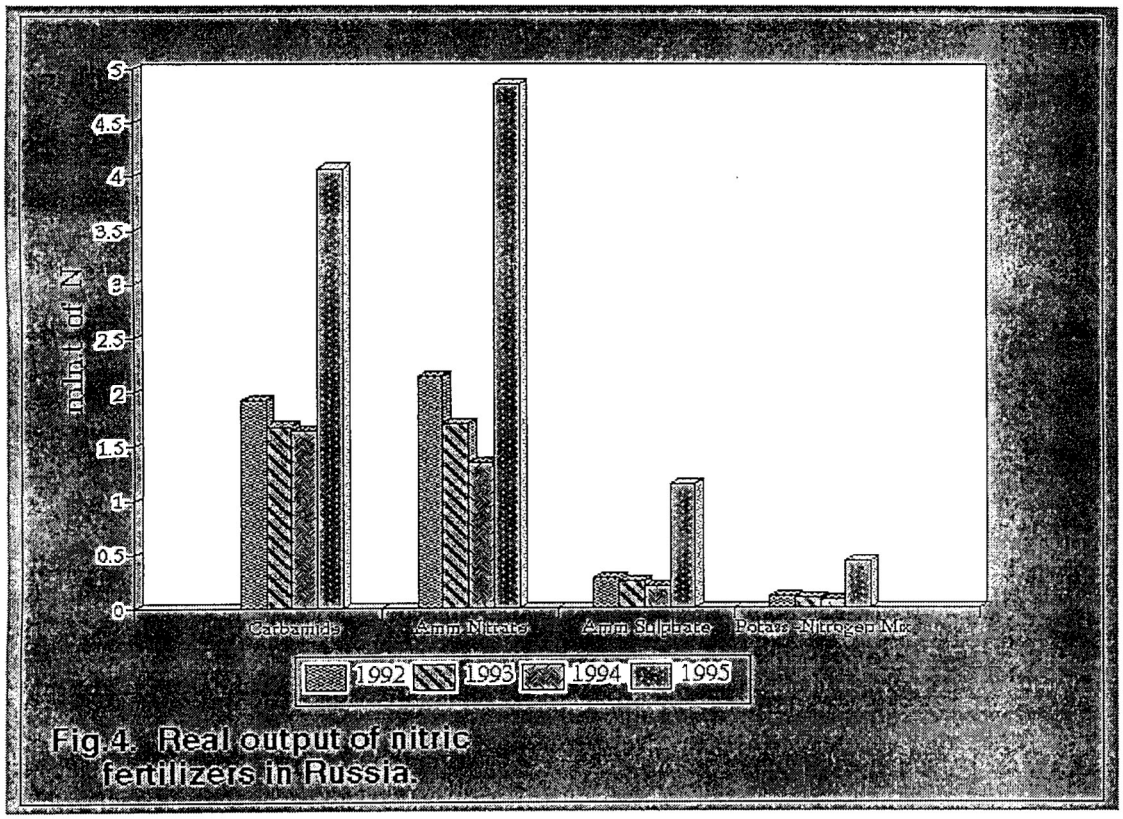

Fig.4. Real output of nitric fertilizers in Russia.

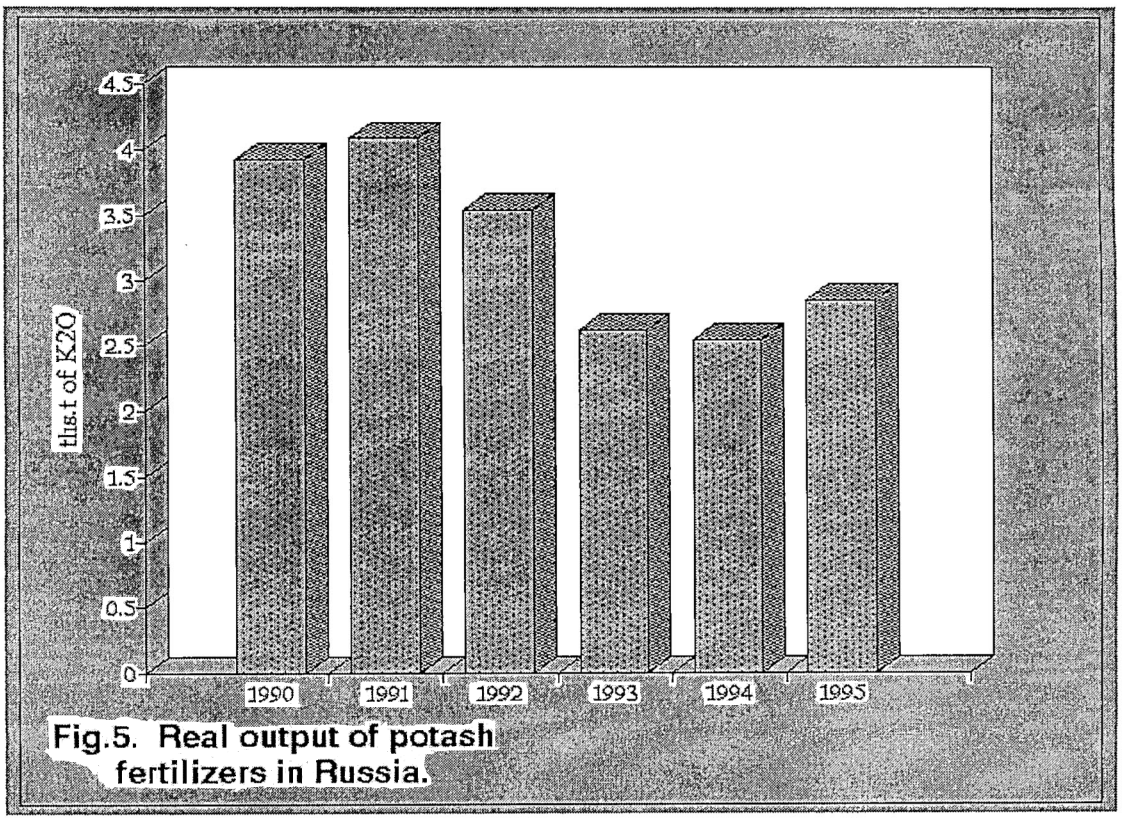

Fig.5. Real output of potash fertilizers in Russia.

Table 6.

Outputs of ammonia and nitrogen fertilizers

(in ths. t)

Product	Unit	Annual average Capacity in 1995	Output 1993	1994	1995
Ammonia	Ths. t of product	13874.0	9899.7	8838.0	9658.4
Carbamide	Do	5727.3	3609.0	3618.4	4134.0
Ammonium nitrate	Do	9091.0	4973.0	4137.9	4893.0
Ammonium sulphate	Do	1870.5	1332.0	1069.1	1192.1
Solutions of potassium-nitrogen mixtures	Do	1000.0	215.5	204.0	465.0

Output of the basic fertilizers produced by the phosphate industry in 1993-1995 is shown in Table 7.

Table 7.

Output of the basic fertilizers produced by the phosphate industry of Russia

Product	Unit	Capacity as of 01.01.95	1993	Output 1994	1995
Ammophos	Ths. t 100% P_2O_5	1445.0	1226.5	978.0	1093.0
Diammophos	Do	408.0	300.0	320.0	423.0
Azophoska and nitroammophos	Do	454.0	346.7	255.6	305.0
Nitrophoska	Do	81.9	-	20.8	34.0
Phosphate fertilizers in total	**Do**	**4939.6**	**2500.2**	**1715.4**	**1933.3**
Sulphuric acid	Ths. t	13820.0	8241.4	6340.0	6942.6
Apatite concentrate	Ths. t P_2O_5	6816	3552.5	2973.3	3316.3

With the relationship between the nutriments, as forecasted by us, consumption of the fertilizers in the long run is shown in Table 8.

Table 8.

Consumption of mineral fertilizers in Russia

(in ths. t of nutriments)

	1988	1994	2005-2010	2010/1998
Nitrogen fertilizers	5800	1000	3500 (4600)	60% (79%)
Phosphate fertilizers	4700	20	1900 (2530)	40% (54%)
Potash fertilizers	3900	200	1600 (2070)	48% (63%)
Grand total	**13800**	**1400**	**7000 (9200)**	**51% (67%)**

The figures in brackets are given assuming that Russia will still be exporting agricultural products.

The figures show that in the foreseeable future we can hardly hope for restoration of the fertilizer consumption to the level that existed in the last years of planned economy. The Russian fertilizer producing industry was created to meet that level. According to our forecast, when compared to 1994, the consumption of fertilizers in Russia will increase in the distant future by five to seven times. However, as compared with 1988 the consumption will be most likely reduced by 40% as it relates to nitrogen fertilizers - by 60% as it relates to phosphate fertilizers - by 60% and by half as it relates to potash fertilizers.

Utilization of the operating capacities for production of mineral fertilizers and ammonia in the long run (2005-2010), with the home demand for the fertilizers being satisfied, is shown in Table 9.

Table 9.

Russia utilization of operating capacities for the production of mineral fertilizers and ammonia in the long run (2005-2010) with the home demand for fertilizers being satisfied

(ths. t of nutriments)

Fertilizers	Operating Capacities	Home demand for fertilizers	% of utilization of capacities with the home demand being satisfied
Nitrogen	8046.6	3500 (4600)	43.5 (57.2)
Phosphate	4940.0	1900 (2530)	38.5 (51.2)
Potash	5652.0	1600 (2070)	28.3 (36.6)
In total	18 638.6	7000 (9200)	37.6 (49.4)
Ammonia (N)	11 404.0	3500 (4600)	30.7 (40.4)

Thus, even if Russia will become in the distant future an exporter of the agricultural products, the operating capacities for the production of mineral fertilizers, due to home demand will be used not more than to 50%, including capacities for nitrogen fertilizers - to 57.2%, for phosphate fertilizers - to 51.2% and for potash fertilizers - to 36.7%. Otherwise, the operating capacity will be used, due to home demand, to 40%. Capacities for the production of ammonia will be used to 30-40% (ignoring its utilization for industrial purposes).

The forecasted utilization of operating capacities for the production of mineral fertilizers and ammonia in 1999 with the home demand for fertilizers being satisfied, is shown in Table 10.

Table 10.

Russia utilization of operating capacities for the production of mineral fertilizers and ammonia in 1999 with the home demand for fertilizers being satisfied

(ths. t of nutriment)

Fertilizers	Operating Capacities	Home demand for fertilizers		% of capacities utilization	
		GIAP's* Version	Fertecon's version	GIAP's* Version	Fertecon's Version
Nitrogen	8046.6	2800	3050	34.8	37.9
Phosphate	4940.0	1140	900	23.1	18.2
Potash	5652.0	960	850	17.0	15.0
In total	18 638.6	4900	4800	26.3	25.8
Ammonia	11 404.0	2800	3050	24.6	26.7

* GIAP – State Institute of Agrochemical Industry.

It follows from the table that in order to satisfy the Russian home demand for the mineral fertilizers in a not distant future a quarter of the operating capacities will be more than sufficient. Some additional quantity of the fertilizers will be used for industrial purposes. However, the main bulk of the capacities may be used due to export deliveries. So far, the enterprises have not yet faced severe competition on the foreign markets; they consider export as a great benefit, reliable safety valve to remedy financial situation. But the very moment the prices for carbamide fall in the ports of Yuzhny and Ventspils by 50-70 us dollars (and this is quite realistic, it should be remembered that the market economy is characterized by a cyclical nature), the enterprises will immediately feel that it would be much better to have a capacious and safe domestic market than to depend on the arbitrary trends of the freckle foreign market.

CONCLUSION

The degree of utilization of the capacities for producing mineral fertilizers in Russia in 1994 came in total to 42,5%; as it relates to nitrogen fertilizers it came to 48.1%, potash fertilizers - to 44.1%. The lowest mark of decline was observed for the degree of utilization of the capacities for producing the phosphate fertilizers: in 1994 it was as low as 31.8%. Accordingly, the degree of utilization of the capacities for producing sulphuric acid was as low as 45.3% and apatite concentrate - 43.6%.

The results of the mineral fertilizer industry activities during 1995 are indicative of a notable revival in production of all the basic product grades. The yearly output of the mineral fertilizers increased in total by 15.3%, including output of nitrogen fertilizers which increased by 17.6%, phosphate fertilizers - by 12.7% and potash fertilizers - by 13.8%.

The capacities for producing ammonia during the period in question will be in a range between 21221 and 19941 ths. t (in nitrogen). According to statistic data, in 1995 the capacities for producing ammonia were used to 56%. It is expected that the degree of utilization of the production capacities will gradually increase and towards the and of the decade it will be as high as 65%. The demand for the nitrogen fertilizers will increase by 1.4 times and run to 3462 ths. t (pessimistic forecast). The surplus will decrease from 7200 down to 3672 ths. t of nitrogen.

The potash fertilizers are predominantly represented by KCl. The capacities for producing potash fertilizers in Russia come to 5652.3 ths. t of K_2O. They are mainly concentrated in two enterprises: Joint Stock Company "Uralkaly" (Berezniki) and Joint Stock Company "Silvinit" (Solikamsk).

In 1994 production output of the potash fertilizers in Russia decreased, as against 1991, by 1.6 times. In 1995 production output of the KCl increased by 13.3%.

According to our forecast, when compared to 1994, the consumption of fertilizers in Russia will increase in the distant future by 5-7 times. However, as compared to 1988, the consumption will be most likely reduced by 40% as it relates to nitrogen fertilizers, by 60% as it relates to phosphate fertilizers and by half as it relates to potash fertilizers.

In the long run, the operating capacities for the production of mineral fertilizers,

due to home demand, will be used not more than to 50%, including capacities for nitrogen fertilizers - to 57.2%, phosphate fertilizers - to 51.2% and potash fertilizers - to 36.7%.

4. RUSSIAN FOREIGN TRADE IN MINERAL FERTILIZERS

Russia is one of the major world exporters of mineral fertilizers, first of all, the nitrogenous and potash grades. During 1993-1995 exports of the chemical fertilizers have increased by 39% in terms of physical indicators and by 98% in terms of the cost ones.

In 1995 Russia has exported 82% of the mineral fertilizers produced in this country (95% of the carbamide have been produced on Russia for export).

In 1996 Russia has exported 8430 ths. t of nitrogenous fertilizers for the amount of 1073 m US dollars and 3607 ths. t of potash fertilizers for the amount of 279 m US dollars.

The exported volumes of nitrogenous fertilizers in 1997 have ranged to 8.1 m t, potash fertilizers - to 3.6 m. t. According to forecast in 1988, the exported volumes of nitrogenous fertilizers will range to 8.0 m. t and potash fertilizers - to 3.8 m t.

Trade between Russia and SEA Countries.

According to the goal of this Project an investigation of the consumer's market in the SEA countries and saturation thereof with mineral fertilizers from Russia is of practical interest.

The main consumer of mineral fertilizers in the SEA countries is China. Table 11 gives the import structure for the mineral fertilizers transported into China from Russia during 1996-1997.

As may be seen from the Table 11 volumes of the fertilizers imported into China from Russia in 1997 amounted to 6.25 m t, having been reduced by 20.2% as against the preceding year. Along with that deliveries of the nitrogen fertilizers were reduced by 46.5%, that is down to 2.36 m. t while deliveries of the potash and combined fertilizers increased by 12.5%, that is up to 2.42 m. t and by 15.7%, that is up to 1.47 m. t, respectively.

Table 11.

Imports of fertilizers into China from Russia

Products	1996	1997
Grand Total	**7836.1**	**6251.5**
Nitrogen fertilizers	**4413.7**	**2360.8**
Carbamide	3317.3	2084.6
Ammonium nitrate	1018.6	246.3
Ammonium sulphate	77.8	29.9
Potash fertilizers	**2148.4**	**2416.1**
Potassium chloride	1965.0	2386.6
Potassium sulphate	11.9	14.5
Combined fertilizers	**1274.0**	**1474.6**

The Russian share in the Chinese imports of such basic fertilizer grades as carbamide and potassium chloride in 1997 amounted to 61.0 and 51.5% (by volume).

According to preliminary outline, the total volumes o fertilizers to be imported into China in 1998 will amount to 10 m. t (which, based on an estimation made, is less be 6.5 m. t than in 1997) of which 3.9 m. t will be accounted for by potash fertilizers, 3.0 m. t - by phosphorous, 3.0 m. t - by nitrogen and other fertilizers (according to information from the Trade Mission of the RF in China).

On the strength of statistic data an analysis of freight traffic has been made, based on carload shipments from the facilities producing the mineral fertilizers to the sea ports of Russia, Baltic countries and Ukraine during each month of 1996. Freight traffic during the summer season of Arctic navigation has been given separately and a comparative estimation of the distances of transportation through alternative transportation routes from

the producing facilities to the reference port of Hongkong, made.

In 1996 4928.6 ths. t of mineral fertilizers have been sold to the SEA countries. The products sold have been transhipped via the western ports of Russia and Baltic countries as well as via the southern ports of Russia and Ukraine, including:

- China - 3786.3	- Indonesia - 40.0
- Singapore - 742.0	- Japan - 20.0
- Malaysia - 325.3	- Vietnam - 10.0
	- Taiwan - 5.0.

As may be seen from the statistics given, the biggest importer of Russia fertilizers in the SEA countries is China. It accounts for 76.8 % of the total volumes exported by Russia to SEA.

Of the total volume of mineral fertilizers transported by sea to the SEA countries abt. 1.0 m. t were transported during the summer season of Arctic navigation (July - October). In 1996 205 ths. t of fertilizers were exported via the port of Murmansk during the summer Arctic navigation.

5. TRANSPORTATION ROUTES FOR MINERAL FERTILIZER TRAFFIC VIA SEA PORTS OF THE FORMER USSR

Transportation routes for mineral fertilizer traffic in combined railway-maritime service from the producing facilities to the reference port of Hongkong are shown in Fig.6.

An estimation of the distance of transportation from the producers of mineral fertilizers in Russia to the consumers in the CEA countries has been made by comparing the total length of well established transportation routes with the potential transportation routes through the NSR.

The results of the comparative estimation of the transportation route lengths are given in Fig.7.

The distances of transportation from the major producers to the port of Hongkong via Suez Canal and through the transhipment port of Novorossiisk are, on the average, by 5000 km longer than through the transhipment port of Murmansk and further along the NSR.

The distances of transportation from the major producers of fertilizers in Russia to the port of Hongkong via Suez Canal and through the transhipment ports of St.Petersburg and Murmansk are accordingly by 6500 to 8000 km longer than through the transhipment port of Murmansk and further along the NSR.

Thus, in the general concept of selecting the shortest route for transportation of the mineral fertilizers to the SEA countries the Northern Sea Route Has a definite advantage.

The task of stirring the shipping along the NSR to greater activity during the summer Arctic navigation season (July-Octobér) may be achieved through conclusion of contracts for carriage of the mineral fertilizers to China and Japan via the port of Murmansk.

The traffic of fertilizers along the NSR to Indonesia, Malaysia and Singapore will be economically feasible provided return cargo to the ports of Europe is available.

TRANSPORTATION DISTANCES
from ports of Russia, Baltia & Ukraine
to HONGKONG,
nautical miles

via North Sea Route

Murmansk	6960

via Suez

Murmansk	11280
S-Peterburg	11080
Tallin	10915
Riga	10860
Ventspils	10740
Kaliningrad	10675
Novorossiisk	9620
Kherson	9570
Odessa	9500

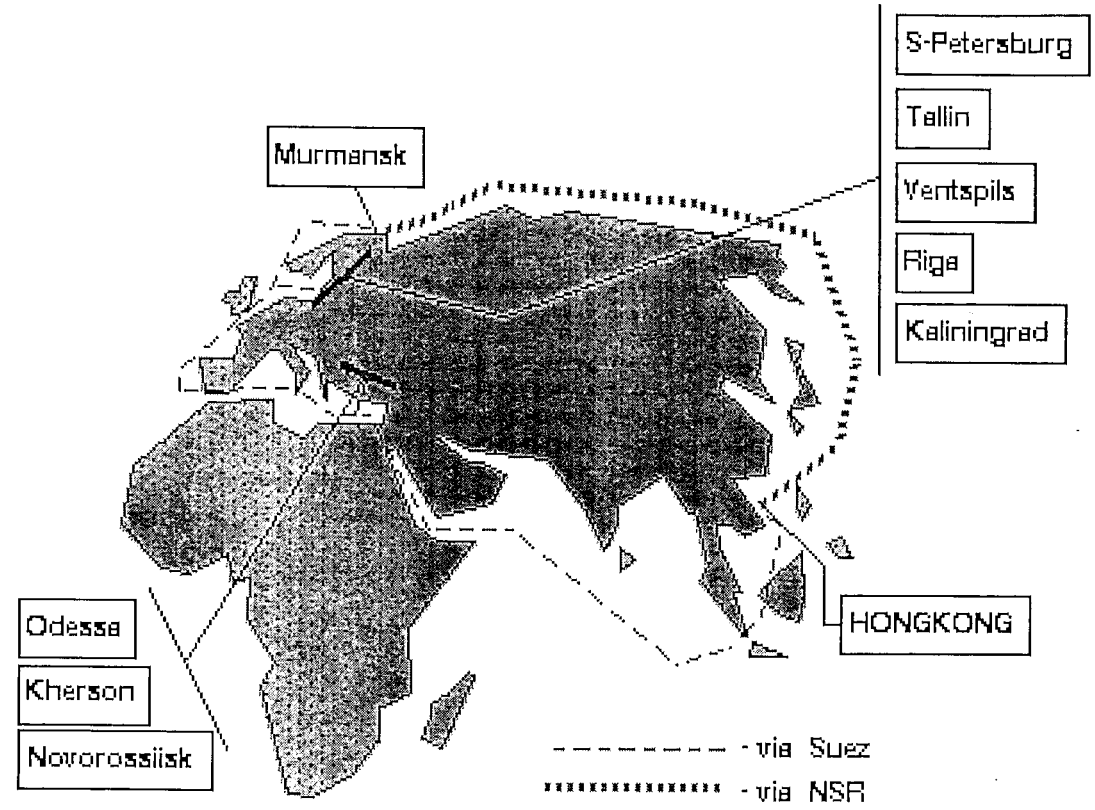

Fig.6 Transportation routes for mineral fertilizer traffic from sea ports of Russia, Baltia & Ukraine to S.E.A.

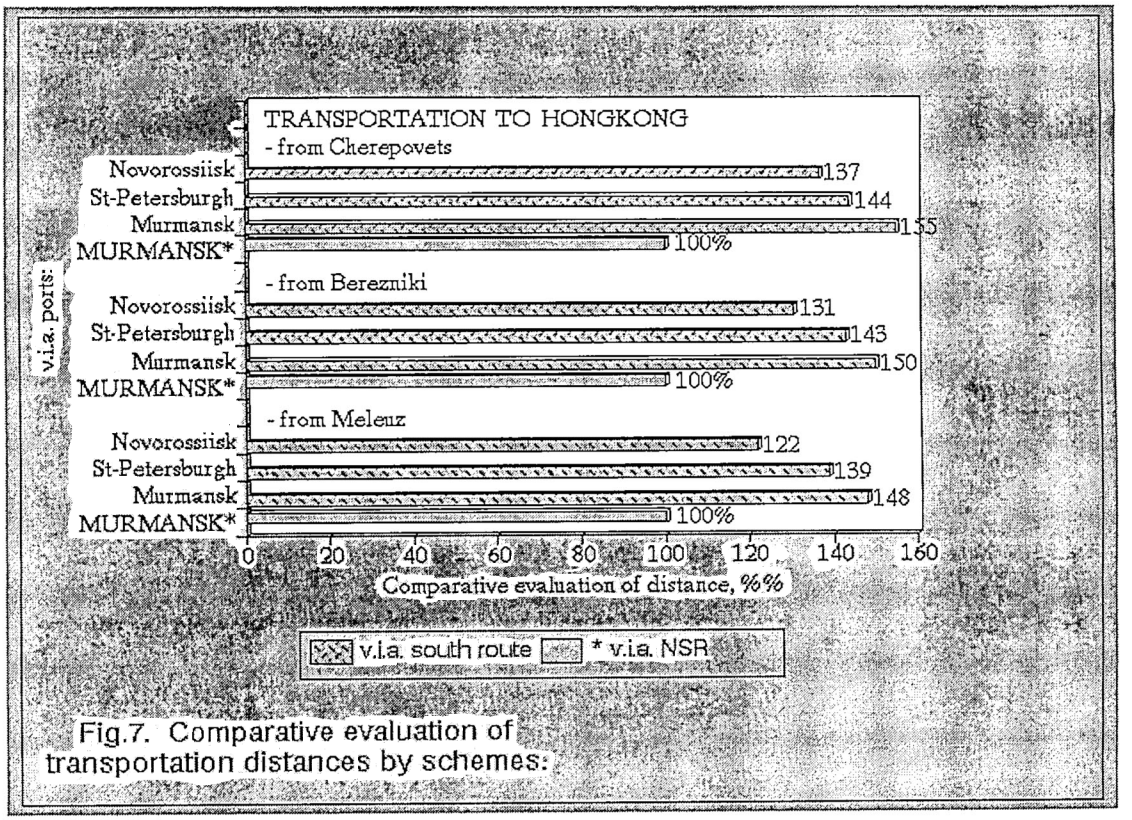

Fig.7. Comparative evaluation of transportation distances by schemes:

The quantitative indices of mineral fertilizer exports from the points of departure in SEA via the sea ports in Russia, Baltic countries and Ukraine are given in Table 12.

Table 12

Exports of the Russian mineral fertilizers

Point of departure Description of cargo	Volume, *ths. t*	Transhipment port	Country of destination	Volume, *ths. t*
Novgorod		***Murmansk***		
Nitroammophos	551.0 ------- 150.0		China	551.0 ------- 150.0
St. Azotnaya (Moskow Region)		***Murmansk***		
Nitroammophos	190.0 ------- 55.0		China	190.0 ------- 55.0
Solikamsk		***St.Petersburg***		
Potassium chloride	415.3 ------- 160.1		China	30.03 ------- -
			Malaysia	305.27 -------- 160.08
			Indonesia	40.00 ------- -
			Singapore	40.00 -------- -
Solikamsk		***Ventspils***		
Potassium chloride	127.1 ------ 19.0		China	187.10 -------- 19.00
Berezniki		***Ventspils***		
Potassium chloride	856.8 ------- 230.3		China	824.93 -------- 115.50

Point of departure Description of cargo	Volume, *ths. t*	Transhipment port	Country of destination	Volume, *ths. t*
			Malaysia	20.05 ------- -
			Singapore	286.80 -------- 114.80
			Japan	20.00 -------- -
			Taiwan	5.02 ------- -
Nevinnomyssk		***Novorossiisk***		621.97 -------- -
Ammonium nitrate	56.52 ------- -		China	56.52 ------- -
Carbamide	426.80 -------- -		China	426.80 -------- -
Nitrogenous fertilizers	60.00 ------- -		China	60.00 -------- -
Nitroammophos	78.65 ------- -		China	78.65 -------- -
St. Severnaya (Moskow Region)	381.90 -------- 86.40	***Odessa***		381.90 -------- 86.40
Carbamide	325.20 -------- 59.40		China	325.20 -------- 59.40
Ammonium nitrate	56.70 ------- 27.00		China	56.70 ------- 27.00
Togliatti		***Odessa***		
Carbamide	653.7 ------- -		China	653.7 ------- -

Point of departure Description of cargo	Volume, *ths. t*	Transhipment port	Country of destination	Volume, *ths. t*
Nevinnomyssk Carbamide	11.5 ------ -	***Odessa***	China	11.5 ------ -
St. Berezniki		***Odessa***		
Carbamide	313.10 -------- 76.70		China	313.10 -------- 76.70
Potassium chloride	294.50 -------- 2.70		China	62.40 ------- 16.40
			Singapore	232.10 -------- 56.30
St. Osentsy (Sverdl. Railway)		***Odessa***		
Carbamide	224.00 -------- 44.00		China	224.00 -------- 44.00
Potassium chloride	125.00 -------- 33.00		Singapore	125.00 -------- 33.00
Meleuz		***Odessa***		
Carbamide	34.70 ------- -		China	34.70 ------- -

The traffic volumes in Table 12 are expressed by fraction. The numerator indicates the total traffic volume, the denominator gives the same volume that is shipped during the summer Arctic navigation season (July-October).

Thus, Russia export annually via the western port about 5 m. t of mineral fertilizers to the SEA countries. Of this quantity abt 1 m. t are exported during July-October. The bulk of the producing facilities are located in the middle part of the Russian Federation and shipment of the fertilizers via the ports of Ventspils and Odessa, all economic conditions being equal, cannot offer advantages in reducing transportation costs.

The statistics presented for 1996 shows that already at the present time there are favorable prerequisites for step-by-step diverting the mineral fertilizer traffic via the port of Murmansk to the Northern Sea Route.

The case in point is primarily the transit traffic during the summer Arctic navigation season (July-October) and experimental voyages during the autumn, winter and spring seasons. In the foreseeable future about 90% (4.0-4.5 m t) of the total quantity of mineral fertilizers can be shipped to the countries of the Asian-Pacific Region via the port of Murmansk and along the Northern Sea Route.

To hit such a target to-day it will be necessary to obtain goodwill of the cargo sellers, buyers and shipowners to create efficient commercial conditions for organization of transit traffic along the NSR.

6. CONCLUSIONS

Production output and trade in mineral fertilizers in the former USSR occupied a prominent place after the oil, natural gas and metal exports.

The total capacities of the former USSR for production of mineral fertilizers were estimated at 36.25 m. t of nutriments, including those of nitrogenous grade at 14.8 m. t (N), phosphate grade - at 10.5 m. t (P_2O_5) and potash grade - at 10.95 m. t (K_2O). About a half of these capacities are available in Russia: the Russian shares in fertilizer production capacities are as follows: 54% for nitrogenous fertilizers, 47% for phosphate fertilizers and 51.6% for potash fertilizers.

In recent years, Russia out down considerably production of the mineral fertilizers. Since 1995 some stabilization and revival of the fertilizer production may be observed. In the long run, the operating capacities for producing the mineral fertilizers, due to home demand, will be used not more than to 50%, including capacities for nitrogenous fertilizers - to 57.2%, for phosphate fertilizers - to 51.2% and for potash fertilizers - to 36.7%.

In 1996 Russia has exported 8430 ths. t of nitrogenous fertilizers for the amount of 1073 m US dollars and 3607 ths. t of potash fertilizers for the amount of 279 m US dollars.

The main consumer of mineral fertilizers in SEA is China. In 1996 7836.1 ths. t of fertilizers have been exported to China, including 3769.9 ths. t of fertilizers which have been shipped via the western ports of Russia, Baltic countries and Ukraine. In the same time 1142.3 ths. t of fertilizers have been exported to the SEA countries (Vietnam, Japan, Singapore, Indonesia, Malaysia).

The transportation routes from the western ports of Russia, Baltic countries and Ukraine go traditionally through the Suez Canal.

In the same time, there exists a shorter freight transportation route, namely the Northern Sea Route.

The distances of transportation from the major producers in Russia to the port of Hongkong via Suez Canal and through the transhipment port of Novorossiisk are, on the average, by 5000 km longer than through the transhipment port of Murmansk and further along the NSR.

The distances of transportation from the major producers of fertilizers in Russia to the port of Hongkong via Suez Canal and through the transhipment ports of St.Petersburg and Murmansk are accordingly by 6500 to 8000 km longer than through the port of Murmansk and further along the NSR.

The distances of transportation from the major producers of fertilizers in Russia to the port of Hongkong via Suez Canal and through the transhipment ports of St.Petersburg and Murmansk are accordingly by 6500 to 8000 km longer than through the port of Murmansk and further along the NSR.

Thus, in the general concept of selecting the shortest route for transportation of the mineral fertilizers to the SEA countries the Northern Sea Route has a definite advantage.

The task of stirring the shipping along the NSR to greater activity may be achieved through conclusion of contracts for carriage of the mineral fertilizers to China and Japan via the port of Murmansk.

The case in point is primarily the regular transit traffic during the summer Arctic navigation season (July-October) and experimental voyages during the autumn, winter and spring seasons. In the foreseeable future about 90% (4.0-4.5 m. t) of the total quantity of mineral fertilizers can be shipped to the countries of the Asian-Pacific Region via the port of Murmansk and along the Northern Sea Route.

To hit such a target to-day it will be necessary to obtain goodwill of the cargo sellers, buyers and ship owners to create favourable conditions for organization of transit traffic along the NSR.

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Annex 1.

Review of "Russian Fertilizer Industry, Potential Cargo Segment for the NSR" By Joachim Schwarz.

The paper provides an excellent background on production and consumption of mineral fertilizer worldwide, but with emphasis on RUSSIA. It tells about the area of production and the ports of shipment. The information can be used for planning the shipment of fertilizer cargo, i.e. the evaluation of costs and profits for a shipping company.

The NSR certainly benefits from shorter distance between Murmansk/ St. Petersburg and harbours in East and South-East Asia. Any Cost-benefit calculations, however, must consider the investment for the ice-class ship and any icebreaker assistance. This may be a task of its own, which could be a logic follow-up of this paper.

Besides some orthographic/ typing errors, the following numbers should be checked:

- on page 32: marked percentage 58,2
- on page 40: marked 8769.9 ths. t
- Table No. 2: USSR – 1993 – 27015 ?

The report shows that the production of fertilizers in Russia is only in the range of 50 % of the capacity. Why ?

All together, the information provided is a valuable basis for any Transport planning, especially for Transport along the NSR from Russia to SEA.

J. Schwarz

Answer of the Russian Specialists to the review of Professor Schwarz to the Project III.01.4 "Russian Fertilizer Industry, Potential Cargo Segment for the NSR".

We express our gratitude and appreciation to the esteemed Reviewer for his concise and substantial appraisal of our work. We feel that the Expert fully understood the objectives and contents of the project. At the same time we have been upset about the unfortunate misprints existing in the English version and offer our apologies for them.

Regarding the question about reduction in production of fertilizers in Russia we make the following comment.

During the period of economic recession demand for the main kinds of mineral fertilizers on the domestic market was decreased significantly. Decline in exports on the domestic market was an important impetus to development of export. So, during 1993-1995 (see p. 27 of the project) the exports increased by 39 % in physical indicators and by 98 % in cost indicators.

Coincidentally with the increase in exports a rise in domestic prices took place which fostered decrease in export profitability. The tendency for further strengthening for the non-tariff barriers on the side of fertilizer consumers complicates still further state of the Russian exporters. Protectionism was manifested in allocating the fertilizer imports from Russia to the West Europe and China, imposing obstacles to delivery of fertilizers, forcing on Russia limitations to carbamide export.

The following internal factors were also instrumental in decline of the fertilizer production capacity:

- high inflation level, escalation of prices and tariff rates for services (in particular, expenses for fuel and electric power increased in 1995 by 5%, for transport by 3.7 % with a tendency for further increase);
- excessive tax pressure on the Manufacturers;
- unsatisfactory state of the basic production assets at the renewal factor being 3-4 times lower than the technically and economically substandard level, etc.

It is worth noting also the fact that in early 1990 s use of nitrogen grade fertilizers in the countries of the central Europe was reduced significantly. A slight stabilization of the nitrogen fertilizers consumer's market is recently observed in Poland. Czech Republic and Hungary. However in the southern parts of the Central Europe the situation continues to remain unfavourable, e.g. in Romania and Bulgaria.

Utilization of production of the ammonia factories in the Central Europe comes presently to about 65 % against 50 % in 1992. However if in Romania it does not exceed 35 %, in Poland it amounts almost to 80 %.

Thus, the utilization of production capacities of the fertilizer manufacturers in Russia is characterized by the common tendencies of the world market and stabilized generally by the export potential.

Two misprints exist in Table 2 of the English version:

USSR –1993 – 27015, is to be amended: USSR – 1993 – 2701;

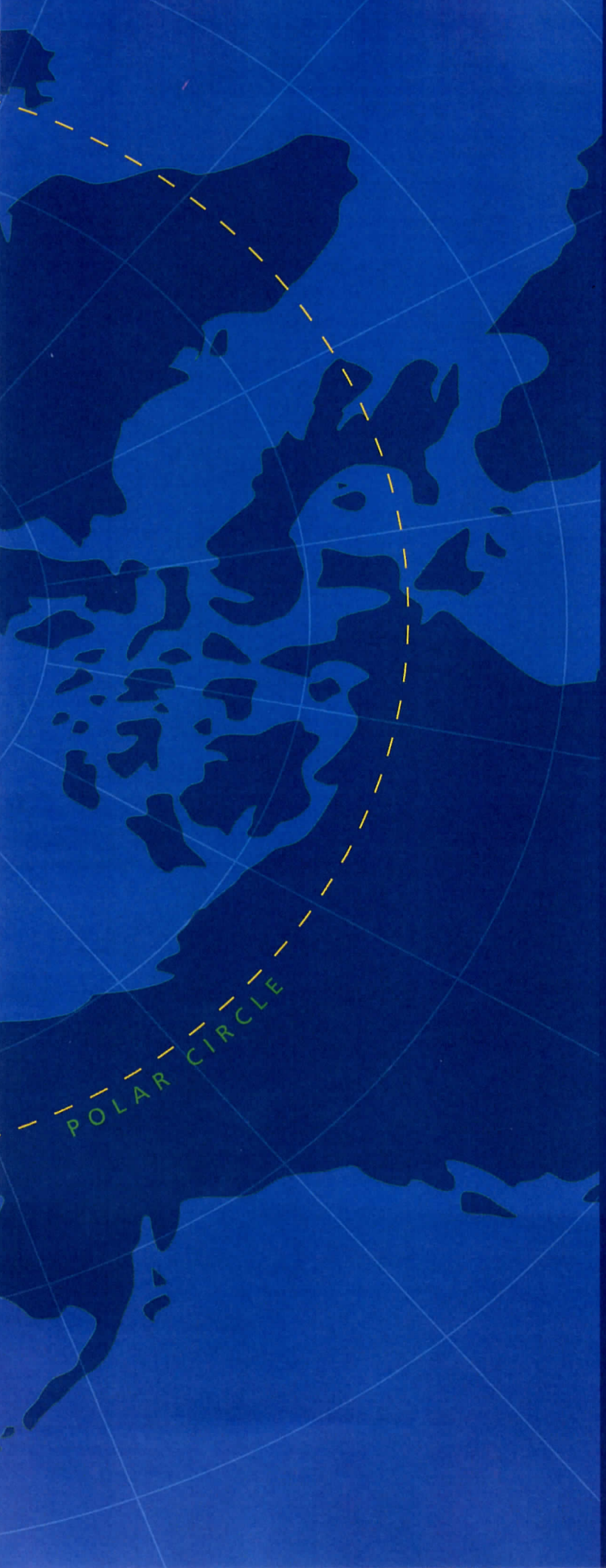
1994 – 1755, is to be amended: 1994 – 2755.

On page 32: 58.2 per cent, is to be amended: 76.8 per cent.

On page 40: the following text is to be read: " In 1996 7836.1 ths. T of fertilizers have been exported to China, including 3769.9 (instead of 8769.9) ths. t of fertilizers which have been shipped via the western ports of Russia, Baltic countries and Ukraine".

All the mentioned misprints have been corrected in the last edition of the Project.

Many thanks to the Reviewer.



The three main cooperating institutions of INSROP

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

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

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

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

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

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