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THE DEVELOPMENT OF FERTILIZER INDUSTRY

IN THE USSR AND

EUROPEAN CMEA COUNTRIES

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Foreword

The Soviet Union is the world largest fertilizer producer and one of the major fertilizer exporter. It accounts for nearly a quarter of world fertilizer production and about 12 percent of world fertilizer exports. The development of fertilizer industry in the USSR affects considerably world supply and demand situation, level of prices, commercial profitability of fertilizer projects in different countries, including developing ones.

In this connection the analyse of the trends and prospects of fertilizer industry in the USSR will provide an opportunity to developing countries to forecast correctly the situation on the world fertilizer market, to evaluate their own position on it and be able to make well assessed and weighted decisions as far as domestic fertilizer industries are concerned. At the same time the experience of the USSR and other CMEA countries in the development of different forms of mutual co-operation in fertilizers, its forms and conditionss is of interest to developing countries.

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I. TRENDS OF PRODUCTION AND CONSUMPTION

Production - The expansion of Soviet fertilizer industry in the seventies and the early mid-eighties was characterized by high rates of growth of production, consumption and foreign trade.

Over 1970-1985 the output increased 2.5-fold reaching to 33.2 million tons I/, whereas the average annual rate of growth equalled 6.1 per cent. In 1985 the increase in fertilizer output over the previous year was 7.8 per cent.

Table I

Fertilizer Production in the USSR

(thousand tons, in terms of 100 per cent nutrients)

	1960	1970	1980	1984	1985
Total	3281	13099	24767	30808	33200
including:					
nitrogen	1003	5423	10241	13328	14223
phosphate	1192	3585	6455	7695	7825
including:					
ground rock phosphate	280	1085	833	766	771
potassium	1084	4087	8064	9776	10367

Source: USSR in Figures. M., 1986, P.56. The USSR National Economy. M., 1985, P. 145

In the total production nitrogen fertilizers output

increased most considerably and the share rose from 30.6 per cent in 1960 to 41.4 per cent in 1970 and 42.8 per cent in 1985. Despite a considerable increase in phosphate fertilizers production their share went down from 36.3 per cent in 1960 to 23.6 per cent in 1985. The relative share of potassium fertilizers remained practically unchanged and was equal to 34.2 per cent in 1985. Compound and concentrated fertilizers whose share rose from 84.6 per cent in 1980 to 90 per cent in 1985 account almost entirely for the total increase achieved in fertilizer production. Over the same period the fertilizer nutrient content rose from 38.1 per cent to 41.6 per cent 2/.

Increased fertilizer production has resulted from large scale construction of new capacities, a more effective use of existing enterprises and higher unit capacity of installations and production lines. The following facilities went into operation in 1981-1985: a world's largest nitrogen fertilizer complex "Togliatti-Azot"; a fertilizer plant in Odessa; and a unique ammonia (2,600 km. long) pipeline from Togliatti to Odessa with 30 distribution stations for direct application of liquid ammonia on the spot 3/. In 1981-1985 Soviet fertilizer capacities increased by 6.8 million tons. The increase in sulphuric acid production equalled 5.4 million tons per annum. Over 1981-1984 new 27

2/ Khimia i Zhizn (Chemistry and Life). M., No. 2, P.3, 1986.

3/ Khimia i Zemlya (Chemistry and Land). M., 1985, P. 9.

million tons capacities to extract phosphate-containing ores were added to the country's running stock 4/.

Table 2

Commissioning of Fertilizer Capacities in the USSR Through New Construction and the Extension and Reconstruction of Operating Enterprises

	1971-1975	1976-1980	1981-1985	1985
Mineral fertilizers (in terms of 100 per cent of nutrients), million tons per annum	9.0	8.8	6.8	1.6
Sulphuric acid, million tons per annum	8.6	9.7	5.4	1.6

Source: USSR in Figures. M., 1986, PP. 156-157.

The industry's technical potential has also grown up through the introduction of higher per unit capacities in individual lines of production as follows: ammonia, 450,000 tons per annum; nitric acid, 380,000 and 670,000; urea, 330,000 and 450,000; ammonium nitrate, 450,000; sulphuric acid, 450,000 and 600,000; and nitro-ammophoska, 550,000 tons per annum. As compared to 1975 the per unit capacities of fertilizer and relevant primary materials enterprises have increased by now 2.5 - 3 times.

4/ Chemistry in Agriculture. M., No. 10, 1985, P. 73.

Since 1979 the Soviet Union has been producing liquid compound fertilizers. Seven 300,000 tons per annum installations for producing such fertilizers are in operation. Their output increased from 320,000 tons in 1979 to 2,200,000 tons in 1985. The basic type of fertilizer produced is 10-34-0. Large-scale production of super-phosphoric acid was commissioned in 1984 at a chemical plant in Krasnodar, however the bulk of liquid compound fertilizers is produced today from imported acid 5/. Over the period ending in 1990 it is planned to considerably expand its domestic production. Essential progress has been achieved in ammonia production based on the use of domestic and imported equipment. Over 1970-1985 ammonia production increased from 7.6 million tons to 21.5 million tons 6/.

The fertilizer industry is comparatively young in European CMEA countries. Before 1950 Hungary, Poland and Czechoslovakia produced very little fertilizers, while Bulgaria and Rumania produced practically none. The subsequent period was characterized by a rapid growth of the fertilizer industry following from the mentioned countries' economic integration with the Soviet Union. As far back as 1958 the 10th CMEA Session recommended that all European CMEA nations boost their nitrogen and phosphate fertilizer production; the German Democratic Republic and the Soviet Union were advised to give priority to potassium fertilizer production. The relevant long-term

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5/ Chemistry in Agriculture. M., No. 3, 1986, PP. 2,3.

programme envisaged that the interested countries should co-ordinate efforts to meet their demand for fertilizers through own extended production or through mutual deliveries based on specialized and co-operated manufacture.

The following basic trends directly concerning the fertilizer industry can be distinguished in the socialist countries' programme of economic integration:

- Joint solution of fuel and raw materials problems by the countries concerned;
- Extended specialized and co-operated production of individual types of fertilizers; and
- Measures to co-ordinate national economic plans for a long-term period, including scientific and technical co-operation.

The decisive role for the expansion of the nitrogen fertilizer industry in the socialist countries played the construction of a network of gas, oil and oil products transportation pipelines in the Soviet Union (including projects assisted by other socialist nations) and in the CMEA countries enabling them to create a stable raw materials and energy base for the production of all types of fertilizers based on deliveries of hydrocarbons from the Soviet Union. From 1950 to 1985 the

network of trunk gas pipelines in the Soviet Union extended from 2,300 km. to 174,000 km. 7/. In 1983 a gas pipeline of more than 4,600 km. from Urengoi via Pomari to Uzhgorod was put in operation. CMEA countries are assisting the Soviet Union in creating another gas pipeline from Yamal to the Soviet Western border which opens possibilities of extended gas supplies to European socialist countries. Today the nitrogen industry of practically all European CMEA countries operates on hydrocarbon materials from the Soviet Union.

Table 3

Length of Trunk Oil and Oil Products Pipelines

in CMEA Countries

(by the end of the year; km)

	1970	1980	1984	1985
Bulgaria	-	523	622	-
Hungary	603	1974	2219	-
GDR	681	1301	1301	-
Poland	900	1975	1986	-
USSR	37415	69743	78304	81000

Source: CMEA Countries' Statistical Yearbook. M., 1985, P. 284.

7/ USSR National Economy in 1984. M., 1985, P. 347.

All ammonia producing plants that went into operation in European CMEA countries after 1960 use ga. or liquid oil products. By the early seventies nitrogen fertilizer production in these countries had, on the whole, exceeded their respective needs and the nitrogen fertilizers were put on their exports list. Increasing production was accompanied by improved output pattern with a larger share of concentrated fertilizers, especially urea. By the early eighties urea's share had risen roughly to 40 per cent (as against 30 per cent in the seventies). Thanks to fast rates of growth the share of nitrogen fertilizers has reached today almost 50 per cent of the total production of all types of fertilizers. Considerable increases in Soviet deliveries of phosphate-containing raw materials, as well as in imports of potash chloride from the USSR, GDR and other countries accounted for essential expansion of phosphate and potassium fertilizer production in European CMEA countries.

Table 4

Fertilizer Production in European CMEA Countries

(thousand tons)

	1960	1970	1980	1984	
Total	3234	7402	12355	13145	
including:					
Nitrogen	904	3033	5643	6270	
Phosphate	570	1910	2786	2839	
Potassium	-	2486	3926	3938	8/

8/ Without Rumania

Source: CMEA Countries' Statistical Yearbook. M., 1985, PP. 109-110; Chemical Industry Abroad. M., 1984, P. 5.

Apart from supplies of raw materials and energy the Soviet Union has assisted socialist countries in the construction of many of their fertilizer enterprises. By the mid-seventies enterprises built with the assistance of the USSR accounted for 63 per cent of all nitrogen fertilizers production in Bulgaria and 52 per cent in Hungary 9/. By January 1986 the Soviet Union had helped the socialist countries to put into operation 1.9 million tons of fertilizer capacities.

In their activities to specialize and co-operate production CMEA countries make better use of the practice of pooling the interested parties' resources, including investments in projects with the credits to be paid back in relevant products. For example, to meet their demand in phosphoric fertilizers Bulgaria, the GDR, Czechoslovakia and Hungary joined efforts to expand "Fosforit" complex in the Kinguisepp district of the Soviet Union. They have been supplied as construction co-partners with ammonia phosphate (215,000 tons per annum) since 1976. Poland and Czechoslovakia have invested in the construction of potassium mining facilities in the Soviet Union. In return the Soviet Union has been satisfying over 50 per cent of Polish demand for

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9/ International Labour Division in agroindustry. M., 1984, P. 124.

potassium fertilizers. As part of specialized manufacture Hungary receives from the Soviet Union potassium and nitrogenous fertilizers in exchange for pesticides.

A large nitrogen fertilizer factory in Piteritz (GDR) runs on Soviet natural gas and is equipped with Czechoslovak-made installations. The Soviet Union and Hungary also took part in its construction. The factory helps to meet both the demand of the GDR and other European CMEA countries. In 1974 the GDR put in action a salt mining and processing complex with a capacity of 900,000 tons per annum (more than a quarter of East Germany's total production of potash salts). Soviet Union, Poland, Czechoslovakia were among active participants in the construction of the project and part of its products went to European CMEA countries to repay their credits 10/.

Integration projects based on compensation arrangements are more profitable than imports which is proved by the growing share of such production in meeting the demand for fertilizers. East German experts have estimated that 2,800 million cu.m. of gas annually transported from the Soviet Union to the GDR through the "Souyz" pipeline and used also for making fertilizers is equivalent to 20 million tons of brown coal mining and processing of which requires 2.5 times more money than East Germany's share participation in the construction of the above-mentioned pipeline 11/ (the GDR's total import of gas in 1984 amounted to 6,200 million cu.m.).

In solving problems of specialized petro-chemical production within the CMEA framework the Soviet Union with its vast resources has undertaken to develop the most material and energy intensive types of products. Under the General Agreement of 1979 signed by all CMEA member-countries the Soviet Union shall considerably expand its capacities in energy intensive types of products, whereas the other CMEA countries are to seek similar progress in less energy intensive fields. With due account of its partners' needs the production of ammonia and other fertilizers is increasing in the USSR, whereas in the socialist countries the production of pesticides and other small tonnage chemicals are to be increased. Under the said Agreement in 1981-1985 the Soviet Union supplied to its partners nearly 2.7 million tons of ammonia and over 11 million tons of fertilizers 12/. The Soviet commitments on supplies of energy intensive products, including ammonia and fertilizers, in 1981-1985 are estimated at 1,000 million rubles (or $1,500 million at the 1980 rate of exchange). In 1986-1990 they are to rise to 2,800 million rubles ($4,300 million) in 1980 prices. Instead of simple co-ordination of their foreign trade deliveries the CMEA countries today jointly plan their integration measures and create large-scale construction projects of compensatory nature.

12/ Frumkin B.E. CMEA countries' Integration in the Agro-Industrial Sphere. M., 1986, P. 66.

In 1985 the total fertilizer production in the Soviet Union and the European CMEA countries reached the 46.5 million tons. In 1970-1985 the annual average rate of growth in fertilizer production in these countries equalled 5.6 per cent. As the result, the CMEA countries' share in world fertilizer production rose from 21 per cent in 1960 to 29 per cent in 1970, to 32 per cent in 1980 and to 34.5 per cent in 1984.

Consumption - Increased fertilizer production in the USSR contributed to much larger use of fertilizers in agriculture - from 2.6 million tons in 1960 to 18.8 million tons in 1980, to 25.4 million tons in 1985. In 1980-1985 alone fertilizer consumption increased by 35.3 per cent (by 6.6 million tons). Individual types of fertilizers consumption shows the following percentage of increase: nitrogenous, 32.5: phosphoric, 36; and potassium, 39.

Table 5

Fertilizer Supplies to Soviet Agriculture

(thousand tons, in terms of 100 per cent nutrients

	1960	1970	1980	1984	1985
Total	2624	10317	18763	23080	25389
including:					
Nitrogen	769	4605	8262	10279	10951
Phosphate	823	2160	4760	5858	6837
Potassium	766	2574	4904	6167	6817

Source: The USSR in Figures. M., 1986, P. 111.

Despite an essential increase in phosphate fertilizer supplies (from 1.6 million tons in 1965 to 7.6 million tons in 1985) agriculture still needs more fertilizers of this kind.

Over 1970-1985 fertilizer consumption per hectare of crops and perennial plants went up in the Soviet Union from 47 kg. to 113 kg. Despite this significant increase the level achieved is inadequate and the task is to step up fertilizer supplies to agriculture, first and foremost, phosphoric fertilizers, as well as liquid ammonia, liquid compound fertilizers and pesticides 13/. One ton of fertilizers used in Soviet agriculture in 1976-1980 is estimated to have increased the average annual yield of individual crops as follows (tons): grain, 4.9; raw cotton, 2.7; sugar beet, 14.6; potato, 10.4; and vegetables, 13.5 14/.

Table 6

Fertilizer Consumption in the Soviet Union by Types of Fertilizers per Hectare of Arable Land

(in terms of 100 per cent nutrients, kg.)

	1960	1970	1980	1984	1985
All types of fertilizers, including:	12.2	46.8	83.9	102.9	113.2
Nitrogen	3.6	20.9	36.9	45.9	48.8
Phosphate	3.8	9.8	21.3	26.1	30.5
Potassium	3.6	11.7	21.9	27.5	30.4

Source: The USSR National Economy. M., 1986, P.270.

13/ The Economics of Agriculture. M., 1985, No. 11, P. 12.
14/ Khimia i Zemlya (Chemistry and Land). M., 1984, P. 13.

Increased supplies of mineral fertilizers to agriculture have been accompanied by their improved quality and greater variety. In 1965 the average concentration of nutrients in fertilizers comprised 25.1 per cent; in 1985 it rose to 41.6 per cent. The consumption of liquid compound fertilizers exceeded 2 million tons. In 1982-1985 organic fertilizer consumption increased from 923,000 tons to 1.2 million tons; application of liquid ammonia went up from 526,000 tons to 1.2 million tons 15/.

Though fertilizer consumption per hectare in the USSR has significantly grown its level is still much lower than in the European CMEA countries (240-340 kg. per hectare).

Table 7

Fertilizer Consumption in European CMEA Countries

(in terms of nutrients, per hectare of crops and perennial plants, kg.)

	1960	1970	1980	1984
Bulgaria	36	159	205	238
Hungary	29	150	262	288
GDR	188	319	325	314
Poland	49	158	244	231
Rumania	8	67	113	122
Czechoslovakia	95	230	334	340

Source: CMEA Countries' Statistical Yearbook, M., 1985, P. 228.

In 1985 the average fertilizer input per hectare of arable land and perennial plantations in CMEA countries (except Rumania)

II. FERTILIZER INDUSTRY'S RAW MATERIALS BASE

On the whole, CMEA countries have well-developed raw materials base to keeptheir agriculture supplied with nitrogen and potassium fertilizers through own manufacture and mutual exchange. One of the major handicaps for a more extensive use of fertilizers is an inadequate supply of phosphate fertilizers 16/. Extending and effective use of nitrogen and potassium fertilizers depends on available phosphate fertilizers. Soviet and other CMEA countries' agriculture suffers from lack of phosphorus though its supplies and consumption have considerably expanded. For example, over 1970-1985 phosphate fertilizer supply in the Soviet Union grew 2.5 times (a 7.4 fold increase since 1960), but the achieved rates of consumption do not meet lack of phosphorus in soils. Phosphorus-lacking soils (less than 100 mg per kg.) account for about 80 per cent of the arable land, while agro-chemical practice and science shows that stable yields require 160-200 mg. of P_2O_5 per kg. of soil 17/. Today the requirements of Soviet agriculture for phosphate fertilizers are met by 60-65 per cent. According to estimates the achievement of the required level in phosphate fertilizer supply may raise the farm output (in terms of grain) to 30 million tons 18/.

16/ Chemistry in Agriculture. M., 1985, No. 1, P. 7.

17/ Chemistry in Agriculture. M., 1986, No. 2, PP. 2-3.

18/ The Planned Economy. M., 1983, No. 8, P. 83.

At the same time the Soviet Union has large phosphate resources. The proved reserves amount to 13,000 million tons (1,800 million tons of P_2O_5). The average contents of phosphoric anhydrate approximate 13.8 per cent fluctuating from 3 to 28 per cent depending on specific deposits 19/. According to later surveys only 20 out of 230 proved deposits are industrially exploited. 12 largest fields out of the 230 mentioned are estimated to contain 18,500 million tons of ore (1,600 million tons of P205) 20/. Many of phosphate fields, however, are characterized by poor ores and are located in hard-of-access areas which entails heavy operational and capital investments. This explains why the Kola peninsula phosphate deposits which comprise only 25 per cent of the country's proved phosphate resources account for over 70 per cent of phosphate fertilizer production in the Soviet Union. Today these mines produce 18.5 million tons of aptatite concentrate per annum (39.4 per cent of P_2O_5). Obviously, the same level of production will continue in the next several years to come 21/.

19/ Peshev N.G. Economic Problems of the Rational Use of Raw Phosphates. Leningrad, 1980, P. 27.

20/ Chemistry in Agriculture. M., 1986, No. 2, P. 27.

21/ Chemistry in Agriculture. M., 1985, No. 5, P. 3.

The Khibin apatite-nepheline depossits on the Kola peninsular have been the main source of phosphates raw material for the past 50 years. They are exhausting concentration of the principal element is decreasing and the production costs are increasing 22/. In 1961-1978 alone the concentration of phosphoric anhydride in extracted ores all over the country dropped from 16.6 per cent to 15 per cent (30-32 per cent in 1930) 23/.

The total phosphate resources of the Karatau basin second zichestatter the Kola peninsula deposits are estimated at 1,600 million tons. They contain 25 per cent of P205 and a lot of silica and ferruginous admixtures and are hard to be beneficiated. This area accounts for 16-18 per cent of the country's total phosphate production; the share of other fields is only 12-13 per cent. It takes 2.5 tons of sulphuric acid to produce one ton of P205 from the apatite concentrate from the Kola peninsular deposits and 3.5 tons in case of Karatau's phosphates containing 24.5 per cent of P_2O_5. In the latter case one ton of extracted phosphoric acid costs almost twice as much 24/. Phosphorites from many deposits with low concentrations of P_2O_5 and a good deal of impurities are directly applied in the form of ground rock phosphate. A lot more phosphate resources have been discovered in the past 10-15 years, but this does not provide an easy solution to all the problems because many of the new fields,

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22/ Chemistry to Agriculture. M., 1984, No. 6, P. 3.

23/ Peshev N.G. Economic Problems of the Rational Use of Raw Phosphates. L., 1980, P. 50.

especially in Siberia and the Soviet Far East, are situated in hard-of-access areas.

III. FOREIGN TRADE

CMEA member-countries' specialization in fertilizer production and foreign trade naturally depends on the raw material resources they possess. The GDR and the Soviet Union are the only countries that have potassium salts reserves which exceed their internal requirements. The Soviet Union and Poland enjoy the same advantage in respect of sulphur resources. As the nitrogen industry operates on oil and gas nitrogen fertilizer production in European CEMA countries (except Rumania) is based on deliveries of Soviet oil and gas as well as on phosphate containing raw materials used by a large number of phosphate fertilizer producers in socialist countries. While some member-nations have to import fertilizers or raw materials for their manufacture, others need more investments for setting up extra productive capacities to meet both their own and their partners' demand, this is a basis for CMEA countries' co-operation not only in foreign exchange, but in production as well.

CMEA countries meet their needs in fertilizers mostly through own manufacture, including mutual co-operation in promoting fertilizer production and mutual exchange. Over 1970-1980 the share of fertilizers in CMEA countries' pattern of all imported chemicals dropped almost twice - from 13.9 per cent to 7.4 per cent. The reduction was especially dramatic in the following countries: GDR, from 19 to 2 per cent; Poland, from 31.8

It was caused by the many new large fertilizer capacities in the above-mentioned countries. At the same time the relative share of fertilizers in CMEA countries' mutual chemical imports was intensively on the up reaching almost 17 per cent by 1980. The total imports of CMEA countries in 1970-1980 grew insignificantly - from 3.3 million tons to 3.6 million tons.

1970-1980 witnessed an essential drop in the share of imports in fertilizers consumption - from 16.6 to 11.3 per cent, and a rise in the relative share of exports in CMEA countries' production from 19 to 23.3 per cent.

Table 8

Relative Share of CMEA Countries' Foreign Trade in Fertilizer Production and Consumption

(percentage)

CMEA Member-Countries	share of exports in production		share of imports in consumption	
	1970	1980	1970	1980
Total 25/	19.0	23.3	16.6	11.3
including:				
Bulgaria	6.9	11.8	23.5	20.3
Hungary	6.6	19.7	62.2	50.4
GDR	53.6	63.1	10.9	2.8
Poland	2.9	4.4	41.9	38.3
Rumania	24.5	41.4	4.3	9.4
USSR	14.1	16.1	0.3	0.7
Czechoslovakia	-	21.9	60.0	49.8

Source: Estimated on the basis of Table 9.

At the same time the share of fertilizers in CMEA countries' exports of chemical goods in 1970-1980 went somewhat up - from 21.9 to 22.5 per cent. In individual countries it rose as follows: Bulgaria, from 6.8 to 8 per cent; Hungary from 5.6 to 18.4 per cent; and GDR, from 21.9 to 25.1 per cent. The share of fertilizers in Soviet and Polish exports decreased.

CMEA countries' specialization in fertilizers has a clear trend: the Soviet Union is the leading producer and exporter of all types of fertilizers among its CMEA partners; the GDR exports mostly potassium fertilizers, whereas Rumania and other member-nations specialize in nitrogen fertilizers exports. Among socialist countries the Soviet Union is practically the sole supplier of phosphate fertilizers and phosphates to CMEA countries' market. At the same time all European socialist countries import phosphate fertilizers and raw materials for their manufacture, as well as potassium fertilizers (except the USSR and the GDR).

The Soviet Union whose fertilizer imports in the postwar period were very insignificant appeared for the first time on phosphate fertilizer market in 1975. In the next decade its purchases of phosphate fertilizers kept essentially increasing and reached 703,000 tons (non-nutrient terms) in 1985 26/. The bulk of Soviet imports was super-phosphate bought mainly in Morocco, Tunisia and Turkey. Recent years have also witnessed essentially increasing imports of super-phosphoric acid containing roughly

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26/ Soviet Foreign Trade in 1985. Statistical Yearbook. M.,.1986.

70 per cent of P_2O_5. In 1985 these imports reached 1.2 million tons, including 958,000 tons from the USA and 113,000 tons from Belgium under respective long-term contracts 27/. A long-term contract has also been signed by the Soviet Union with the Spanish company "Fosforico Espanol" providing for the delivery of 1,400,000 tons of super-phosphoric acid to the USSR over 1984-1993 28/.

Table 9

Fertilizer Production, Exports, Imports and Visible Consumption in CMEA Countries

(thousand tons, in terms of nutrients)

Member-countries	Production		Exports		Imports		Visible consumption	
	1970	1980	1970	1980	1970	1980	1970	1980
Total, x/	20588	37122	3916	8636	3332	3627	20004	32113
including:								
Bulgaria	434	653	30	77	124	147	528	723
Hungary	518	1045	34	206	796	851	1280	1690
GDR	3245	4735	1739	2989	184	50	1690	1796
Poland	1629	2238	47	99	1144	1329	2726	3467
Rumania	895	2451	219	1015	30	150	706	1589
Soviet Union	13099	24767	1847	3979	33	143	11280	20931
Czechoslovakia	709	1233	0.1	270	102	956	1702	1920

x/ Without Vietnam, Cuba and Mongolia.

Source: CMEA Countries' Economic Co-operation. M., 1983, No. 2, P. 20.

27/ Ibid.

28/ Soviet Foreign Trade. M., 1985, No. 4.

On the whole, however, the Soviet Union is a large-scale world exporter of nitrogen and potassium fertilizers. It also exports certain amounts of phosphate fertilizers and raw materials for their manufacture mainly to socialist countries.

The seventies and the first part of the eighties witnessed important changes in the fertilizer exports' pattern of the Soviet Union, first of all, a considerably higher role of nitrogen fertilizers whose exports increased from 1,246,000 tons (non-nutrient terms) in 1970 to 5,048,000 tons in 1985 29/. The Soviet Union is a largest world exporter of urea (its exports in 1985 amounted to 3,483,000 tons and the average concentration of N_2 equals 46 per cent); it also exports ammonia sulphate (21 per cent of N_2) and ammonium nitrate (34.8 per cent of N_2). In 1985 its exports of potash chloride (60 per cent of K_2O) rose to 5,456,000 tons. At the same time Soviet exports of phosphate fertilizers in 1985 amounted to 753,000 tons, i.e. remained at the 1970 level (see Appendix 10).

Table 10

Soviet Fertilizer Exports' Pattern

(percentage)

	1970	1980	1985
Total,	100	100	100
including:			
Phosphate	13.9	6.9	6.7
Potassium	61.7	64.9	48.5
Nitrogen	24.4	28.2	44.8

Source: Estimated from data in Appendix 10.

In recent years almost all phosphate, some 70 per cent of potassium and over 60 per cent of nitrogen fertilizers have been exported to socialist countries. Among phosphate fertilizers the main product exported is super-phosphate (approximately 95 per cent in 1985). The respective percentage among nitrogen fertilizers is as follows: urea, 69; ammonia sulphate, 19; and ammonium nitrate, 12.

Almost 60 per cent of ammonia exports is diverted to developed countries. In 1984 Soviet-made ammonia was marketed in the following countries (share in percentage) USA, 26.3; Turkey, 14; Finland, 7.5; Sweden, 7; Greece, 5.8; GDR, 6; and Belgium and Italy, 3.5 each.

The relative share of fertilizers (without ammonia) in total Soviet exports is 1-1.3 per cent, or 940 million rubles worth (or roughly $ 1.1 million according to averaged rate of exchange) in 1985.

CMEA countries' co-operation in the production and bi-and multilateral exchange of fertilizers does not lead to their isolation from other countries and a closed market. In the seventies the traditional forms of foreign trade with developed and developing countries blended with varied forms of co-operation based on compensation arrangements to give another boost to sales of various fertilizers (urea, ammonia, potasium chloride).

Co-operation between CMEA and developing nations in the fertilizer field is not yet very extensive 30/. In 1980 the share of fertilizers in the CMEA-assisted agricultural projects in developing countries was only 6 per cent. For many developing countries however this co-operation is very important for meeting their demand in fertilizers and expanding exports.

CMEA-assisted geological prospecting in Syria discovered large deposits of lphosphates. Bulgaria, Rumania and Poland assisted Syria in setting up phosphate mining and beneficiating enterprises. In 1984 phosphate production in Syria was 1.5 million tons; 890,000 tons was diverted for export. Before 1980 all phosphates had been exported. Part of the exports had gone to CMEA countries both on commercial terms and as payment for earlier credits. In 1980 Syria launched a large super-phosphate plant with an annual capacity of 460,000 tons (211,000 tons of P_2O_5). The plant's construction had been assisted by Rumania. Today the country's requirements for this kind of fertilizer are fully satisfied, small amounts go for export. The 148,000 tons per annum nitrogen fertilizer factory earlier put up by the Soviet Union and Czechoslovakia in co-operation with Italian firms and at a later stage extended, practically meets all Syria's demand in nitrogen fertilizers. The CMEA-assisted operating capacities in Syria account for a bulk of the country's extraction and processing of phosphorus-containing raw materials and for nearly 100 per cent of nitrogen fertilizer production. CMEA countries'

30/ CMEA Countries' Co-operation with developing Nations in

economic co-operation with Syria makes for the comprehensive development of a series of industries and for the country's growing export potential.

The Soviet-assisted 110,000 tons urea plant launched in Afghanistan in 1974 was the first national enterprise to meet the country's demand in fertilizers earlier satisfied entirely through imports. Part of the plant's products is exported to the Soviet Union and other countries 40-50,000 tons per annum) to pay for the technical assistance. The enterprise operates on natural gas whose discovery and putting to industrial uses was also assisted by the Soviet Union 31/.

Many CMEA countries have signed agreements with phosphate producing developing countries on co-operation in the construction of mining and processing facilities, including contracts which provide for credit back payments in phosphoric fertilizers and raw materials (for example, Poland has such contracts with Egypt, Tunisia, Morocco and Syria; Bulgaria with Tunisia and Morocco; etc.).

Rumania co-operated with Turkey in developing phosphate deposits, carrying out feasibility studies and supplying Turkish phosphoric fertilizer plants with technological equipment. Rumania also helped Egypt to construct a large phosphate mine whose output in 1985 exceeded 1 million tons with 150,000 tons

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31/ CMEA Countries' Co-operation with developing Nations in

out of it channeled to export. Rumania and the GDR are taking part in organizing a phosphate production at some plants in Tunisia. Rumania has built a complex to mine, process and transport phosphate ores, while the GDR has been involved in design blue-printing, supplying part of the equipment and assembling a large phosphate dressing and transportation facility constructed by Western companies. Poland co-operated with Western firms in constructing a fertilizer complex in Algeria and was also a sub-contractor of a Belgian firm engaged in building a phosphoric fertilizer enterprise in Iraq.

The Soviet Union has helped Vietnam to put into operation 300,000 tons per annum sulphuric acid and superphosphate capacities and to launch the construction of an export-oriented appatite mining and beneficiating complex and a nitrogen fertilizer plant. The Soviet-assisted enterprises in Cuba account for roughly 80 per cent of the Republic's nitrogen fertilizer production.

To date the Soviet Union has rendered technical assistance to developing countries in commissioning 1.2 million tons fertilizer capacities 32/. Many of them have no infrastructure, so that the USSR helps developing countries to create an adequate raw material and energy base for fertilizer production through co-operation in oil refining, gas and power industries' development. By January 1, 1986 the Soviet-aided capacities

in developing countries were as follows (figures in brackets refer to projects not yet completed): electric power stations, 14 million kwt (23); coal mines, 21 million tons (98); and oil refineries, 20 million tons (10) 33/. The Soviet technical assistance is mostly based on long-term government credits to be repaid, as a rule, within 12 years (a year after the deliveries of equipment have been completed) 34/. Today approximately 40 per cent of all Soviet-assisted projects are "turn-key" enterprises.

Co-operation between CMEA and developing nations in fertilizer production and trade seems to effectively contribute to resolving food problem they are faced with. It can be significantly extended both on bilateral and multilateral basis, through co-operation with Western firms and through three-partite co-operation of partners from CMEA, developing and developed countries.

At present there are some new trends which can be helpful in extending co-operation between CMEA and developing nations in the fertilizer field for instance, for increasing the number of long-term agreements, prolonging their period of action and adopting a comprensive approach to developing the whole cycle of fertilizer production and trade as it is in the case, for example, with Syria.

33/ Ibid.

34/ Alexeyev A.P. Foreign Economic activities of the

Another example is the 1978 USSR-Morocco Agreement on economic and technical co-operation in the field of phosphorus containing raw materials on a compensation basis, which contributes to comprehensive development of relations between the two countries. Under this Agreement the Soviet Union conducts geological exploration and a set of measures to develop the Mescala deposit, including the construction of mining facilities with a capacity of 10 million tons of ore per annum 35/. By way of compensation for its economic and technical assistance the Soviet Union will receive various types of phosphorus containing raw materials from Morocco.

There are opportunities for such extended co-operation including multilateral efforts in fertilizer, specifically, phosphoric fertilizer production with other countries as well. It will be possible within the framework of such long-term agreements to determine on an orderly basis the types of fertilizers whose manufacture can be extended through the interested countries' joint efforts, or organized anew in the developing countries concerned with an orientation for long-range exports to CMEA countries. Some CMEA countries may choose not to go ahead with the construction of similar enterprises or the extension of the operating ones. The described alternatives will lead to the formation of mutually supplementary economic structures.

35/ CMEA Countries' Co-operation with Developing Nations in Solving the Food Problem. M., 1983, P. 110.

Today the Soviet Union is constructing a series of large ammonia, nitrogen and potassium fertilizer enterprises some of which are assisted by CMEA nations. Interested developing countries in short supply of nitrogen and potassium fertilizers may have an opportunity to participate in some of these projects.

The USSR is exporter of a number of technologies and equipment for fertilizer industry including the latter for auxiliary processes (storage, absorbsion and neutralization of noxious wastes. etc). In the USSR nowadays there is rich experience of processing low quality phosphate rock with low concentration of P_2O_5. Such experience is likely to be of interest to developing countries that are faced with the problem of phosphate rock deterioration. Besides, Soviet Union exports basic technology and equipment for phosphate fertilizers production. Along with technology, Soviet Union offers equipment for basic processes for noxious wastes processing, including those containing HF, production of complex and liquid fertilizers, semi-manufactures, etc. A wide range of equipment is offered for small scale and medium range production. The USSR is a major producer of some kinds of equipment such as absorbers, screw and belt conveyers, all mixers, granulators centrifuges, pumps, drills, cooling drums, etc.

IV. PROSPECTS OF DEVELOPMENT

At present the Soviet Union takes measures to further expand fertilizer production, extend the fertilize industry's raw materials base, in the first place its phosphorus and sulphur-containing primary resources, increase per unit capacity of installations and put to uses more effective technological processes and equipment. The growth of production will be achieved through extending and reconstructing the existing enterprises and building new facilities.

Growing production will be accompanied by a wider variety and higher quality standard of fertilizers. They will be made in granular, large-crystal and liquid form. The new varieties will include nitrification inhibitors and chloride-free brands, straight and water soluble types, phospheric potassium granules, and fertilizers with additives of boron, zink, copper, manganese and some other elements.

It is planned to raise the total production of mineral fertilizers in the Soviet Union to 41.7 million tons by 1990 (an almost 26 per cent increase as against 1985) and to 56-58 million tons by the year 2000.

Table 11

Planned Fertilizer Production in the USSR

(million tons, of nutrients)

	1985(effective)	1990	2000
Total,	33.2	41.7	56-58
including:			
Nitrogen	13.9	17.4	23-24
Phosphoric	8.7	11.9	16-16.5
Potassium	10.4	12.4	17-17.5

Source: Comprehensive Programme of the Use of Chemicals in the USSR National Economy. M., 1985, P. 18.

The production of pectisides is expected to rise to 470,000 tons by 1990 and to 560,000-600,000 tons by the year 2000 (as compared to 348,000 tons in 1985).

It is contemplated to step up the production of ammonia, ammonium nitrate, urea, nitric, sulphuric and phosphoric acids, to equip the fertilizer industry with installation of a larger per unit capacity, to re-construct and modernize the existing facilities and to introduce new catalysts.

The raw materials base of the fertilizer industry will be expanded through the introduction of more effective potassium and phosphate ores' dressing technologies, more extensive application of underground lexivation techniques in potassium salts' extraction and extended use of secondary raw materials

(sulphur-containing waste gases in non-ferrous metallurgy and oil-refining) in sulphuric acid making.

By 1990 supplies of mineral fertilizers and feed additives to Soviet agriculture are expected to achieve the 34.4 million tons mark. In the year 2000 the respective figure will rise to 45.3 million tons 36/. The ramifying of the Togliatti-Odessa trunk ammonia transportation pipeline is expected to increase direct application of liquid ammonia to 2.5 million tons by the year 1990.

The use of organic fertilizers will reach 1.5 million tons in 1990 as against 983,000 tons in 1984.

In pursuance of their long-term agreements the CMEA countries will continue to extend and deepen their co-operation in fertilizer production and mutual trade in raw materials, fertilizers and equipment. New facilities, including raw material capacities for fertilizer production, will continue to be built up on integrational or other contractual arrangements. Specialized manufacture will be stimulated to match world quality standards and competition and to step up export production 37/.

36/ Comprehensive Programme of the Use of Chemicals in the USSR National Economy for the Period Ending in 2000. M., 1985, P. 12.

37/ Ibid., PP. 29-30.

Measures have been taken to speed up the construction of a large sulphur-making complex in Astrakhan. Apart from reduction in sulphur imports it will enable the country to start exporting about 1 million tons per annum of sulphur in the early nineties 38/.

The Comprehensive programme of the Use of Chemicals in the USSR National Economy over the period ending in 2000 adopted in 1985 provides for continued extension of economic relations with developed and developing countries which fully refers to fertilizers as well.

The joint forecast of the Standing CMEA Committee on co-operation in the chemical industry made public in 1984 39/ envisages a 1.8-fold increase in CMEA countries' fertilizer production by the year 2000 as against 1980. Correspondingly, the aggregate fertilizer output in the year 2000 will exceed 68 million tons, including nitrogen fertilizers, over 28 million tons; potassium fertilizers, almost 20 million tons, and phosphoric fertilizers, 19.5 million tons which will make for increased consumption and exports of individual fertilizers.

38/ Soviet Foreign Trade. M., 1985, No. 2, P. 6.

39/ CMEA Countries' Economic Co-operation, No. 2, 1985, P. 37.

Today CMEA countries meet their requirements for standard chroline-containing potassium and nitrogen fertilizers through own production and mutual trade. In the forthcoming period their demand for ammonia and nitrogen fertilizers will be met through own production and mutual deliveries, especially from the Soviet Union, whereas their needs for potassium fertilizers will be covered through deliveries from GDR and the USSR.

At the same time because of the inadequate raw materials base the lagging phosphoric fertilizer production will fail to catch up with the growing demand despite the measures taken to give it a boost 40/.

The Khibin area alone can no longer cope with the rising demand for phosphates 41/ which makes it urgent to develop new prospected deposits in the Soviet Union and use to the maximum its available primary resources, and to accelerate the putting into operation of new capacities in the Soviet Union and Poland to put out sulphur-containing raw materials required for phosphoric fertilizer production. In the period ending in 1990 the Soviet Union plans to build a 700,000 per annum sulphuric acid-producing plant to use a domestically-developed direct-flow, contact-pressure technology of sulphur conversion, which enables to decrease consumption of raw materials and sulphuric

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40/ CMEA Countries' Economic Co-operation, No. 2, M., 1985, P. 38.

41/ The Food Programme. The Tasks of Science. M., 1983, P. 101.

dioxide pollution 42/. A technology is being developed to make use of low grade pyrites. A series of experimental plants will be built to obtain sulphuric acid from pyrites using a new economic technology which also sharply reduces harmful discharges into the atmosphere. As the Khibin mines cannot be made to enlarge the yield of apatite concentrates 43/ new deposits will have to be tapped to achieve the contemplated significant increases in phosphorous fertilizer production in the next few years to come. A special technology for these types of raw phosphate is being developed to purify the extracted phosphoric acid, first of all, from magnesium inclusions so that it could be evaporated to required concentrations of P_2O_5. Larger technological lines (150,000-300,000 tons of P_2O_5 per annum) will be designed for the new projects (the respective capacities for the Khibin concentrates and the standard Karatau phosphorites are 110,000 and 68,000 tons)44/. New facilities will be constructed to make superphosphoric acid for liquid compound fertilizers. Specifically, two superphosphoric acid producing plants of 100,000 tons of P_2O_5 per annum each 45/ will have gone into operation before 1990 to essentially step up liquid compound fertilizer production whose share today in total phosphoric fertilizer output approximates 7 per cent and it is increasing. By 1988 two projects

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42/ The Chemical Industry, No. 3, 1986, PP. 3-4.

43/ The Food Programme. The Tasks of Science. M., 1983, P. 101.

44/ The Chemical Industry, No. 3, P. 4, 1985

45/ Chemistry in Agriculture. M., 1985, No. 3, P. 75.

of 360,000 tons and 230,000 tons of P_2O_5 per annum operating on domestic super-phosphoric acid (at present it is mostly imported acid) will have been commissioned 46/. Over a longer term period a new more concentrated 11-37-0 brand of liquid compound fertilizer (instead of the presently produced 10-34-0) is planned to be produced. In experimental industrial conditions the following manufacturing technology for sulphurous liquid fertilizers is used: nitrogen, 11 per cent, phosphorus, 32 per cent, and sulphur, 6-8 per cent. Liquid compound fertilizers with zink, molibdenum and copper are being tested. Also, the demand for the 8-24-0 brand of liquid compound fertilizers based on standard extraction phosphoric acid is increasing.

The improving phosphoric fertilizer assortment will result in a greater variety of compound forms. Today mono-ammonium phosphate leads the list (36 per cent of all deliveries), but its share will be decreasing because of the increasing production of di-ammonium phosphate.

Extended phosphoric fertilizer consumption in CMEA countries will be achieved both through maximized use of the Soviet raw materials base and through co-operation with Mongolia, Vietnam, Morocco and other countries.

46/ Chemistry in Agriculture, No. 3, 1986, P. 3.

A joint CMEA countries' team of geologists has prospected the Hubsugul phosphates deposit in Mongolia and submitted their proposals for its industrial development. The prospected resources approximate 4,000 million tons of ore. The magnesium-poor ores are easier to beneficiate than the Karatau phosphorites yielding 30-32 per cent of P_2O_5 concentrate in flotation 47/. Interested CMEA countries intend to build facilities for production of phosphate fertilizers, yellow phosphorus and feed phosphates in Mongolia.

Work is in progress to develop one of the world's largest deposits of phosphates in Vietnam. Concentration of P_2O_5 in their top quality ores averages 23 per cent and in some cases it exceeds 40 per cent. Geological exploration and preparation of technical and economic documentation for the development of the Mescala deposit in Morocco are underway.

Imports of phosphate raw materials and fertilizers from developed and developing countries will continue to play a certain role in meeting CMEA countries' long-term demand for these products.

47/ The Food Programme. The Tasks of Science. M., 1983, P. 74.

SUMMARY

Over 1970-1985 the Fertilizer Production in the Soviet Union increased 2,5-fold reaching the level of 33,2 million tons. Only during 1981-1985 Soviet Fertilizer capacities increased by 6,8 million T/Y.

Fertilizer production in other European CMEA countries is a relatively young Industry whose fast progress is closely associated with the econimic integration of the CMEA countries. During 1970-1985 production increased nearly 2-fold reaching 13 million tons. In accordance with a long-term Programme the concerned CMEA countries coordinate their efforts in meeting their fertilizers demand through expanding both own production and mutual deliveries, jointly solving their fuel and raw materials problems, expanding specialization in manufacture and scientific and technological cooperation. A large share of fertilizers in CMEA countries is produced by enterprises created with the technical assistance of the USSR. With the direct involument of soviet specialists and organizations about 1,9 million MT/Y capacities were comissioned there.

In 1985 the total fertilizer production in the Soviet Union and other European CMEA countries exceeded 46 million tons and their share in world fertilizer production exceeded 34 per cent (21 per cent in 1960). Fertilizer consumption per hectare of arable land and permanent crops in the Soviet Union rose from 47 kg. in 1970 to 113 kg. in 1985. Despite such an increase its level continues to be much lower than in other European CMEA countries (240-340 kg per hectare).

Presently the Soviet Union takes measures to boost the fertilizer production and to extend its raw material base, especially in respect to phosphorus and sulphur-containing raw materials.

Over the period of 1986-1990 it is planned to commission 8,2 million t/y of new capacities, 6,4 million of ammonia and 4 million t/y of sulphuric acid. It is planned to raise the total fertilizer production to 42 million tonnes in 1990, including over 17 million tonnes of N-fertilizers, 12 million tonnes of P-fertilizers and over 12 million tonnes of K-fertilizers.

For the year 2000 the respective figures would be as follows:

56-58 million t/y total production

23-24 million t/y of N-fertilizers

approx. 16 million t/y of K-fertilizers

The phosphate fertilizer production will be lagging behind the growing demand. The phosphate fertilizer production and consumption in CMEA countries will increase through a maximized use of the available Soviet resources and extended cooperation in the development of phosphate deposits in Mongolia, Vietnam, Morocco and some other developing countries. Imports from developed and developing countries will also play a certain role in meeting the CMEA countries demand in phosphate fertilizers.

The practice of joining resources, including capital investments in fertilizer projects, is growing steadilly among interested CMEA countries. This includes the pay-back of credits by the product supply. Such compensation projects are profitable which is proved by the growing share of their products used in meeting member-countries demand in indivudual fertilizers. By today the CMEA nations have passed from simple coordination of their foreign trade deliveries to joint planning and construction of large projects.

As the whole the CMEA nations have sufficient raw material basis to provide their agriculture with nitrogen and potassium fertilizers through own production and mutual deliveries. At the same time all of them experience lack of phosphorus. For example, today the requirements of the Soviet agriculture alone in phosphate fertilizers are met by 60-65 per cent only.

Natural resources of an individual CMEA member-country determine its specialization in fertilizer production and foreign trade in the community. Only the Soviet Union and the GDR have potassium deposits that exceed their domestic needs; the Soviet Union and Poland have the largest sulphur resources among the CMEA countries; the nitrogen fertilizer production in European CMEA countries (except Rumania) largely depends upon the supplies of hydrocarbons from the USSR. The CMEA countries meet their demand for fertilizers mainly through own production and mutual exchange. The share of imports in fertilizer consumption has dropped to 10 per cent. CMEA countries are lage net exporters of nitrogen and potassium fertilizers. The Soviet Union is one of the world largest exporters of nitrogen and potassium fertilizers. In 1985 its export of urea amounted to 3,5 million tons (46 per cent of N_2), potassium chloride to 5.5 million tons (60 per cent of K_2O). The GDR specializes mostly in potassium fertilizer exports, whereas Rumania, and other European member-countries, export nitrogen fertilizers. At the same time European CMEA countries import phosphate fertilizers and raw materials for their production, as well as potassium fertilizers (except the Soviet Union and the GRD). In the recent period of time the Soviet Union has been increasing its imports of phosphate fertilizer and of super-phosphoric acid.

However the USSR shall remain one of the world leading exporter of nitrogen and potassium fertilizers.

CMEA countries cooperation with developing nations in fertilizer field is not very active, but for a number of developing states it plays an important role in meeting their fertilizer requirements and increasing exports. With technical assistance of the USSR 1220 thousand tons per year fertilizer capacities were commissioned in developing countries. The bulk of Soviet assistance to developing countries is rendered on the basis of long-term government credits to be repaid as a rule within a period of 12 years. In recent years 40 per cent of all such enterprises have been commissioned as turn-key projects.

Cooperation between CMEA and developing countries in fertilizer production and trade seems to be promising. There is room for significant extension of CMEA countries cooperation with developing nations both on a bilateral and multilateral basis.

At present there are some new trends which can be helpful in extending cooperation between the USSR and developing countries in the fertilizer field. There is a possibility for increasing the number of long-term agreements and export-import contracts, prolonging their period of action, which creates stable foundation for industrial cooperation, exports and meeting import demand; adopting a comprehensive approach to the whole cycle of production and export as it is in the case, for example, woth Syria; implementing such new forms of cooperation as joint ventures.

In case of long-term agreement with the producer and experting of phosphates and phosphate fertilizers the CMEA countries may well abstain from developing own phosphate fertilizer facilities. The case of USSR-Marocco agreement reffers.

In this case some CMEA countries may have option weather to go ahead with the construction of similar enterprises or the extention of the operating ones.

At present the USSR is constructing large ammonia and nitorgen and potassium fertilizer projects, some of which are assisted by CMEA countries. It opens possibilities for interested developing countries to use a number of options of participat in some of these projects. At the same time there are possibilities of cooperation in the field of fertilizer technoligy, including the projects, which are being jointly elaborated by the CMEA countries.

CONCLUSIONS AND RECOMMENDATIONS

For the developing countries, the experience of the CMEA countries in development of fertilizer industry could be useful in the following main aspects:

- Joint solution of such essential for fertilizer industry problems, as energy and raw materials supply;
- Production specialization and cooperation on the basis of bilateral and multilateral agreements;
- Practice of combining resources, including investments in the constraction of joint fertilizer projects in order to satisfy completely or partially the requirement of the interested countries;
- Cooperation on a compensation basis which constitute a way of switching from sporadic transactions to a stable, long-term relations, which gives possibility to developing countries to overcome the problem of foreign exchange shortage.

Since UNIDO is very well placed within the world system of industrial development and taking into account its mandate and obligation before developing countries it may be recommended that:

1.- Using direct contacts with the CMEA Secretariat opportunities of possible participation of developing countries in the CMEA ammonia fertilizer project should be studied.

2.- Places special emphasis on promoting different forms of economic relations between the developing and the CMEA countries to enhance the development of fertilizer industry in developing countries.

3.- Intensifies its activities on assisting developing countries in the specialization and cooperation of production planning of fertilizer industry on national, sub-regional and regional levels, taking into account the experience of the CMEA countries.