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Intelligence Report

*Soviet Fertilizer: Expansion
of Output and Exports*

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SOVIET FERTILIZER: EXPANSION OF OUTPUT AND EXPORTS

SUMMARY

Aided by large infusions of Western equipment and technology, production of chemical fertilizer in the USSR is scheduled to nearly double in 1975-80. Soviet agriculture will benefit from far larger quantities of fertilizer of a much improved quality. The USSR probably will become the world's largest fertilizer producer and the second largest exporter, behind Canada.

Soviet concern with raising agricultural productivity, forcefully expressed in the Brezhnev farm program, accounts for the rapid expansion of fertilizer output.

- Output of plant nutrients grew by 47% during 1971-74 and is scheduled for a further increase of 15% in 1975 to 22.2 million metric tons.
- Fertilizer production in the USSR in 1975 will rival output in the United States, although the assortment and quality of Soviet products will continue to be inferior.
- The target for a further increase of 63% in nutrient production in 1976-80 is ambitious, but not beyond reach. Even allowing for some shortfall, the USSR should displace the United States as the largest fertilizer producer before 1980.

To support its massive fertilizer program, the USSR bought nearly \$400 million worth of equipment in the West in 1960-71. Purchases mushroomed to about \$1 billion during 1973-74 as Moscow ordered 16 large modern ammonia plants from non-Communist suppliers. Purchases of Western chemical equipment are likely to continue at a high level at least through 1980.

Soviet fertilizer exports have been growing rapidly despite the still unmet needs of agriculture at home. Exports in 1973 were 2.45 million tons (nutrient basis), or 38% above 1970, and by 1980 may be twice as high. In addition, Soviet exports of ammonia, a fertilizer feedstock, may reach as much as 4.5 million tons by 1980, 1.5 times the total world ammonia trade in 1973. In 1980, only Canada is likely to export more fertilizer than the USSR.

Soviet fertilizers, which until now have mostly gone to Communist countries, will appear in increasing quantities in Western markets. Responsibility for sales

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will often rest with Western firms under the terms of various agreements. Ammonia exports, for example, will largely reflect repayments of Soviet purchases of Western fertilizer equipment and barter agreements such as the compact with Occidental Petroleum Corporation. Already a major exporter of potassium fertilizers, the Soviet Union will substantially increase its exports of nitrogen fertilizers by 1980 and will begin exporting small quantities of multinutrient fertilizers.

DISCUSSION

Introduction

1. The Soviet Union, the world's second largest producer of fertilizers, accounts for about one-fifth of world output. Nonetheless, production falls short of domestic requirements, while poor fertilizer quality and assortment are continuing problems.

2. Determined to solve the USSR's chronic agricultural problem, the Soviet leadership charted a rapid expansion in fertilizer output during the 1970s and sought Western help on a broad front to carry out the program. This report reviews Soviet plans and achievements, with particular emphasis on the outlook for supplies and exports of fertilizer in 1980.¹ The contribution of Western-supplied equipment also will be discussed, together with prospects for additional Soviet purchases.

Background

3. In July 1970, General Secretary Brezhnev unveiled an agricultural plan for 1971-75. The program called for substantially higher investment than had been planned for 1966-70, a large increase in grain output, more land reclamation, and a sharp rise of more than 60% in fertilizer deliveries. Moreover, the rapid growth of fertilizer output charted for 1971-75 was to continue during the Tenth Five-Year Plan (1976-80).

4. By 1970 the Soviet Union, richly endowed with the necessary raw materials (see Table 1)—particularly natural gas and potash—already was a large producer of fertilizer. During the decade ending in 1970, production of nitrogen fertilizer had grown by 441%, phosphate by 201%, and potassium (potash) by 277%. The Soviet press claimed that every seventh ton of grain, one-third of the potatoes and sugar beets, and more than one-half of the cotton were obtained as a result of the use of fertilizer.

Table 1
USSR: Principal Inputs and Products of the Fertilizer Industry

	Type of Fertilizer		
	Nitrogen	Phosphate	Potash
Raw material	Natural gas Coke gas	Apatite Phosphorites Pyrites	Sylvinite Carnallite Kainite
Intermediate	Ammonia Nitric acid	Sulfuric acid Phosphoric acid	
End product	Ammonium nitrate Urea Ammonium sulfate Aqua ammonia	Single superphosphate Triple superphosphate Monoammonium phosphate	Potassium chloride Potassium sulfate Mixed potassium salts

¹ The effect on agricultural production will be explored in a forthcoming publication.

5. Nevertheless, the full benefits possible from the use of fertilizers were far from being realized. Improvements in quality and assortment were not commensurate with increases in output. The best phosphate raw materials—Kola apatites—are located far from most of the regions where fertilizers are produced and consumed, necessitating long, expensive hauls. Soviet efforts to exploit other phosphate deposits have been hampered by the lower nutrient content and complex nature of most of these ores. A major weakness of the fertilizer industry has been its failure so far to eliminate chronic shortages of phosphate fertilizers, a serious problem in a country where more than one-half of the arable land is markedly deficient in phosphorus. Serious problems also exist in the distribution and use of fertilizer. Orders frequently are not filled at the proper time, and many Soviet farms have only one-third of the application equipment required.

6. Since the Brezhnev program was set out, a new comprehensive program for development of agriculture in the non-black soil region of the Russian Republic (RSFSR) has been announced (in March 1974). During 1976-80 the non-black soil zone is to receive 120 million tons of fertilizer (standard units²), almost double the 63 million tons planned for 1971-75. Although land in this region needs more phosphorus and potassium, and acid soils are found in three-fifths of its arable area, the zone has high annual rainfall and responds well to applications of fertilizer and lime. Most appealing to the leadership, annual fluctuations in grain harvests in the zone are less than half of those in the Ukraine. Clearly, the leadership is counting a great deal on the fertilizer industry to upgrade the lagging Soviet farm sector.

The Fertilizer Program in 1971-75

Plans

7. In 1970, Soviet agriculture used only two-thirds as much fertilizer as American agriculture, although the sown area in the USSR was more than 70% larger. Soviet efforts to increase the supply and upgrade the quality of chemical fertilizers in the Ninth Five-Year Plan (1971-75) clearly reflect Brezhnev's resolve to raise crop yields—one of the key planks in his farm program.

8. By 1975, Soviet production of fertilizers is scheduled to reach 90 million tons, more than 1.6 times the 1970 level; deliveries to agriculture are set at 75 million tons³ (see Table 2). With the aim of improving fertilizer assortment, the share of complex fertilizers containing two or more nutrients is slated to grow from 5% of total output in 1970 to 15% in 1975. Measures are also being taken to redress an imbalance that developed earlier, when the

² Under the standard unit concept, nitrogen fertilizers contain 20.5% N; phosphate fertilizers, 18.7% P₂O₅; and potash fertilizers, 41.6% K₂O.

³ Data are expressed in Soviet standard units and are believed to be unadjusted for losses. The quantities shown above are equivalent to 22.2 million tons (production) and 18.1 million tons (supply) in terms of the three primary nutrients—nitrogen, phosphate, and potash. Some of the fertilizer materials included in Soviet statistics are used as animal feeds and some probably are used domestically for industrial purposes. The substantially increased difference between planned production and supply of fertilizers to agriculture in 1975, compared with the smaller difference in 1970 (see Table 1), suggests that Soviet planners anticipated a rapid growth in exports.

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Table 2

USSR: Fertilizer Production and Deliveries to Agriculture

Million Metric Tons¹

	Deliveries to Agriculture ²					
	Production		Total ³		For Crops	
	Standard Units	Nutrients	Standard Unit	Nutrients	Standard Units	Nutrients
1960.....	13.9	3.3	11.4	2.6	11.3 ⁴	2.6
1965.....	31.3	7.4	27.1	6.3	26.9 ⁴	6.3
1970.....	55.4	13.1	45.6	10.4	45.4	10.3
1971.....	61.4	14.7	50.5	11.5	50.0	11.4
1972.....	66.1	15.9	54.8	12.5	53.9	12.4
1973.....	72.3	17.4	60.0	13.8	58.5	13.5
1974 ⁵	80.3	19.3	65.9	15.4 ⁴	63.9	15.0 ⁴
1975 ⁶	90.0	22.2	75.0	18.1	72.0	17.5

¹ Data are expressed in Soviet standard units (a statistical concept) and in 100% nutrients (N, P₂O₅, K₂O). Under the standard unit concept, nitrogen fertilizers contain 20.5% N; phosphate fertilizers, 18.7% P₂O₅; and potash fertilizers, 41.6% K₂O. Production data include phosphate feeds and probably some fertilizer materials that are used in industry.

² Data are believed to be unadjusted for losses in fertilizer nutrients en route to farm and during storage.

³ Total includes phosphate animal feeds as well as fertilizer for crops. Quantities used for animal feeds in 1960 and 1965 probably were negligible.

⁴ Estimated.

⁵ The 1974 plan called for production of 80.2 million tons (19.6 million tons of nutrients), with 64.6 million tons (standard units) going to crops.

⁶ Plan.

growth of nitrogen fertilizer output outran that of phosphate and potassium fertilizers. But the primary adjustment will be an increase in the ratio of potassium to nitrogen (Table 3). Phosphates will remain in short supply despite the fact that more than half of all arable land in the USSR is phosphorus deficient. (Phosphorus is especially important for hastening the maturing of wheat in areas that have short growing seasons—most of the Soviet spring wheat regions.)

Progress in 1971-74

9. Soviet fertilizer production, measured in plant nutrients, rose by 47% during 1971-74 to 19.3 million tons. According to the Soviet press, the USSR passed the United States to become the world's largest fertilizer producer in 1973—although the claim seems premature because reported production figures include substantial quantities of materials not used as fertilizer.⁴ Through 1974 the growth of production stayed close to the schedule set out in the 1971-75 plan. In fact, chemical fertilizer was 1 of only 9 industrial products listed in plan fulfillment figures for 1974 (out of 57) that were on track with respect to the original Ninth Five-Year Plan goals (see Table 4).

⁴ Soviet fertilizer output in 1973, excluding phosphate feeds, amounted to 17.11 million tons. The actual total was somewhat less because the gross data also include unspecified quantities of nitrogen animal feeds and apparently some material used for industrial purposes. US fertilizer production was about 17.14 million tons in calendar year 1973.

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Table 3

USSR: Fertilizer Production and Deliveries to Agriculture, by Type¹
Thousand Metric Tons of Nutrients

	Production				Deliveries to Agriculture			
	N	P ₂ O ₅	K ₂ O	Total	N	P ₂ O ₅ ²	K ₂ O	Total ³
1960.....	1,003	1,192	1,084	3,281	769	1,088 ⁴	766	2,624
1965.....	2,712	2,300	2,368	7,389	2,282	2,091	1,891	6,303
1970.....	5,423	3,585	4,087	13,099	4,605	3,129	2,574	10,368
1971.....	6,055	3,802	4,807	14,670	5,182	3,376	2,788	11,451
1972.....	6,551	3,940	5,433	15,931	5,624	3,498	3,238	12,530
1973.....	7,241	4,261	5,918	17,429	6,256	3,600	3,605	13,756
1974.....	N.A.	N.A.	N.A.	19,300 ⁵	N.A.	N.A.	N.A.	15,400 ⁶
1975 ⁷	8,000	5,700	8,500	22,200	6,785	4,442	6,282	18,100

¹ Production information includes fertilizers and phosphate animal feeds and probably also covers some fertilizer materials used for industrial purposes. Totals generally include small quantities of trace fertilizers. Data on phosphate fertilizers include ground phosphate rock used for direct application. Data on fertilizers supplied to agriculture are unadjusted for losses.

² Data on phosphates supplied to agriculture exclude phosphate feeds unless otherwise specified.

³ Supply totals include phosphate feeds.

⁴ Including phosphate feeds.

⁵ The plan for 1974 called for total production of 19.6 million tons of fertilizer nutrients. Preliminary information suggests that the plan for potash was not met.

⁶ Estimated.

⁷ Plan.

Table 4

USSR: Fertilizer Production

	Million Metric Tons				
	Standard Units				
	1971	1972	1973	1974	1975
Original Ninth Five-Year Plan (1971-75) goals	61.3	65.9	71.1	80.2	90
Reported	61.4	66.1	72.3	80.3	—

10. At the same time, however, the quality and assortment of Soviet fertilizers remain unsatisfactory. One-fourth of the output of phosphate fertilizers in 1973, for example, consisted of ground phosphate rock, which is inferior to water-soluble types such as triple superphosphate and ammonium phosphate. And, although the 1974 production plan was overfulfilled in terms of standard units, the goal stated in nutrients was not. Nitrogen and phosphate targets were exceeded, but potash output probably was below plan.

11. The priority assigned to the fertilizer industry increased markedly in 1973, following the 1972 harvest disaster. Capital investment in new fertilizer plants in 1973 was scheduled to rise to 80% above the 1972 level, whereas investment in the chemical industry as a whole was to rise by 40%. Projects completed in 1974 included four large ammonia units, the second stage of a potash facility in the Urals, and at least a few complex fertilizer installations.

12. Despite Moscow's success in meeting fertilizer output goals, commissioning of new capacity has been subject to delays. Scheduled to grow by

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almost 38 million tons (standard units) in 1971-75, production capacity rose by only 10.4 million tons in the first two years of the plan. An earlier program to increase fertilizer production capacity by 48 million tons during 1968-72 fell short by 11 million tons. Although additional fertilizer production capacity totaling 16 million tons was introduced in 1973-74, the new capacity was 4 million tons below target. Deadlines for bringing projects on stream were not met, in part because of delays in equipment deliveries and shortages of construction materials. Operational problems were also apparent. The fulfillment of fertilizer production goals in the face of these difficulties suggests that Soviet planners introduced a safety factor by scheduling more new capacity than was needed to meet production goals. Alternatively, the planners may have had a realistic view of when new plants had to come on stream to meet the production targets but may have set extremely taut investment spending schedules so as to put pressure on the construction organizations charged with building new chemical plants.

13. As a consequence of the increase in fertilizer production, the USSR was able to supply 13.5 million tons of nutrients⁵ to agriculture in 1973 (excluding phosphate feeds)—about 75% of gross fertilizer consumption in the United States.⁶ Although the supply of fertilizer to the farms slightly exceeded plan, shortcomings in assortment were still apparent. The potash delivered to agriculture in 1971-73 amounted to only 44% of the amount targeted for 1971-75.⁷ In 1974, according to a preliminary estimate, deliveries to agriculture were 15 million tons.

Exports Climb

14. Despite the large, unsatisfied demand for fertilizer for Soviet farms, fertilizer exports have been rising.⁸ In 1973 the amount of fertilizer shipped abroad—2.45 million tons of nutrients—was five times the level in 1965 (see Table 5). The value of these exports—\$198 million—was 53% more than the value of shipments in 1970.⁹ Sharp increases in potash exports spurred the growth in foreign sales—the quantity of phosphate fertilizers exported has declined steadily since 1970 and nitrogen exports (nutrient tons) in 1973 were only 9% larger than in 1970.

15. In fiscal year 1972-73 (1 July through 30 June) the USSR accounted for 5% and 2%, respectively, of world exports of nitrogen and phosphate fertilizers (on a tonnage basis). The share of Soviet potash in world potash exports in 1972-73 was larger—about 15%. In 1972-73 the USSR ranked second to Canada as a potash exporter.

16. Soviet fertilizers sold abroad go mainly to East European countries. In calendar year 1973 these countries received more than three-fifths of Soviet

⁵ Gross supply unadjusted for losses.

⁶ US gross fertilizer consumption in calendar year 1973 (also unadjusted for losses) is estimated at 18.0 million tons, the average of gross consumption in the fertilizer years 1972/73 and 1973/74.

⁷ A 50% rise in potash exports in 1971-73 may have been responsible in part for the shortfall.

⁸ The USSR imports relatively small quantities of fertilizer, chiefly phosphates.

⁹ Part of this increase, however, reflects higher prices—in terms of nutrient tons, the increase was only 38%.

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Table 5

USSR: Fertilizer Exports

Thousand Metric Tons of Nutrients¹

Type of Fertilizer	1965	1970	1971	1972	1973
Total ²	481	1,773	2,050	2,206	2,449
Phosphate (P ₂ O ₅).....	54	133	109	95	92
Potash (K ₂ O).....	343	1,309	1,622	1,706	1,997
Nitrogen (N).....	84	331	319	405	360
Including:					
Ammonium sulfate.....	68	181	167	187	178
Ammonium nitrate.....	3	47	35	49	36
Urea.....	13	102	117	168	146

¹ Nutrient values are estimated from official Soviet foreign trade data on fertilizers, based on the following assumptions concerning average nutrient content: phosphate fertilizers, 18.7% P₂O₅; ammonium nitrate, 34% N; potash, 41.6% K₂O; urea, 46% N; and ammonium sulfate, 20.5% N.

² Because of rounding, components may not add to the totals shown.

potash exports (tonnage basis). Poland, the largest customer, purchased 39% of total potash exports. Shipments to Belgium and Japan, the major Western purchasers, absorbed one-fifth of the total. Eastern Europe, Turkey, and Cuba were the principal buyers of Soviet nitrogen fertilizers in 1973. One-third of Soviet urea exports went to Turkey, while Czechoslovakia and Cuba together accounted for one-half of the other Soviet nitrogen fertilizers.

Outlook for 1975

17. Despite persistent difficulties in building fertilizer plants and bringing them to rated production, Soviet prospects for meeting 1975 fertilizer production goals are good. Even with the customary Soviet delays in commissioning new capacity, the 1975 production target—90 million tons (22.2 million tons of nutrients)—clearly is within reach.¹⁰ At this level, Soviet fertilizer output in 1975 should about equal US output.¹¹

18. Production capacity amounted to 93 million tons (standard units) at the beginning of 1974, and was scheduled to grow by more than 20 million tons by the end of 1975. At least 15 complex fertilizer plants and several nitrogen and potash units were to be commissioned in 1974-75.¹² Capacities of a number of phosphoric acid plants are being increased by 30%-40% as a result of their conversion to a process that permits sharp reductions in inputs of electric power and water

¹⁰ Gross fertilizer production capacity probably was on the order of 100 million tons at the beginning of 1975 and is scheduled to grow by 10.3 million tons during 1975.

¹¹ The gross figure for planned Soviet output of nutrients in 1975 (see Table 2) was adjusted to 19.8-20.1 million tons as follows: the figure was reduced by 7%-8% to allow for materials believed to go for industrial use and was further reduced by 561,000 tons to allow for the quantity planned for use as phosphate animal feeds. US output of fertilizers in calendar year 1975 was projected at 19.9 million tons by averaging USDA data on production levels expected in the adjacent fiscal years.

¹² For the locations of Soviet fertilizer projects that were scheduled for operation in 1974 or later, see the Appendix.

per unit of output.¹³ Although the overall 1975 production goal almost certainly will be met as a result of the steep increase in nitrogen capacity, the targets for phosphate and potassium fertilizer will be more difficult to attain. The outlook for phosphate fertilizers depends on the timely completion of about ten complex fertilizer plants. The potash plan assumes better use of existing capacity in 1975.

19. Thus the assortment and quality of Soviet fertilizers going to crops is still a serious problem. Soviet plans for 1975, adjusted for phosphate feeds, suggest a nitrogen-phosphate ratio of 1:0.65, compared with 1:0.68 in 1970 and 1:0.58 in 1973. According to Soviet scientists, the overall nutrient ratio (N, P₂O₅, K₂O) for the USSR should be 1:1:1. Apart from the shortcomings cited, the effectiveness of Soviet fertilizers is reduced because storage capacity is inadequate, special railcars for shipping unpackaged fertilizers are in short supply, and holdings of fertilizer application equipment are insufficient.

The Role of Foreign Equipment

Purchases Through 1971

20. To carry out its ambitious fertilizer program, the USSR has had to purchase many fertilizer and related raw material installations. Domestic manufacturing capacity could not produce the equipment in the necessary volume or variety. Plants depending mainly on equipment ordered from the West and from Eastern Europe through 1971 provided 50% of Soviet ammonia, 64% of the urea, and 74% of the complex fertilizers in 1973. Western firms provided most of the imported complex fertilizer equipment and also contributed substantially to the growth of ammonia and urea capacity. Some Soviet equipment, however, also is used in plants based mainly on Western equipment and technology.

21. During 1960-71 the USSR bought an estimated \$383 million worth of Western fertilizer plant and equipment. Orders peaked in 1970, when contracts for ammonia plant and equipment totaled \$106 million (see Table 6).

Table 6

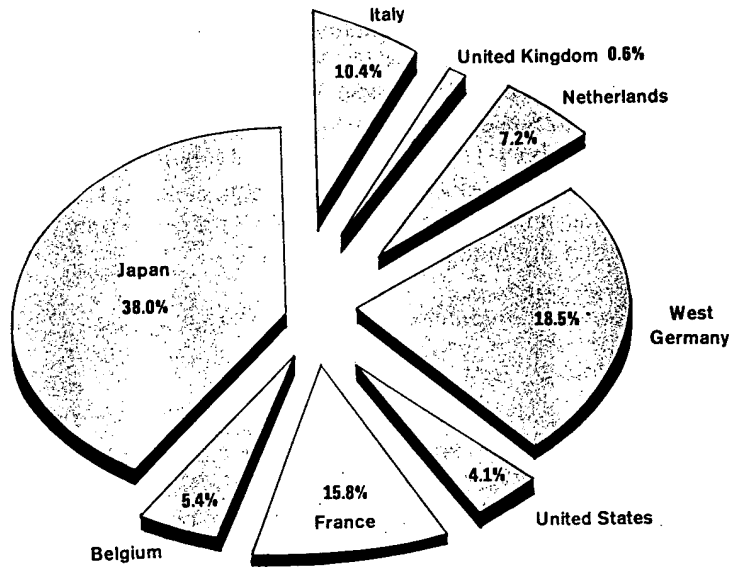
USSR: Orders for Western Fertilizer-Related Plant and Equipment

		Million US\$	
1960	41.5	1966	33.0
1961	31.0	1967	7.2
1962	34.0	1968	3.3
1963	18.1	1969	26.0
1964	24.0	1970	106.0
1965	36.1	1971	22.5

22. Contracts awarded to Japan, West Germany, and France accounted for more than 70% of the value of Soviet orders for Western fertilizer equipment

¹³ The changeover from a dihydrate to a hemihydrate process, planned for 1973-75, will affect seven existing phosphoric plants and nine that are under construction. As of early 1975, however, the conversion was behind schedule—in part, apparently, because of the opposition of two chemical institutes.

USSR: Origin of Fertilizer Plant and Equipment Purchased from the West, 1960-71¹



¹ Based on total purchases with an estimated value US \$383 million.

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in 1960-71 (see the chart). Japan, which received orders totaling \$146 million, supplied a large urea fertilizer complex and several ammonia plants. West German sales were more diversified, including equipment for production or processing of ammonia, phosphorus, potassium, and complex fertilizers. France provided equipment for ammonia, phosphoric acid, and complex fertilizer plants.

23. The United States accounted for only about 4% of the value of Soviet contracts. US sales were largely confined to potash mining equipment and to technology for producing ammonia in large plants. The USSR often found that it could purchase chemical equipment more cheaply or on more favorable credit terms in Japan and Western Europe.

24. Although many of the purchased plants came on stream only after a delay of a year or more, they have contributed substantially to Soviet fertilizer output. Five urea plants purchased in the early 1960s had a total production capacity of more than one million tons and contributed up to 30% of Soviet urea output in 1970. Plants supplied by the West also accounted for one-third to one-half of total Soviet production of complex fertilizers in 1970. Moscow ordered equipment for 16 ammonia plants during 1960-71. Seven of these plants were in at least partial operation in 1970, producing about 10% of Soviet ammonia output in that year. In 1969 the USSR began to buy large single-stream ammonia plants that reportedly will reduce unit investment and operating costs by

30%-50% compared with earlier Soviet plants.¹⁴ Western equipment for nine such plants was ordered in 1969-71 to put content into the Soviet 1971-75 plan calling for a 4.2 million ton per year increase in ammonia output by 1975. Purchased installations will furnish at least half of the scheduled increase since most of them will be in operation by the end of 1975.¹⁵

25. Soviet access to Western ammonia technology has sometimes included the right to manufacture ammonia installations incorporating Western designs. Soviet engineers, for example, reportedly were allowed to copy a French-designed plant ordered in 1965. The plant had two lines, each with an annual production capacity of 200,000 tons; the largest Soviet-designed ammonia lines built in the 1960s had capacities of 100,000-110,000 tons. In purchasing the five 450,000 tons per year ammonia plants in 1969-71, the USSR also acquired the right to use US designs for the reforming section in other ammonia plants to be built in the Soviet Union.

Purchases Mushroom in 1973-74

26. After a hiatus in 1972¹⁶ the Soviet Union resumed purchases of Western fertilizer equipment in 1973-74 on an unprecedented scale. Soviet leaders, frustrated by the poor 1972 harvest, apparently decided to pull out all stops in rescuing their consumer programs, which depend so heavily on rapid growth of farm production. Orders and purchase agreements for Western equipment in the two years exceeded \$1 billion, more than 2½ times the total value of such orders in 1960-71.¹⁷ These agreements and orders call for Western firms to supply 16 ammonia plants and 2 large urea fertilizer installations (see Table 7). US, French, and Japanese firms each are to supply four ammonia plants.¹⁸ Italian firms, which contracted to provide the two urea installations, also are to supply four ammonia plants, although final contracts are still pending.

27. The ammonia plants and miscellaneous related equipment will cost an estimated \$962 million. In addition, port facilities ordered for storage, shipment, and handling of fertilizers have a price tag of \$147 million.¹⁹ In contrast with earlier orders, the USSR will repay Western credits primarily with funds earned from the sale of products from the purchased plants. Western firms have agreed to buy specified quantities of the products. The impetus for such arrangements has been the Soviet need for Western technology coupled with the availability of raw materials and energy at a time when these inputs are scarce and expensive in the West.

¹⁴ The Western ammonia equipment ordered in 1969-71 had an annual production capacity of about 4 million tons. According to one Soviet author, each ammonia unit erected at existing fertilizer installations will permit a reduction of 45%, or 25 million rubles, in investment costs and 50%, or 15 million rubles, in annual operating costs.

¹⁵ The first 450,000 ton per year unit began operating in February 1973 and the second a year later. At least four more of the large ammonia plants were scheduled for commissioning during the last half of 1974.

¹⁶ During 1972 the USSR awarded orders for seven ammonia reactors to Czechoslovakia.

¹⁷ About \$200 million of the total represents the estimated cost of four ammonia plants for which agreements were signed in 1973-74 but for which final orders are still pending. The total excludes, however, the cost of two urea plants for which contract values were not reported.

¹⁸ US designs may be used in the French-supplied ammonia plants.

¹⁹ Most of the port equipment was ordered in connection with a 20-year fertilizer exchange agreement between the Soviet Union and a US firm, Occidental Petroleum Corporation.

Table 7

USSR: Orders and Agreements for Purchase of Fertilizer Equipment and Related Facilities

Type of Plant or Equipment	Production Capacity (Thousand Metric Tons per Year)	Million US \$	Exporter		Plant Site and/or Scheduled Completion Date
			Country	Firm	
1973					
Ammonia ¹ (2 plants)	1,000 ²	100 ³	Italy	Montedison	1976
Urea ¹	500	N.A.	Italy	Montedison	1976
Ammonia equipment ⁴.....	....	28.9 ³	Japan United States	Toyo Engineering Corp. Clark	N.A.
1974					
Ammonia ⁵ (2 plants)	900 ²	100 ³	Italy	ENI	1977-78
Ammonia..... (4 plants)	1,800 ²	215 ³	United States	Chemico	Tolyatti area—1978
Ammonia..... (4 plants)	1,800 ²	220	France United Kingdom	Creusot-Loire Entreprises Kellogg International Corp. (for design and services) ⁶	1978-79—Gorlovka (2 plants) Kemerovo (2 plants)
Ammonia ⁷ (4 plants)	1,800 ²	240	Japan	Mitsui and Company Toyo Engineering Corp.	European USSR, possibly Ukraine
Compressors for ammonia plants	....	20 ³	United States	Dresser Industries, Inc.	N.A.
Installations for storage, refrigeration, and loading of ammonia	....	20.4	France	Construction Metalliques de Provence	1977—Tolyatti area
Ammonia storage equipment.	....	17.6	France	Construction Metalliques de Provence	Gorlovka
Urea ⁵	500	N.A.	Italy	ENI	1977-78
Port facilities for storage and transshipment of fertilizers	....	100	United States	Occidental Petroleum Corporation	Odessa and Ventspils
Port facilities for handling urea	....	47	West Germany	Pohlig-Heckel-Bleichert Vereinigte Maschinenfabriken	Near Odessa

¹ The ammonia and urea plants to be supplied by Montedison come under a 1973 agreement. The final contract for the urea plant was signed in 1974 and contracts for the two ammonia plants may still be pending.

² Total.

³ Estimated.

⁴ The Japanese firm is to provide pipes, valves, motors, and instruments valued at \$12.9 million. The US firm is to provide four compressors valued at \$16 million. The equipment may be for use in four ammonia plants for which some equipment had been ordered from the Japanese firm in 1971.

⁵ The ammonia and urea plants to be supplied by ENI came under a 1974 agreement. The final contract for the urea plant was signed in late 1974 or early 1975. Contracts for the ammonia plants apparently are still pending.

⁶ Part of the design or technology for the ammonia plants from France may be of US origin.

⁷ Contract was signed in 1974 but approval of financing by Japanese Export-Import Bank was still pending as of mid-January 1975.

Outlook for 1976-80

Production

28. The long-range plan announced by Brezhnev in 1970 and since re-affirmed in several Soviet publications calls for production of 150 million tons of fertilizer (standard units) in 1980 (see Table 8). The 1980 production targets are difficult but not impossible. Dozens of large, modern production facilities must be built, while enormous increases are needed in the production capacities for major material inputs. To improve the product structure of the industry, phosphate fertilizers are scheduled to grow fastest, followed by nitrogen and potash. The absolute increase in nutrient production would be more than 50% greater than that planned in 1971-75.

Table 8
USSR: Fertilizer Production

Type of Fertilizer	Million Metric Tons				Percentage Increase 1980/1975 (Standard Units)
	1975 ¹		1980 ²		
	Standard Units	Nutrients	Standard Units	Nutrients	
Total ³	90.0	22.2	150.0	36.1 ⁴	67
Nitrogen	38.9 ⁵	8.0	63.5	13.0	63
Phosphate ⁵	30.6	5.7	56.5	10.6	85
Potash	20.5 ⁵	8.5	30.0	12.5	46

¹ Plan.

² Preliminary plan.

³ Totals include small quantities of trace fertilizers.

⁴ Some publications give a higher total.

⁵ A few publications give 39.2 million tons for nitrogen fertilizers and 20.2 million tons for potassium.

⁶ Including ground phosphate used without further processing and phosphate animal feeds.

29. Major increases are needed in the output of two key intermediate inputs. Four million tons of sulfuric acid capacity will have to be commissioned annually in 1976-80. In addition, Soviet ammonia requirements in 1980 for both domestic use and export are estimated at 23-24 million tons, 11-12 million tons more than scheduled output in 1975.²⁰ Production from plants ordered in the West but not completed or fully employed in 1975 could provide about 8.2 million tons of the total increase in production needed by 1980.²¹ Soviet and Czechoslovak equipment should be able to supply a large part of the remaining 3-4 million tons.

²⁰ Of the total ammonia required, an estimated 16 million tons will be used for fertilizers. Other domestic uses may absorb 3-3.5 million tons, and exports, perhaps 4-4.5 million tons.

²¹ The annual production capacity of ammonia plants ordered from the West in 1973 and 1974 amounts to 7.3 million tons. The carryover capacity of Western equipment ordered by the USSR in 1970-71, but not fully utilized in 1975, is estimated at 1.8 million tons. From the 9.1 million tons of additional or unused capacity available after 1975, about 8.2 million tons of ammonia could be produced in 1980, assuming capacity utilization of 90%.

30. As part of this program, the USSR is trying to develop sulfuric acid plants with unit capacities of 720,000 tons per year (twice that of the largest Soviet units now in operation) and ammonia installations with daily capacities of 2,000-3,000 tons (as opposed to the 1,360 ton per day capacities of plants now being built). Such installations are comparable with the largest units under development in the West.

31. Even if the planned increases do not materialize in full, the USSR probably will become the world's largest producer of chemical fertilizers during 1976-80.²² According to estimates of the US Department of Agriculture, fertilizer production in the United States will not grow much between 1975 and 1980—perhaps to a level of 22.2 million tons of nutrients in the year ending in mid-1980.

Raw Materials Not a Constraint

32. Raw material problems should not hold back the scheduled development of the fertilizer industry. Soviet gas reserves can easily support the planned level of nitrogen production in 1980, or indeed the likely increases through 1990. Potassium reserves are also very large—sufficient for 500 years, according to one Soviet source. Existing large potassium complexes in the Urals and in Belorussia are undergoing expansion. In addition, the USSR intends to exploit large potassium deposits in the Gaurdak area of the Turkmen Republic, using a solution mining process.

33. Compared with its natural gas and potassium reserves, the USSR is less well endowed with phosphate raw materials. Nonetheless, this situation should not be a problem for at least 25 years.

- Large quantities of phosphate rock are exported—6.6 million tons in 1973, or about 30% of domestic production. These exports can and probably will be reduced as domestic production of fertilizer increases.
- Major phosphate complexes are being expanded on the Kola Peninsula and at Karatau in the Kazakh SSR. Phosphorite ore capacity at Karatau is planned to more than double during 1976-80—to 23-25 million tons.
- Major new phosphate deposits also will be exploited during 1976-80, including those at or near Kovdor (Kola Peninsula), Oshurkovo (Buryat ASSR), Aktyubinsk (Kazakh SSR), and Zima (Irkutsk region).
- Under a 20-year agreement, Occidental Petroleum will provide to the USSR one million tons of superphosphoric acid per year, starting in 1978, in exchange for Soviet ammonia, urea, and potash. In addition, the USSR will begin importing phosphate rock from Morocco some time before 1980.²³

²² Depending on the actual level of output in the Soviet Union and the United States, the USSR could become the largest fertilizer producer in 1975. Soviet fertilizer output, adjusted for losses and non-fertilizer uses, however, would be only slightly greater than US output.

²³ The USSR also has a long-term agreement with Morocco, whereby the Soviets hope to obtain 3-5 million tons of phosphate rock annually during the 1980s and 10 million tons per year starting in 1990.

Deliveries to Agriculture in 1980

34. According to the long-range plan announced in 1970, Soviet agriculture was to receive 130-135 million tons of fertilizer (measured in standard units) in 1980. More recently, Brezhnev has said that agriculture's share will be at least 120 million tons. The apparent change in plans probably reflects increases in Soviet export commitments for fertilizer.²⁴ An upper limit for the supply plan still cannot be set, and the target might include phosphate animal feeds. We expect, however, that about 123 million tons of fertilizer (see Table 9), including 4.5 million tons of phosphate feeds, will be allocated to agriculture in 1980. Nitrogen will still be the predominant plant nutrient in the USSR in 1980, although the share of phosphate and potassium in the assortment will be greater than in the mid-1970's.

Table 9
USSR: Growth of Fertilizer Deliveries to Agriculture

Type of Fertilizer	Standard Units			Nutrients		
	1970	1975 ¹	1980 ²	1970	1975 ¹	1980 ²
Total ³	45.6	75.0	123.4	10.4	18.1	29.1
Nitrogen	22.5	33.1	53.7	4.6	6.8	11.0
Phosphate ⁴	16.9	26.7	47.6	3.2	5.0	8.9
Potash	6.2	15.1	22.1	2.6	6.3	9.2

¹ Plan.

² Projected.

³ Because of rounding, components may not add to the totals shown.

⁴ Including phosphate feeds.

35. The estimated gross supply available for crops—almost 119 million tons—may still be subject to losses of up to 10%, despite Soviet efforts to improve handling operations by assigning responsibility for receipt, storage, and application of fertilizers to specialized agrochemical organizations.²⁵

Implications for Foreign Trade

Opportunities for Further Western Equipment Sales

36. Despite the large number of contracts already concluded, the USSR has shown interest in further acquisition of Western fertilizer technology. Judging from negotiations in 1973-74, Soviet orders in the near future may include complete plants for production of phosphoric acid, complex fertilizers, urea, and ammonia. A large sulfuric acid plant may also be bought in the West, although Poland probably will supply most of the sulfuric acid plants in 1976-80.

²⁴ For details on new Soviet export commitments, see paragraphs 40-41.

²⁵ A recent Soviet article reported fertilizer losses in the USSR equal to 10% of the quantity supplied to agriculture. This figure should be considered a minimum. Losses amount to 200-500 kilograms of fertilizer per vehicle when bulk fertilizer is shipped by truck in the USSR, and these losses often are not counted because the recipient records the weight on the goods invoice rather than actual weight.

37. On the basis of Soviet press complaints concerning the poor quality and low productivity of domestically produced equipment, opportunities probably also exist for the sale of individual equipment items, including

- Electric filters for phosphorus furnaces
- Centrifugal compressors for ammonia plants
- Apparatus for granulating superphosphate
- Equipment to ship, store, and apply liquid fertilizers
- Installations for loading bulk fertilizers and bagged fertilizers
- Corrosion-resistant pumps for producing phosphorus and sulfuric acid
- Potash mining and processing equipment
- Equipment for blending fertilizers
- Heat exchangers and superchargers for sulfuric acid units at nonferrous metallurgical plants

38. Soviet plans to exploit new fertilizer raw material sources may provide additional opportunities for Western firms. In mid-1973, the Minister of the Chemical Industry, Leonid Kostandov, suggested the possibility of a joint Soviet-US project to develop potassium deposits in Central Asia and phosphorite deposits in Siberia. Although the Soviets have already been working on these deposits, progress has been slow and some technical problems apparently have not been resolved.

The USSR in the World Fertilizer Market

39. Perhaps the most surprising consequence of Moscow's fertilizer program will be its impact on foreign trade. In FY 1973 the USSR accounted for about one-tenth of world fertilizer exports, ranking behind Canada and the United States:

Million Tons of Nutrients		
Canada	United States	USSR
4.5	2.8	2.33

By 1980 the USSR could overtake the United States to become the world's second largest fertilizer exporter. Annual Soviet fertilizer sales abroad by 1980 (excluding ammonia) may be about 5 million tons, double the 2.45 million tons²⁶ exported in calendar year 1973 and perhaps one-seventh of world exports.

40. The substantial growth expected in Soviet fertilizer exports by 1980 will be mainly the result of a 20-year Soviet fertilizer barter agreement with Occidental Petroleum Corporation and commitments to repay Western credits used to finance Soviet purchases of fertilizer equipment. If the Soviet-Occidental contracts are implemented on schedule, the reciprocal barter trade will have

²⁶According to the estimates presented above (see Tables 8 and 9 and paragraphs 32-33), the production goal of 36 million tons of nutrients is possible, while planned deliveries to agriculture seem to be about 29 million tons. In 1973, when output of plant nutrients exceeded the quantity supplied to agriculture by 3.67 million tons, the USSR exported two-thirds of the balance. Assuming that up to 70% of the difference (7 million tons) between production and agricultural use is exported in 1980, almost 5 million tons of fertilizer (nutrient basis) would be available for shipment abroad.

an annual value of \$1 billion (\$0.5 billion each way), equivalent to about two-thirds of total US-Soviet trade turnover in 1973. Known commitments to Occidental will require annual Soviet exports of 690,000 tons of nitrogen fertilizer (N)²⁷ (excluding export commitments for ammonia) and about 400,000 tons of potash (K₂O).

41. In addition, the USSR is to deliver 1 million tons of potash (K₂O) annually to Poland through 1985 and probably will also furnish potash to other East European countries. The USSR may also have a long-term commitment to export potash to Morocco. Soviet commitments to export phosphate fertilizers to Bulgaria and Czechoslovakia in 1976-80 total about 85,000 tons annually of monoammonium phosphate (product weight), and unspecified quantities of the same product are to go to Hungary and East Germany.

42. The projected Soviet capability to export about 5 million tons of fertilizer nutrients in 1980 would more than cover known export commitments. Soviet export plans and the composition of exports in 1980, however, are unknown. If more than about 2.8 million tons of potash are exported, the projection of supplies to agriculture will have to be reduced—unless the preliminary 1980 Soviet production plan for potash (12.5 million tons) is revised upward.

43. In addition to the fertilizer exports, Soviet commitments to deliver ammonia in 1980 could amount to as much as 4.5 million tons,²⁸ about 50% more than total world trade in ammonia of 2.94 million tons in 1973. At wholesale prices for ammonia effective in the United States in late 1974, potential Soviet exports of ammonia in 1980 would be valued at about \$850 million and probably would make the USSR the world leader in this category.

44. The Western firms that will have responsibility for disposing of substantial quantities of Soviet fertilizers and ammonia starting in the late 1970s could face a less than buoyant world market. The sharp prospective rise in Soviet exports, plans for new nitrogen fertilizer capacity in the non-Communist world, and the likelihood of a substantial increase in availability of phosphate rock by the end of 1976 suggest that supply and demand for nitrogen and phosphate fertilizers could come into balance between 1976 and 1978. Production capacity for potash also is growing, but the world potash market situation in 1980 is still unclear because plans for expansion of Canadian capacity are not yet firm. In any case, there already are indications that growth in fertilizer demand is being dampened by high prices. The expansion of world supplies of nitrogen and potassium materials in sight by the late 1970s should add to the downward pressure on prices.

²⁷ The nitrogen exports, excluding ammonia, will consist of 1.5 million tons of urea, containing about 690,000 tons of nitrogen. The urea shipments come under the Soviet-Occidental barter agreement. In addition, the USSR is to export unspecified quantities of urea to Italy and Morocco.

²⁸ Tentative Soviet export commitments for ammonia include 1.5 million tons per year resulting from barter agreement with Occidental Petroleum Corporation; 500,000 tons per year to repay credits for purchase of several chemical plants from an Italian firm (final contracts not all signed yet); 1.5 million tons per year to repay credits financing purchase of four ammonia plants from a US firm plus related port equipment; 300,000 tons to help repay credits for ammonia plants ordered from a French firm (sales contract for ammonia deliveries not signed yet, however). In addition, the USSR also has agreed to supply ammonia to an Italian firm and to Morocco on a long-term basis, but the quantities involved are unknown.

APPENDIX

USSR: Fertilizer Projects¹
1974-80

Location ³	Type of Fertilizer ⁴	Annual Capacity ²		Nutrients ⁶ (Thousand Metric Tons)	Scheduled Startup ⁷	Comment
		Standard units ⁵ (Thousand Metric Tons)				
Almalyk, Uzbek SSR	NPK (Karboammofoska)	50		N.A.	1975	To be produced at a coke-chemical plant, construction of which began in 1974. Installation was to be included in a titanium dioxide plant.
Altay Kray, West Siberia	Ammonium sulfate	N.A.		N.A.	N.A.	
Armyansk area, Crimea, Ukraine	MAP	N.A.		N.A.	1974	
Balakovo, Saratov Oblast	Triple superphosphate MAP	700		131 P ₂ O ₅ 187 P ₂ O ₅ 43 N	1975 N.A.	Total output of plant is to be 3 million tons (basis unspecified but possibly expressed in standard units or product weight). Construction began in 1972.
Belorechensk, Krasnodar Kray	NPK	1,000-2,000 ⁸		N.A.	1977	
Berezniki Nitrogen Fertilizer Plant, Perm Oblast	Ammonia	N.A.		N.A.	December 1975	New unit was planned to double ammonia production capacity.
Berezniki Potassium Combine No. 3, Perm Oblast	Ammonium nitrate Potash	1,800 (second stage)		749 K ₂ O	December 1975 1974	In operation at end of 1974. First stage, with same capacity, was commissioned in December 1973.
Berezniki Potassium Combine No. 4, Perm Oblast	Potash	7,000		2,912 K ₂ O	N.A.	Construction started in 1973.
Chardzhou, Turkmen SSR	MAP	N.A.		N.A.	N.A.	Construction of large shop was scheduled under 1971-75 plan.
Cherepovets, Vologda Oblast	NPK (Nitroammofoska) Triple superphosphate	1,600 ⁸ 2,800 ⁸		N.A.	First stage 1975 N.A.	Capacity of first stage is to be 500,000 tons.
Chirchik, Uzbek SSR	Possibly nitrogen	N.A.		N.A.	N.A.	Equipment for nitric acid unit was delivered in October 1974.
Dneprodzerzhinsk, Ukraine	Possibly MAP	1,000		187 P ₂ O ₅ 43 N	N.A.	Under construction since 1972.
Dorogobuzh, Smolensk Oblast	NPK (Nitrofoska)	540 ⁸		N.A.	1975	
Dzhambul, Kazakh SSR	MAP Triple superphosphate	N.A. 700		N.A.	N.A.	Put into operation January 1974. Plant's production capacity for MAP will increase by 50%.
Gaurdak area, Turkmen SSR	Potash	N.A.		N.A.	N.A.	Raw material base may be Karlyuk deposits.
Gomel, Belorussia	MAP	650 ⁸		N.A.	1974	Initial output reported in January 1975.
Gorlovka, Ukraine	Ammonia	900 ⁹		740	1978 or 1979	Includes two units, each with annual capacity of 450,000 tons.
Grodno, Belorussia	Ammonium sulfate Ammonium nitrate	N.A. N.A.		N.A. N.A.	N.A. N.A.	In operation in first half of 1974. In operation in July 1974.
Jonava, Lithuania	Ammonia	N.A.		N.A.	N.A.	Reconstruction of ammonia line, completed in November 1974, will permit 11% increase in fertilizer output.
	NPK (Nitroammofoska) Fertilizer, granular	750 ⁸ N.A.		N.A. N.A.	1975 N.A.	Assembly of fourth line started October 1974.

USSR: Fertilizer Projects¹
1974-80
(Continued)

Location ³	Type of Fertilizer ⁴	Annual Capacity ²		Scheduled Startup ⁷	Comment
		Standard units ⁵ (Thousand Metric Tons)	Nutrients ⁶ (Thousand Metric Tons)		
Karakalpakskaya ASSR, Uzbek SSR	Possibly nitrogen	N.A.	N.A.	N.A.	Construction planned.
Kemerovo, Kemerovo Oblast, West Siberia	Ammonia	900 ⁹	740	1978 or 1979	Includes two units, each with annual capacity of 450,000 tons.
Kingisepp, Leningrad Oblast	Possibly nitrogen	N.A.	N.A.	N.A.	In 1974, reconstruction of unspecified fertilizer shops was completed.
	MAP	340	64 P ₂ O ₅	1974	Second line commissioned May 1974. First line, with same capacity, commissioned December 1973.
	MAP	680	15 N		
Kohtla-Jarve, Estonia	NPK	More than 800 ⁸	127 P ₂ O ₅	1975	
Konstantinovka, Ukraine	Superphosphate	Possible increase of 116 ⁸	29 N		
Krasnopererekopsk, Crimea, Ukraine	Possibly MAP or NPK	N.A.	N.A.	1975	Under construction since 1973.
Krasnouralsk, Sverdlovsk Oblast	Triple superphosphate	400 ⁸	N.A.	1975	Reconstruction of shop completed in November 1974.
Mary, Turkmen SSR	Ammonium nitrate	N.A.	N.A.	N.A.	Plan to raise existing capacity of 600,000 tons per year to one million tons per year in 1975.
Meleuz, Bashkir ASSR	Calcium phosphate, dibasic	300 ⁸	N.A.	1975	Construction of nitrogen fertilizer combine to begin in 1975.
Mendeleysk, Tatar ASSR	NPK	1,500 ⁸	N.A.	N.A.	Product can be used as feed or as fertilizer.
Moscow	Ammonium sulfate	N.A.	N.A.	N.A.	Major use probably will be as feed.
Navoi, Uzbek SSR	Ammonium polyphosphate	N.A.	N.A.	N.A.	Construction was to begin during 1971-75 plan.
Nevinnomyssk, Stavropol Kray	Ammonia	N.A.	N.A.	N.A.	Production began 10 December 1974 at coke gas plant.
	Ammonia	N.A.	N.A.	N.A.	Initial output, possibly on an experimental basis, was reported in December 1974.
Novgorod, Novgorod Oblast	Ammonia	N.A.	N.A.	Fourth quarter 1975	
	NPK (Nitrofoska)	N.A.	N.A.	1975	
Novomoskovsk, Tula Oblast	Ammonia	450 ⁹	370 N	First half 1974	Was under construction in 1972.
	Ammonia	450 ⁹	370 N	1975	In operation 28 October 1974.
Odessa, Ukraine	Ammonium nitrate	765 ¹⁰	157 N ¹⁰	Fourth quarter 1974	Commissioned in December 1974.
Odessa area, Ukraine	Superphosphate, granular	N.A.	N.A.	N.A.	Put into operation in 1974.
	Complex (nitrogen-phosphorus)	More than 3,000 ⁸	N.A.	First stage 1978	Construction began in 1974.

Orenburg area, Urals.....	Complex	10,000 ⁸	N.A.	N.A.	N.A.	Will use 1.3-1.5 million tons of apatite annually.
Oshurkovo area, Buryat ASSR.....	Phosphate	N.A.	N.A.	1979	N.A.	
Polotsk, Belorussia.....	Ammonium sulfate	N.A.	N.A.	Third quarter 1974	N.A.	
Revda, Sverdlovsk Oblast.....	Superphosphate	N.A.	N.A.	N.A.	N.A.	Large shop to be built.
Rososh area, Voronezh Oblast.....	Complex	1,400 ⁸	N.A.	N.A.	N.A.	Construction of the Pridon Chemical Combine began late in 1974.
Rovno, Ukraine.....	Ammonia	400 ⁹	329 N	1974	1974	Put into operation in first half 1974.
	NPK (Nitroummofoska)	1,000 ⁸	N.A.	1975	1975	First stage scheduled for completion in first quarter 1975 and second stage in second quarter 1975. Operation of the NPK facility originally was planned for 1974.
Rozdol, Ukraine.....	NPK (Nitroummofoska)	1,600 ⁸	N.A.	First stage 1975	N.A.	
Salavat, Bashkir ASSR.....	Ammonia	N.A.	N.A.	Fourth quarter 1974	N.A.	
	Urea	N.A.	N.A.	Fourth quarter 1974	N.A.	
	Fertilizer, unspecified	270	N.A.	1975	1975	To result from reconstruction and modernization.
Samar kand, Uzbek SSR.....	MAP	More than 800 ⁸	N.A.	1975	1975	Put into operation February 1974.
Severodonetsk, Ukraine.....	Ammonia	450 ⁹	370 N	1974	1974	Put into operation December 1974.
	Ammonia	450 ⁹	370 N	1974	1974	Construction was planned to start in 1974.
Shumilino, Belorussia.....	NPK	N.A.	...	N.A.	N.A.	The increase in capacity was planned for the second ore directorate.
Soligorsk, Belorussia.....	Potash	100	42 K ₂ O	1974	1974	Construction of the fourth potassium complex in Belorussia was under way in 1974.
	Potash	5,000	2,080 K ₂ O	N.A.	N.A.	Second stage of the Yuzhnyi complex of the combine. First stage, with production capacity of 624,000 tons (K ₂ O) was commissioned late in 1973.
Solikamsk Potassium Combine, Perm Oblast.	Potash	1,000	416 K ₂ O	1975	1975	
Solikamsk "Novosolikamsk" Potassium Combine, Perm Oblast.	Potash	7,000	2,912 K ₂ O	1978	1978	The increase in capacity is planned to bring total output of plant to 1.2 million tons per year after 1974.
Sumgait, Azerbaydzhan SSR.....	Superphosphate	360 ⁸	N.A.	1974	1974	First stage, with same capacity, was commissioned in December 1973.
Sumy, Ukraine.....	MAP	540	101 P ₂ O ₅	Second stage 1975	1975	Construction completed in July 1974.
	Ammonium sulfate	200-250 ¹⁰	23 N	1974	1974	Commissioned in late 1974.
	Ammonia (4 plants)	1,800 ⁹	41-51 N ¹⁰	1978	1978	
Voskresensk, Moscow Oblast.....	MAP	540	101 P ₂ O ₅	1974	1974	Construction began in November 1974.
			23 N	1974	1974	Commissioned in late 1974.

Footnotes at end of table.

USSR: Fertilizer Projects¹
1974-80
(Continued)

Location ³	Type of Fertilizer ⁴	Annual Capacity ²		Scheduled Startup ⁷	Comment
		Standard units ⁵ (Thousand Metric Tons)	Nutrients ⁶ (Thousand Metric Tons)		
Yefremov, Tula Oblast.....	N.A.	N.A.	N.A.	N.A.	Planning institute has completed technical plans for chemical plant, which is to produce unspecified type of fertilizer.
Zima, Irkutsk Oblast.....	Triple superphosphate	N.A.	N.A.	N.A.	Production to be based on local deposits of apatite.

¹ Based on information through mid-January 1975. Projects include new fertilizer and ammonia installations and expansions of existing facilities.
² Annual capacities refer only to those of projects completed in 1974 or scheduled for operation after 1974.
³ City or area and the pertinent Soviet republic, except for sites in the RSPSR, for which administrative regions smaller than republic are given.
⁴ NPK is used here to represent multinutrient fertilizers in which the three major nutrients have been combined as a result of chemical processing. Soviet designations, if known, are given in parentheses after NPK. MAP represents monoammonium phosphate (Soviet designation АММОФОС), which contains two major nutrients. The word "complex" is used when it is unknown whether the type planned will have two or three nutrients.
⁵ Unless otherwise stated, Soviet data on fertilizers often are expressed in standard units, a statistical concept whereby quantities shown are those for fertilizers containing an arbitrary nutrient content. For example, phosphate fertilizers are equated to fertilizer containing 18.7% P₂O₅. Standard units applied to MAP also are in terms of 18.7% P₂O₅. The nitrogen content in MAP generally is equal to slightly more than one-fifth of the P₂O₅ nutrient figure.
⁶ Nutrient values were mainly derived from Soviet standard units. Nutrient values were computed for multinutrient fertilizers only when it was possible to determine whether the reported capacities were expressed in standard units or actual product weight.
⁷ Several 1974 projects were not commissioned on schedule, and actual startup will be later than planned.
⁸ Basis for capacity figure (standard units or actual product weight) unknown.
⁹ Annual capacity in terms of ammonia.
¹⁰ Estimated.