

## THE U. S. FERTILIZER SITUATION AND OUTLOOK

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In 1972 after several years of acute oversupply in the U.S., the supply of fertilizer materials - primarily through increased foreign trade - regained a balance with demand. Now both farmers and the fertilizer industry are being called upon to increase production levels in order to meet the increased world demand for food and the necessary fertilizers are in critically short supply. The purpose of this paper is to review the factors that have led to the current critical situation and to suggest possible paths the U.S. market will take in the next few years.

For more than two decades the full productive capacity of U.S. agriculture has been held in check. This was achieved intentionally through a combination of government sponsored acreage control and price support programs. During this period many farmers left the land while those that remained developed new skills and adopted new technology, and made large investments in land and machinery. They have assembled a combination of capital, technical skills, and mechanization that by 1972 (still operating under acreage controls) enabled each farmer to produce enough food to meet his needs and those of the nation.

At present, less than 5% of the population in the U.S. is engaged in food production and it is generally agreed that the real ability of the U.S. farmer to produce food is still unknown.

The situation now facing the U.S. farmer is unique. For the first time in nearly 25 years the Government, the general public, and for that matter, certain parts of the world are asking that he turn the full might of his skills toward growing as much food as possible. As a consequence the farmer is demanding increased supplies of all inputs while the fertilizer industry is in the midst of a severe short supply situation.

Domestic demand for fertilizer has increased substantially as a result of USDA actions eliminating set aside acreage requirements for wheat, feed grains, and cotton in 1974. This releases about 19 million acres for production which, along with other shifts, will likely result in increases of from 5 to 10 million acres for both wheat and feed grains. In addition to expanded acreages, farmers will increase their rate of application in response to higher expected prices for their output.

On the supply side government enforced price controls removed the incentive for expanding fertilizer production for the domestic market. Even though inventories this summer were nearly exhausted, price controls, based on a relatively unprofitable base period, remained on fertilizers. With the domestic price ceiling the export price for fertilizer was about 30% above the domestic price limits thus encouraging export shipments.

The unprecedented shift in world demand for U.S. fertilizer products is primarily a result of efforts to expand food production abroad. Also, recent devaluations of the U.S. dollar have had the effect of making U.S. products about 20 to 30 percent cheaper as viewed by foreign customers. These factors created an increase in export demand even though export prices for some products more than doubled in the last few months.

In addition, by the late 1960's, the fertilizer industry had over-built production plants and the resulting oversupply depressed prices to disastrously low levels. With little or no incentive for expansion, the industry almost stopped all plant and equipment expansion. So it has been dramatic changes on both the supply and demand side that have created the shortage situation.

As producers try to evaluate their future plans for expansion, several new unknowns must be considered. New pollution control laws and environmental controls will limit

operations in older plants and add substantially to investment and operating costs of new plants. Secondly, there is a shortage of the raw materials needed for fertilizer production. Natural gas, the basis of most of the world's nitrogen fertilizers is in short supply and future supply-demand forecasts are not optimistic. Phosphate rock expansions require new, large, complex equipment which will take time to be delivered and put in operation, thus this vital raw material cannot be made available at a pace necessary to keep up with the demand for fertilizers.

It is with this background of events that the following analysis of the future supply level for the three primary plant nutrients is presented. Discussion will center first on the long term outlook and second on the short term situation as producers respond to recent policy decisions of the U.S. Government.

#### NITROGEN

During the middle 1960's ammonia production in the U.S. kept pace with capacity levels, and the industry was able to maintain an average operating rate of over 85% of capacity. By 1966, however, as production from new large-scale plants began to hit the market, operating rates declined to as low as 76% in 1969. Even with this relatively poor performance, which led to the closing of many small units, inventory levels continued to grow. Not until 1969, when a foreign trade surplus of over 900,000 tons was achieved did the situation begin to improve.

Since 1969, demand has been catching up to potential supply, the trade balance has declined and the industry last year returned to an 86% level of operation. It appears that in 1973 producers will exceed this level as they attempt to meet both a strong domestic demand and a relatively high level of export demand.

For 1973 it is estimated that total nitrogen production capacity will reach 13.8 million short tons of N. Total use and net exports will exceed 12.1 million, an operating level of 87%. With this level of operation, however, net exports will be only 288,000 short tons compared to the high of 904,000 in 1969. By 1975 only a 5% increase in total capacity is anticipated as opposed to a 17% gain in demand. As a result the U.S. is moving rapidly toward becoming a net nitrogen importer with a net import requirement of over 600,000 tons N for 1975. For the remainder of the decade more capacity is needed just to meet the growing domestic demand. With the lack of adequate feedstock supply it appears that the U.S. will not be in a position to contribute to expanded world trade in nitrogen fertilizers.

To indicate the supply situation for the remainder of this decade, two levels of operation were selected and the supply demand position and the trade level needed to keep the market in balance were calculated. The two levels selected were 90% and 80% of total capacity. The 80% level was included to show the effect on supply if a 10% reduction in production should occur because of short feedstock supplies

These market forecasts are shown in Table 1. It compares the assumed total supply level under the two levels of operation to the total demand. It is found that at the 90% operating rate, we will not meet domestic demand after 1973 and that increased imports will be needed. With no new plant construction after 1975 and with the 90% rate, by 1980 a trade deficit of over 4 million tons is indicated. If the U.S. were to rely on imports to this extent, the trade deficit would exceed 30% of total production well above any previous trade deficits that have occurred in the U.S. nitrogen industry

Any future curtailment of production to as low as the 80% level would mean sharp increases in imports if the demand projections are realized. By 1975 imports would be almost 18% of demand and could reach almost 50% by 1980.

Table 1. The U.S. Nitrogen Situation and Future Supplies

Fiscal year	Total ammonia capacity	Total ammonia production	Average operating rate	Other demand <sup>a</sup>	Fertilizer demand	Net trade or calculated trade balance
1972 <sup>b</sup>	13,783	11,753	85	3,200	8,016	189
1973 <sup>b</sup>	13,848	11,900	86	3,360	8,500	288
		Forecast supply level 1				
1974	14,295	12,866	90	3,600	9,471	-205
1975	14,661	13,195	90	3,820	9,980	-605
1980	14,661	13,195	90	4,800	12,523	-4,128
		Forecast supply level 2				
1974	14,295	11,436	80	3,600	9,471	-1,635
1975	14,661	11,729	80	3,820	9,980	-2,071
1980	14,661	11,729	80	4,800	12,523	-5,594

<sup>a</sup>Adjusted for net change in producers stocks. Includes industrial uses, processing losses, and the net change in unreported field inventory levels.

<sup>b</sup>Preliminary.

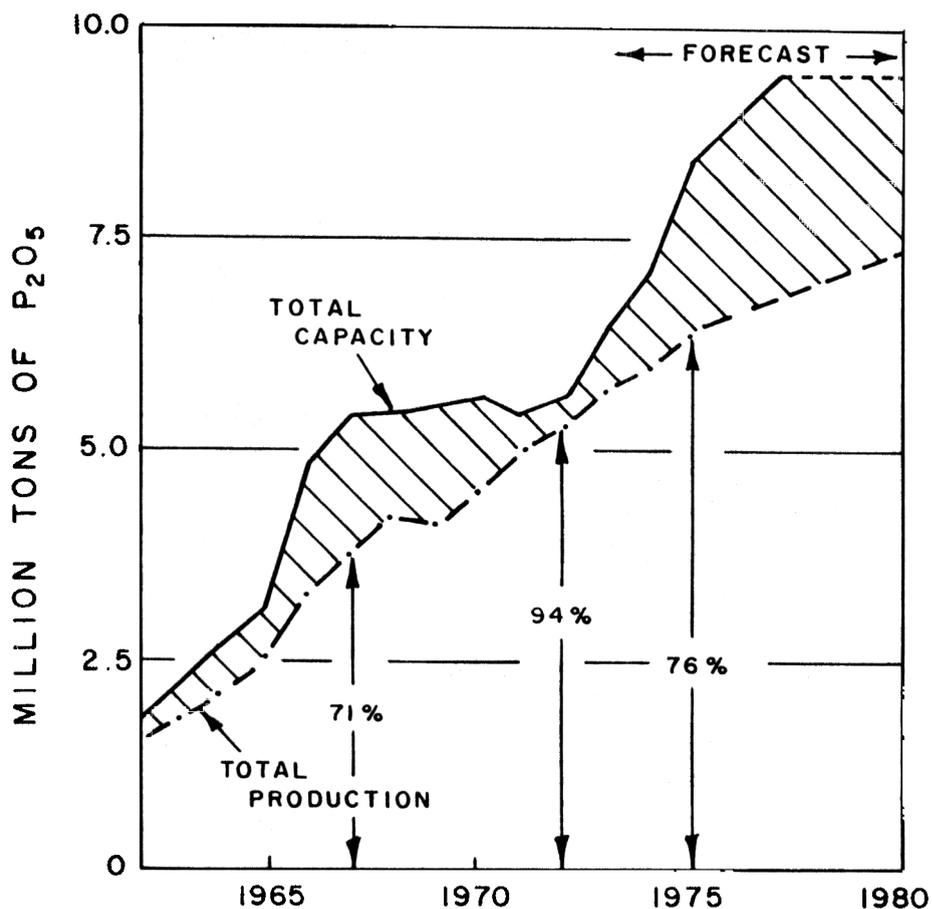
It is not to be implied that this level of nitrogen imports is suggested for the U.S. There is a strong argument for not allowing this country to reach these levels of dependency for a product vital to our nation's agriculture. The potential trade deficits are shown to indicate the need for additional ammonia capacity beyond that which has now been announced.

#### Phosphate

The U.S. is the major world supplier of phosphate fertilizers and recent capacity announcements for the next few years indicate that it will retain this position. Total supply capability for the U.S. by 1975 could exceed 7.7 million tons of  $P_2O_5$  while demand is expected to be about 6.7 million tons. This allows the nation to meet domestic demand increases and to maintain its estimated 1973 level of export of almost 1.2 million tons  $P_2O_5$  for the next few years even with the operating levels at only 80% of total phosphoric acid capacity.

Two conclusions becomes apparent if the large-scale increase in capacity comes into production as scheduled. If plants are to continue to operate at 90% of capacity or better, the U.S. will need to double its trade balance between now and 1975. Or, without the increased trade levels, reductions in operating rates or plant closures will occur. Any decline in our trade balance or domestic demand growth will bring rates of operation down just that much faster.

While figure 1 indicates pending market chaos for the phosphate industry, forces are at work which could make this an orderly expansion. This is especially true if more attention is paid to construction scheduling and if the forces of supply, demand and price are allowed to function properly. Among these factors are stricter pollution controls which may force closure of older plants. Phosphate rock production is not now adequate to supply all of the new phosphate plants and to expand exports. Rock prices are up and the price at which phosphate rock is available has a direct bearing on the number of  $P_2O_5$  producers and their level of production. About 10 million tons of new mining capacity would be needed to supply these new units; yet rock producers are faced with meeting this growing market under more stringent circumstances. Environmental restrictions, competition for land for other uses, and lower  $P_2O_5$  content of the rock reserve all lead to increased rock prices and some difficulty in obtaining needed supplies for several years.



U. S. PHOSPHORIC ACID CAPACITY AND SUPPLY LEVEL  
(EXPORTS AT 5 MILLION TONS P<sub>2</sub>O<sub>5</sub>)

Still another factor that could, in the long term, help to keep the phosphate expansion in bounds is on the demand side. Economic pressures continue for the substitution of wet-process phosphoric acid for thermal acid in the industrial use market. By 1980, with some improved technology, there could be a significant tonnage of wet-process acid moving into industrial markets.

One result of the tight supply of phosphoric acid supply in the U.S. has been a curtailment in the growth of liquid mixed fertilizers. After increasing from less than 100,000 tons of P<sub>2</sub>O<sub>5</sub> in 1962 to almost 490,000 in 1972--a growth rate of almost 20 percent per year--it appears that the short supply of superphosphoric acid will limit further increases for several years. The effects of this reduced supply were felt last year when only 17,000 tons of additional P<sub>2</sub>O<sub>5</sub> was distributed as liquids, compared to 55,000 tons the previous year.

Two factors have contributed to the shortage of supplies for liquid mixtures. High quality phosphoric acid, normally supplied from thermal phosphoric acid producers has been going to the industrial market and no excess has been available for fertilizers. Secondly, the new superphosphoric acid capacity that was scheduled to begin operation this year has experienced start-up difficulty and poor levels of operation. It may take several years to correct those problems making it 1975 before supplies will again be adequate and liquids can continue their rapid increase in their share of the mixed fertilizer market.

It is possible that the rush of new capacity scheduled in the U.S. may lead to an oversupply position once again, especially if trade levels are not maintained because of stockpiling by importing countries or construction of new plants. This could delay additional capacity, result in some plants closing down and bring about an orderly expansion through the decade.

### Potash

With total North American potash capacity more than twice the domestic demand it appears that some form of controls will continue to be in force for some time until domestic demand can catch up and orderly expansion of export markets can take place. With little question of capacity being available during the time period covered, the main interest is in what should happen to the operating level of Canadian plants.

It is apparent that there must be a constant review of the quota system if supplies are to remain adequate. North America exports about 1.5 million tons of  $K_2O$  each year.

Expansion of trade to the two-million-ton-level would bring the operating rate up to 60% next year and to 70% of capacity by 1975. With a steady expansion in world potash use and little in the way of capacity additions, prospects for improvement in the level of operation of Canadian production facilities appear promising as North America continues to grow in importance in the world potash market.

### Current Situation Review

In the short term, two factors in the search for additional supplies must be considered. First is the inventory position and second is the price relationship between domestic and foreign markets.

U. S. inventories at the end of the 1973 fertilizer year were at an all time low level. Nitrogen product inventory was at only 40% of an average monthly production rate and stocks of ammonia are at 50% of the same production index. There is no surplus inventory of nitrogen to meet the additional demand. In fact with the logistics problems that are foreseen there is a need for a buildup in stocks if spring shipments are not to be completely chaotic.

Because of the slower demand growth rate inventory problems and supply levels for phosphates are not as critical as those for nitrogen. But the phosphate industry is faced with the same problems. Stocks are well below the normal level for this time of year and need to be replenished if logistical problems are to be avoided.

In the past few years there have been high inventory levels hanging over the North American potash industry. This year, for a variety of reasons, these stocks are no longer a depressing factor in the market. Stocks are down 30% from last year and certain products face critical shortages. In all three nutrients it is now apparent that any minor miscalculation of the market could leave the farmer without the needed fertilizer supplies.

On October 25, 1973, the decision was made to lift all price controls on fertilizer materials in order to encourage the fertilizer industry to increase supplies of plant nutrients to the American farmer. Projections for a 4-million-ton fertilizer deficit in 1974, plus the increasingly heavy export drain on U.S. production, were the principal factors in the decision to allow upward adjustments of domestic fertilizer prices so that U.S. farmers can compete for products at world market levels. Supply would have been short of needs in many areas because of the nearly 20% increase in U.S. demand since 1970, and the heavy world demand for U.S. products over the past eighteen months.

U.S. industry must sell first on the domestic market but has been discouraged by break-even price controls on U.S. sales compared with more profitable exports. The free market situation now will allow suppliers to serve the domestic market in which they have made a larger investment and have devoted the bulk of their marketing efforts.

In view of the lifting of price controls the U.S. fertilizer industry will respond by making more materials available in the domestic market. They will sell at least an additional 350,000 tons of the major fertilizer materials during the rest of this year and

over 1.1 million tons during the remainder of the fertilizer year. There will be an all out effort to provide an adequate supply of fertilizer.

Higher price levels will mean the continued operation of marginally productive plants and the possible reopening of some production facilities. Also, it can be anticipated that fertilizer firms will undertake construction of new facilities and speed up current construction programs. With the Government attempting to raise priorities on natural gas feedstocks, an increase in operating rates of ammonia plants can be expected, thus adding to nitrogen supplies. With new economic incentives, additional production and capacity should be anticipated.

Higher prices should relieve some of the supply shortages in the short term but supplies will remain tight. The recent action of the U.S. government can help to insure adequate supplies for the longer term if the forces of supply and demand are allowed to operate and producers are allowed to evaluate true market conditions and formulate their plans accordingly.

Short supplies of fertilizer materials and raw materials are not the only problems facing the fertilizer industry. Even if adequate amounts of fertilizers can be produced to meet the increased demand, producers and distributors still face the task of getting these materials to the market. Logistical problems could be greater than last year when the large overseas grain shipments tied up all available rail cars at the ports leaving producers with no equipment to meet shipping schedules. In an attempt to remedy this situation the government, in addition to monitoring fertilizer supplies and exports, has also set up a weekly reporting system to determine the status of transportation equipment used by the fertilizer industry.

In the past there has been little coordination of all of the activities that are needed to ensure that the farmer receives his fertilizer at the right time. The current supply shortage has pointed out the need for increased cooperation and coordination of all phases of the distribution system if the more than forty million tons of product used annually by the farmer is to reach its destination. In recent years there have been many technical advances made by the industry but in the future increased efficiency of the distribution and marketing system for fertilizers will be the key to maintaining adequate supply levels.

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