PHOSPHATE ROCK

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Phosphorus is an essential element for plant and animal nutrition. Most phosphorus is consumed as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers used on food crops throughout the world. Phosphate rock minerals are the only significant global resources of phosphorus.

The United States is the world's leading producer and consumer of phosphate rock, which is used to manufacture phosphate fertilizers and industrial products for domestic use and export. In 1996, 10 companies operated 18 phosphate rock mines. More than 90% of the phosphate rock mined was used to produce chemical fertilizers, and in 1996, production increased for the third consecutive year. Companies in Florida and North Carolina produced about 86% of the marketable phosphate rock mined in the United States and processed most of the refined mineral in fertilizer upgrading facilities. The average value of marketable phosphate rock increased by 8% from that of 1995.

Phosphate rock also is produced in the Western States of Idaho and Utah where the mineral was upgraded into high-analysis phosphate fertilizers and elemental phosphorus (P_4), which is used to produce downstream industrial products. Idaho and Montana produced most of the P_4 consumed domestically and exported from the United States.

In the United States, marketable phosphate rock production and consumption each increased by about 4%. U.S. phosphate rock sold or used by producers was 43.5 million metric tons, which is equivalent to 85% of effective industry capacity. *(See tables 1 and 2.)* The U.S. Department of Commerce reports that wet-process phosphoric acid (WPPA) production was 11.9 million tons as available phosphorus pentoxide (P_2O_5), which represented an industry operating rate of nearly 100% (U.S. Department of Commerce, 1997). The United States accounted for more than 55% of global interregional converted phosphate P_2O_5 trade in order of importance—ammonium phosphates [diammonium phosphate (DAP) and monoammonium phosphate (MAP)], granular triple superphosphate (TSP), and WPPA.

Legislation and Government Programs

The Federal Agriculture and Improvement Reform (FAIR) Act, Public Law 104-127, also known as the Freedom to Farm Act, was passed into law and signed by the President of the United States on April 4, 1996. Because the phosphate rock industry is so heavily dependent on the production and sales of phosphate fertilizers, any changes in U.S. farm legislation are watched closely by phosphate producers. The law contains nine sections, but the major provisions that have the greatest potential impacts for the fertilizer industry can be summarized briefly. The most pertinent portions of the law are Title I—Agricultural Market Transition Act and Title III—Conservation.

Title I.—This portion of the new law changes the way income-support payments to farmers are determined. In the past, these deficiency payments were based on the difference between actual market prices and target prices during a specific time period or the price-support loan rates, whichever were higher. FAIR eliminates the link between market prices and income-support payments, and payments are based on the number of acres covered by income support contracts and a predetermined per-unit payment rate now determined annually by the U.S. Department of Agriculture (USDA). Total contract payments are set for each year specified in the plan and will decrease annually for the following 7 years, which is the period covered under FAIR; payment caps for individual farmers were reduced from $50,000 per person to $40,000 per person. Coupled with the changes to the way deficiency payments are determined is the new flexibility that allows farmers to plant contract acreage with any crop of their choosing, except fruits and vegetables; in the past, farmers could only plant the crop specified in the contract to receive payment. This provision could affect the fertilizer industry because different crops have different nutrient requirements, which would possibly alter the patterns of fertilizer applications throughout the country. Acreage Reduction Programs, which limited the number of acres that contract participants could plant with a specified crop, were eliminated. Opinions on how or if these changes will affect the consumption of phosphate fertilizers are mixed; much depends on what crops are actually planted. For the most part, phosphate producers expect positive growth, but it may take several years under the program to define new consumption patterns.

Title III.—Changes to the conservation provisions of 1990 Farm Bill are also expected to affect the phosphate industry. Previous farm legislation had allowed annual rental payments to farmers who entered a contract to withhold voluntarily environmentally sensitive land from agricultural production under the Conservation Reserve Program (CRP). The number of hectares that could be enrolled in CRP was limited to 15.4 million. FAIR reduced the cap to 14.7 million hectares and allowed for CRP land that meets USDA requirements to be withdrawn from CRP and to be enrolled in production flexibility contracts. New acreage could be enrolled in CRP, but the criteria were more stringent. At a minimum, Title III will return 650,000 hectares to production; increased acreage, however, may be much more, perhaps as much as one-half of CRP hectares (Green Markets, 1996e). This would have a positive

impact on the fertilizer industry. Any acreage returned to production would require additional fertilizer inputs, increasing fertilizer consumption and benefiting the phosphate industry.

Production

Consolidation of the fertilizer industry that began in 1995 continued in 1996. In March, IMC Global Co. merged with Vigoro Corp. IMC Global, which manufactures potash and phosphate, acquired Vigoro's potash and nitrogen businesses, as well as a retail business. In September, Potash Corp. of Saskatchewan (PCS) announced plans to acquire Arcadian Corp., a nitrogen producer. This acquisition would make PCS a producer of all three major fertilizer elements—potassium, phosphorus, and nitrogen. The shareholders' final vote on the merger was scheduled for January 1997. In December, Canadian producer Agrium Inc. acquired Viridian Inc. for an estimated $887 million. Although Agrium already produced all three fertilizer nutrients, it increased its nitrogen production by acquiring Viridian (Kirschner, 1997).

Southern States.—In Florida, phosphate rock was mined and processed by six producers—Cargill Fertilizer, Inc.; CF Industries, Inc.; IMC-Agrico Co.; Mobil Mining and Minerals Corp.; PCS; and U.S. Agri-Chemicals Corp. Their mines and plants were located in Hamilton, Hardee, Hillsborough, and Polk Counties. Nu-Gulf Industries' Wingate Creek Mine and the associated Mulberry Phosphates Inc., Piney Point ammonium phosphate conversion plant in Manatee County were idle. Farmland Industries, Inc.-Norsk Hydro, L.P., and Mulberry Phosphates operated WPPA and ammonium phosphate plants at Green Bay and Bartow, respectively, using phosphate rock purchased domestically as feed.

In January, Mobil Mining and Minerals sold its South Fort Meade, FL, mining operations to Cargill Fertilizer Inc. for $283 million. The beneficiation plant at the operation was designed to process 3.6 million tons per year of rock; rock reserves were estimated to be 104 million tons. Mobil also announced plans to sell its Nichols Mine to Nichols Phosphate Acquisitions Corp. (NPAC); NPAC's name was changed later to Agrifos L.L.C. The acquisition also included about 4,000 hectares of phosphate reserves in Polk County and a phosphate rock processing and drying plant and related equipment. Rock production capacity at the mine was estimated to be 1.36 million tons per year. NPAC agreed to a long-term tolling arrangement with Mobil to upgrade Nichols rock to DAP and MAP (Green Markets, 1996n). As a result of Mobil's exit from the phosphate rock market, PhosRock, the association established in 1970 to market phosphate rock overseas for U.S. producers, officially was dissolved on January 1, 1996.

Increased DAP inventories and seasonal downturns led IMC-Agrico to reduce production or close temporarily some of its DAP plants. Its 900,000-ton-per-year DAP plant in Taft, LA, was temporarily shut down between March 11 and July 22, when IMC-Agrico entered into a sales arrangement to ship 150,000 tons of DAP to China during the second half of 1996 (Green Markets, 1996l). The Taft plant was reidled on September 27 because of a drop in domestic phosphate demand (Green Markets, 1996k). The company also ran its New Wales, FL, facility at 80% of its 2.7-million-ton-per-year capacity from April 18 to July 1, when it resumed full production capacity. The Nichols DAP plant, with an annual capacity of 545,000 tons, was shut down temporarily on May 14; at yearend, the plant remained idle (Green Markets, 1996h).

IMC-Agrico announced that it will end phosphate rock supply contracts with overseas customers when the current contracts expire in July 1997. The company, which has been using its own production to supply rock needs at its chemical operations, is sensitive to finite reserves and wants to limit sales to the merchant market to ensure adequate internal supplies (Green Markets, 1996m).

U.S. Agri-Chemicals, a subsidiary of China's Sinochem, completed a 450,000-ton-per-year MAP powder plant in Ft. Meade, which will enable it to use all the phosphoric acid it produces. The powdered MAP will be sent to Sinochem Fertilizer Co. Ltd.'s Nanjang, China, facility where it will be converted to NPK fertilizers. U.S. Agri-Chemicals had been selling its excess phosphoric acid to Cargill Fertilizer's plant in Bartow, where it was converted to DAP (Green Markets, 1996u).

IMC-Agrico purchased 9,700 hectares of land from Consolidated Minerals Inc. for approximately $31 million. This land in southeastern Manatee County and northwestern DeSoto County is estimated to contain about 91 million tons of phosphate rock reserves, averaging 67% bone phosphate of lime. The purchase brings IMC-Agrico's Florida phosphate rock reserves to about 450 million tons (Green Markets, 1996g).

Rhône-Poulenc S.A. invested about $2 million to upgrade its high-purity phosphoric acid plant near Nashville, TN. With the investment, the company plans to produce an ultrapure phosphoric acid to meet semiconductor standards (North American Mineral News, 1996).

Western States.—In Utah, Simplot-Farmland Phosphates Ltd. Co., a joint venture between J. R. Simplot and Farmland Industries, Inc., operated a major mining and phosphate rock benefication facility at Vernal, which supplied its phosphate fertilizer production plant at Rock Springs, WY.

In Idaho, five firms mined or processed phosphate rock, either for the production of P_4 in electric furnaces for industrial applications or for conversion to WPPA and finished phosphate fertilizers. Three producers conducted open pit mining from the Phosphoria Formation in Caribou County, producing phosphate rock as feedstock for P_4 furnaces. FMC Corp. operated the Dry Valley Mine, Caribou County, on Federal and private leases to provide feedstock for P_4 production at Pocatello. The Monsanto Co. produced phosphate rock from the Enoch Valley Mine in the Caribou National Forest for P_4 production at Soda Springs. Rhône-Poulenc Basic Chemicals Co. produced phosphate rock from the Rasmussen Ridge Mine in the Caribou National Forest for P_4 manufacture at Silver Bow, MT, and domestic sales.

Environment

Mulberry Phosphates received consent orders proposed by the Florida Department of Environmental Protection covering the firm's phosphogypsum stacks at Mulberry and Piney Point. At yearend, the company also was finalizing plans to restart production at its DAP plant in Piney Point by late 1997; the plant has been closed since 1992. Production of 500,000 tons per year of DAP is expected when the plant reopens. Rock for the plant will be supplied by Mulberry's Wingate Creek Mine, which will be reopened about 1 month before the DAP plant. Mulberry signed a letter of intent with Monsanto Envirochem to refurbish the sulfuric acid plant that will be needed to feed the DAP operation. Estimated cost for the restart is $35 million (Fertilizer Week, 1996d).

In response to a petition from The Fertilizer Institute, the U.S. Environmental Protection Agency (EPA) reconsidered a June 3, 1992, final rule revising the National Emission Standard for Radon Emissions from Phosphogypsum Stacks. The EPA proposed a rule to amend research and development regulations that would make it easier for researchers to use phosphogypsum in laboratory and field test settings and to change the methodology used to establish average radium-226 concentrations for a phosphogypsum stack. After a hearing on August 1, the comment period on the proposed regulations was extended to August 31 (U.S. Environmental Protection Agency, 1996).

Consumption

In 1996, U.S. apparent domestic consumption of phosphate rock increased by about 3% compared with that of 1995. About 94% of the total was consumed in the manufacture of 11.9 million tons P_2O_5 WPPA for downstream fertilizer, animal feed derivatives, and purified WPPA for industrial applications. The balance was used to produce P_4 for industrial applications, including detergent and food additives, water- and metal-treatment chemicals, plasticizers, pesticides, vitamins, soft drinks, toothpaste, photographic film, light bulbs, bone china, flame-resistant fabrics, optical glass, and other consumer goods. *(See tables 3 and 4.)*

Stocks

Although producers' yearend stocks increased about 12% from the 1995 level, they remained equivalent to almost 2 months of production, the same production level as that of 1995.

Transportation

In Florida, beneficiated phosphate rock was moved by rail and truck to phosphate upgrading facilities. Phosphate rock and finished phosphate materials were railed to ports at Tampa and Jacksonville, and then were shipped elsewhere for domestic use or exported. Finished phosphate fertilizers and phosphate rock were barged north on the Mississippi River and other major tributaries for domestic consumption and were also transported inland by rail and truck.

In North Carolina, PCS barged phosphate rock and finished products to the port at Morehead City for export and domestic shipment. Rail facilities also were utilized extensively for transport.

Western producers moved phosphate rock from mines to plants by rail, truck, and slurry pipeline. Finished product was moved predominately by rail and truck.

Prices

The weighted average value for marketable phosphate rock in 1996 was $23.40 per ton, f.o.b. mine. This was an increase of almost 8% from the 1995 value. *(See table 5.)*

Foreign Trade

Exports of phosphate rock decreased by 47% from the 1995 level primarily because of IMC-Agrico's decision to stop exporting the material. About 77% of rock exports was shipped to Asia (India, Japan, and the Republic of Korea), and 13% was shipped to Oceania (Australia and New Zealand).

The United States was the third largest importer of phosphate rock from Morocco, with nearly 1.7 million tons in 1996, a decrease from that in 1995. Arcadian and Mississippi Phosphates Corp. used Moroccan phosphate rock in phosphate conversion plants at Geismar, LA, on the Mississippi River, and at Pascagoula, MS, on the U.S. Gulf Coast. Arcadian also used imported ore as feedstock for a purified industrial-grade WPPA plant at Geismar that it operates on behalf of Rhône-Poulenc.

U.S. converted phosphate trade in 1996 appeared to show a significant decrease because of a drop in exports of DAP, particularly to China and India. These DAP exports are believed to be understated and are being investigated by the Bureau of the Census. According to data from the International Fertilizer Industry Association, 1996 U.S. DAP export shipments were 76% of the global total; MAP, 90%; TSP, 48%; and merchant-grade WPPA, 11%. *(See tables 6, 7, 8, 9, 10, 11, and 12.)*

World Review

World phosphate rock production was about 133 million tons in 1996, a slight increase compared with that of 1995. Phosphate rock was produced in about 40 countries; the United States was the largest, with about 34% of total production, followed by China, Morocco, and Russia.

Production in the Middle East was at 98% of total capacity, the highest utilization rate of any geographic region. Capacity utilization in the United States was 89%; Latin America, 85%; Asia, 81%; Africa, 78%; and Europe and Oceania, less than 50% each. *(See tables 13 and 14.)*

Australia.—WMC Fertilizers Ltd., a subsidiary of Western Mining Corp., plans to mine a phosphate deposit in Queensland

and to upgrade the mined rock into 1 million tons per year of DAP and MAP. Reserves at the Phosphate Hill deposit were reported to contain 2 billion tons of phosphate rock, with mining reserves of 103 million tons; average grade of the rock is 23% P_2O_5. The company also plans to construct a new sulfuric acid plant, an ammonia plant, a phosphoric acid plant, and a granulation plant. Plant construction is expected to begin by the third quarter of 1997, with fertilizer production to begin in 1999. Most of the output will be used locally; some will be exported to Southeast Asia (Green Markets, 1996v). An initial production level of 750,000 tons per year of DAP/MAP is expected.

Brazil.—Since the Government privatized the fertilizer products industry in the early 1990's, production of almost all fertilizer products has been controlled by a small number of companies. Several acquisitions in 1996 reinforced this control. Serrana S.A. reportedly purchased 51% of Fertisul, a fertilizer producer, for an estimated $22 million. Serrana and Fertisul already operate two companies—Arafertil and Ipiranga-Serrana—through 50-50 joint ownership; Serrana will assume full control of these operations. Arafertil has an annual capacity of 800,000 tons of phosphate rock and 750,000 tons of single superphosphate (SSP). Ipiranga-Serrana has a 1.2-million-ton-per-year capacity to produce blended fertilizers. After the acquisition, Serrana will have control of 30% of Brazil's phosphate rock production, 20% of its phosphoric acid production, 20% of its MAP production, 15% of its SSP/TSP production, and 10% of its blended fertilizer production (Fertilizer Markets, 1996f). Two companies in the Fertifos Group—Fertiza and Fertibras—purchased Adubos Trevo AS's SSP/TSP plant in Cubatao, Sao Paulo, for $8 million. The plant, which has an annual capacity of 130,000 tons of SSP/TSP, also can granulate 650 tons per day of product. This purchase will enable Fertiza and Fertibras to expand production. The Cubatao plant had been closed since 1995 because of Adubos Trevo's financial difficulties (Fertilizer Markets, 1996a).

The Fertifos Group announced plans to invest $80 million to expand capacity at its Fosfertil and Ultrafertil subsidiaries. A 200,000-ton per-year P_2O_5 phosphoric acid plant and a 500,000-ton-per-year sulfuric acid plant will be constructed at Fosfertil's Uberaba, Minas Gerais, complex by the second half of 1997. Estimated cost for these plants is $55 million. The phosphoric acid plant is scheduled to be run initially at 40% of capacity; capacity would be increased depending on market conditions. Phosphoric acid will feed Fosfertil's MAP/TSP granulation complex, which has been operating at 80% of its 1-million-ton-per-year capacity because of short phosphoric acid supply. The additional MAP/TSP produced is targeted for competition with imported material in the domestic market (Fertilizer Markets, 1996b).

Canada.—In October, Agrium and Viridian agreed to merge in a stock exchange deal, creating a company worth about $2 billion. The merger will require regulatory approval by the United States and Canada before it is finalized. Each of the two companies is estimated to have a 25% share of the fertilizer market in western Canada, and Viridian is estimated to have a less-than 5% share of the U.S. market. Both firms have ammonia and urea production facilities in Canada, Agrium has a 499,000-ton-per-year DAP facility, and Viridian operates a 300,000-ton-per-year phosphoric acid plant (Fertilizer Week, 1996a).

Earth Sciences Inc. expects to begin producing purified phosphates at a new 16,300-ton-per-year plant in Calgary, Alberta, by early 1997. The permits to build and operate the facility have been received, and the company is negotiating to purchase 11,800 tons per year P_2O_5 of super phosphoric acid to upgrade. The purified product will be made into 75% white acid for industrial uses (Green Markets, 1996b).

China.—IMC-Agrico announced that it signed an exclusive letter of intent with the Yunnan Phosphorus Chemical Industry (Group) Corp. and the Yunnan Provincial Petroleum & Chemical Industry Bureau to study phosphate ore resources in the Yunnan Province. If commercially feasible, IMC-Agrico and the Chinese concerns plan to develop the deposits jointly (Green Markets, 1996i).

The Yunnan Phosphate Fertilizer Industrial Co. began operations at a new 140,000-ton-per-year P_2O_5 phosphoric acid plant and a 400,000-ton-per-year TSP plant in Kunming, Yunnan Province, in the third quarter of 1996. The phosphoric acid plant uses a two-stage thermal acid process with elemental phosphorus produced in the first stage and phosphoric acid independently produced in the second stage. The TSP plant uses the slurry process to produce a 46% P_2O_5 product (Phosphorus & Potassium, 1996d).

The Canadian firm Spur Ventures Inc. reportedly signed a preliminary agreement with Yuanyi Phosphorus Chemical Industries Group Co. to develop a phosphate rock deposit in Hubei Province. The Yichang deposit reported proven and probable reserves of 396 million tons, with an average P_2O_5 content of 23%. Preliminary plans are to mine 2.5 million tons per year of rock and to construct a 500,000-ton-per-year DAP plant near Yichang City. Capital costs for the mining operation were estimated to be $138 million, and capital costs for the DAP plant were estimated to be $260 million. Spur estimated operating costs to be $12 per ton for mining and $130 per ton for DAP production. All the production was targeted for the Chinese market (Green Markets, 1996a).

In December, IMC-Agrico reported that it reached a new 2-year DAP supply contract with Sinochem that covers the 1997 and 1998 calendar years. Shipment volumes for the 2 years will be approximately the same as those in 1996, and monthly shipments will reflect market prices at the time of shipment. This is the first contract of this time length for U.S. exports (Green Markets, 1996j).

India.—One of the largest DAP producers in India, Godavari Fertilisers and Chemicals Ltd., announced that it would switch from production of DAP to complex fertilizers principally because high prices of DAP in India have led to large inventories. The company had been in the process of increasing DAP capacity from 300,000 tons per year to 450,000 tons per year; this increase will be used for complex fertilizer

production instead (Green Markets, 1996f).

The Spanish firm Incro S.A. was awarded a contract to upgrade Fertilisers & Chemicals Travancore Ltd.'s DAP/NPK plant in Cochin. The upgrading was expected to increase annual capacity to 400,000 to 450,000 tons. Startup was scheduled for 1997 (Green Markets, 1996d).

Indonesia.—PT Istana Kanematsu opened a new phosphate fertilizer plant in Ciamis, West Java, in October. The new plant, which will supply fertilizers for peat farming lands, has an annual capacity of between 600,000 and 720,000 tons of ground phosphate rock and SSP. Cost of the plant was estimated to be $55 million. PT Istana Kanematsu is a joint-venture company owned by PT Elang Istanamas of Indonesia (60%) and Kanematsu Corp. of Japan (40%) (Fertilizer Week, 1996c).

Kazakstan.—In July, the U.S. trading company IBE Trade Corp. acquired management control over the Kara Tau phosphate complex with a 51% control of the shares of the complex. IBE has an option to purchase the shares after 10 years. The complex includes five phosphate rock mines, the Dzambul Superphosphate Works, and Nadphos, which is the phosphate producer in Novodzambul. IBE reportedly offered $92 million in investments over several years to improve the complex. The first phase would include replacing equipment, roads, and mills at the five phosphate rock mines. The second phase would include the construction of a new WPPA plant at the MAP/DAP facility.

Although the Kara Tau mines were shut down through most of 1995 because of lack of financing, they had been expected to produce up to 2.4 million tons of rock in the second half of 1996. Most of this rock is exported to Uzbekistan, and the MAP produced at the complex is shipped to China (Fertilizer Markets, 1996c). By the end of October, IBE had invested $23.6 million in the complex, and the complex produced more than 2 million tons of phosphate rock. Work to upgrade the Dzanbul superphosphate plant from an annual capacity of 180,000 tons of 42% P_2O_5 MAP to 300,000 tons of 46% P_2O_5 MAP was planned to begin in December (Fertilizer Week, 1996b).

Morocco.—Office Cherifien des Phosphates (OCP) reported exports of phosphate rock to be 10.1 million tons in 1996. Spain (18%), Mexico (17%), and the United States (17%) were the principal destinations.

OCP plans to invest $1.06 billion within 5 years to expand its operations. Expansions include phosphate rock and phosphate fertilizer production. Phosphate rock production will increase by 5 million tons per year to 25 million tons per year, of which 14 million tons per year is earmarked for domestic consumption. Annual phosphoric acid production is expected to increase from 2.6 to 3.2 million tons at the Safi and the Jorf Lasfar complexes. The construction of two new phosphoric acid plants at Jorf Lasfar by 2000 was planned in joint ventures with foreign partners; each plant has been designed to produce 1,000 tons per day (Green Markets, 1996p).

Construction of a new 120,000-ton-per-year phosphoric acid plant in Jorf Lasfar was agreed to at the end of February. The new plant, called Euro Maroc Phosphore (Emaphos) is a 50-50 joint venture between OCP and Belgium's Société Chimique Prayon-Rupel S.A.; construction is estimated to cost $50 million. Production is scheduled to begin in July 1997 (Green Markets, 1996c).

In November, OCP announced that it had obtained $12.8 million financing to construct a purified phosphoric acid plant about 200 kilometers south of Rabat. The project is a joint venture with the Belgian firm Recticel, and acid production for the industrial market is expected to begin in July 1997 (Fertilizer Markets, 1996d).

OCP entered into a 6-year agreement to supply France's Grande Paroisse with 600,000 tons per year of phosphate rock beginning on January 1, 1997. The rock will go toward production of phosphoric acid, and much of the acid produced will be returned to OCP (Green Markets, 1996r).

Pakistan.—Morocco's OCP entered into an agreement with Al Noor Fertilizer Industries Ltd. to build a $220 million fertilizer plant in the Sindh Province. Annual production capacity at the new plant will be 1,300 tons per day of DAP, 1,200 tons per day of urea, and 955 tons per day of ammonia. OCP will supply all the plant's phosphoric acid needs from Morocco. Scheduled startup for the operation is in early 1998 (Green Markets, 1996q).

Peru.—As part of its privatization, Peru's state mining company, Minero Peru, planned to sell its Bayovar phosphate deposits on February 11, 1997. The Bayovar deposits have estimated phosphate reserves of 262 million tons. At least 12 companies have expressed interest in the property. The eventual buyer will have 3.5 years to develop the deposits (Green Markets, 1996o).

Philippines.—The Philippine Government, which owns 50.01% of the Philippine Phosphate Fertilizer Corp. (Philphos), proposed a plan to foreclose on Philphos' assets and to form a new company that would be fully owned by the Government. This plan is opposed by the Government of Nauru, which owns the remaining 49.99% of Philphos. Although Philphos has some operating profits from 1995, the profits have been used to pay interest charges, and the company remains in debt as a result of peso depreciation, yen appreciation, and construction costs from the early 1980's. Although Philphos supplies 70% of the Philippines growing fertilizer needs, no decision on its fate had been reached by yearend (Phosphorus & Potassium, 1996a).

Russia.—Because of low demand from Former Soviet Union (FSU) phosphate producers, Apatit, Russia's largest phosphate rock producer, announced that it would close one of its two beneficiation plants on the Kola Peninsula on July 1, 1996, for an indefinite period. The two beneficiation plants were operating well below the combined 12-million-ton annual capacity before the closure, and energy costs in the region made operating the second plant at 50% of capacity prohibitive. Apatit also ended rock deliveries to some FSU MAP and DAP producers because of nonpayment for first half 1996 deliveries. Because Apatit intended to increase exports of phosphate rock to Norway, Finland, and Germany in 1997, it was dredging the Murmansk port to allow panamax vessels to operate (Fertilizer Markets, 1996e).

Saudi Arabia.—Sabic plans to construct an acids complex in Jubail. The complex will produce 250,000 tons per year of phosphoric acid, as well as sulfuric acid and aluminum fluoride. Plant construction was scheduled to begin in 1997, and was expected to be completed by 1999 (Green Markets, 1996s).

Senegal.—In September, Compagnie Sénégalese Des Phosphate de Taïba announced plans to merge with Industries Chimiques de Sénégal (ICS), its principal customer; the merger will be retroactive to January 1, 1996. The Senegalese Government would have 25% to 30% ownership in the new company, compared with the current ownership of 50% in Taïba and 37.5% in ICS. Taïba produces 1.5 million tons per year of phosphate rock, of which about 1 million tons per year is exported. The remainder is shipped to ICS' 385,000-ton-per-year P_2O_5 phosphoric acid plant. After the merger, the new company plans to increase annual mine production capacity to about 3 million tons, which would support a doubling of phosphoric acid production capacity (Phosphorus & Potassium, 1996b).

Togo.—The Togolese Government announced plans to sell 40% of its holdings in Office Togolais de Phosphates (OTP), the country's only producer of phosphate rock. A committee from the World Bank was assessing OTP's asset value, and an offer for the sale is expected to be made in March 1997. Production capacity at OTP's mine is estimated to be 3.4 million tons per year of rock, and all of the production is exported (Phosphorus & Potassium, 1996c).

Vietnam.—Japan's Tomen Corp. reportedly plans to build a 330,000-ton-per-year phosphate plant near Hanoi. The $180 million plant would be fed by domestic phosphate rock deposits and would be built as a joint venture with the Vietnam National Chemical Corp. (Green Markets, 1996t).

Outlook

U.S. and world annual capacity to mine and beneficiate phosphate ore into marketable phosphate rock continued to exceed domestic and world demand by an estimated 11% and 19%, respectively, in 1996. U.S. phosphoric acid output was very near usable capacity, and world phosphoric acid production was about 94% of available capacity. Fertilizer consumption and plant operating rates in the countries of the FSU remained well below the levels reported prior to the dissolution of the U.S.S.R.

Demand for phosphate rock in the United States is driven primarily by the fertilizer sector, which supplies North America's needs and is the major supplier to world markets; more than one-half the P_2O_5 in finished fertilizers manufactured in the United States is contained in exported materials. With the changes in U.S. farm policy and "Freedom to Farm," the expectation is that more acres will come into production beginning in 1997; the increase in area, however, is relatively small compared to the total. If export sales are maintained, then the expectation is that the U.S. phosphate industry should have results very similar to those of 1996 (that is, phosphate rock production and consumption of about 45 million tons and P_2O_5 in fertilizer sales in the United States of about 4.5 million tons and in exports of finished products of 5.2 million tons) through the remainder of the century. Exports of phosphate rock are expected to decline again in 1997, and the United States will be a net importer as long as the contracts for rock imports from Morocco remain in force.

On a global basis, new mining operations will probably come on-stream in the next 5 years in Australia and Saudi Arabia and possibly in China and Bolivia. An expansion in Morocco is also probable. The biggest mining question remaining is the future of operations on the Kola Peninsula in Russia and operations in Kazakstan, which continue to operate well below the output levels of the late 1980's. Some new fertilizer production capacity will probably be added in Africa, the Middle East, and Southeast Asia. Future fertilizer plant capacity utilization in the countries of the FSU is very uncertain.

Because of the nutritional needs of an expanding population, world fertilizer demand should also increase. The expectation is that world phosphate demand will grow by an estimated 1.2% to 1.5% annually through 2000. If many of the areas being farmed today received fertilizers for proper crop nutrition, then demand would increase substantially and the increased yields would allow a reduction in total acres planted.

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[1]Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1
SALIENT PHOSPHATE ROCK STATISTICS 1/

(Thousand metric tons and thousand dollars unless otherwise specified)

	1992	1993	1994	1995	1996
United States:					
Mine production (crude ore)	155,000	107,000	157,000	165,000	179,000
Marketable production	47,000	35,500	41,100	43,500	45,400
P2O5 content	14,100	10,700	12,100	12,800	13,300
Value	$1,060,000	$759,000	$869,000	$947,000	$1,060,000
Average per metric ton 2/	$22.53	$21.38	$21.14	$21.75	$23.40
Sold or used by producers 3/	45,100	40,100	43,900	43,700	43,500
P2O5 content	13,500	11,900	13,100	13,000	12,900
Value 4/	$1,020,000	$856,000	$929,000	$950,000	$1,020,000
Average, dollars per metric ton	$22.53	$21.38	$21.14	$21.75	$23.40
Exports 5/	3,720	3,200	2,800	2,990	1,570 6/
P2O5 content	1,200	1,020	886	875	NA
Value	$120,000	$91,200	$71,700	$78,300	NA
Average, dollars per metric ton	$32.29	$28.51	$25.60	$28.35	$35.82
Imports for consumption	1,530	534	620 7/	1,080 e/ 7/	1,800 e/ 7/
C.i.f. value	$56,200	$32,300	$30,200	$55,200 e/	$104,000 e/
Average, dollars per metric ton	$36.71	$60.45	$48.76	$51.01	$57.91
Consumption 8/	42,900	38,300	42,900 e/	42,000 e/	43,700 e/
Stocks, Dec. 31: Producers	12,600	9,220	5,980	5,710	6,390
World: Production	139,000	119,000	128,000	130,000 r/	133,000 e/

e/ Estimated. r/ Revised. NA Not available.

1/ Data are rounded to three significant digits.

2/ Average value based on the sold or used values.

3/ Includes domestic sales and exports.

4/ Total value of all domestic and export sales.

5/ Exports reported to the U.S. Geological Survey by companies.

6/ Source: Bureau of the Census.

7/ Some phosphate rock import tonnage and value were suppressed by the Bureau of the Census.

8/ Expressed as sold or used plus imports minus exports. Includes some estimated phosphate rock tonnage imported from Morocco not reported by the Bureau of the Census in 1994, 1995, and 1996.

TABLE 2
PRODUCTION OF PHOSPHATE ROCK IN THE UNITED STATES, BY REGION 1/

(Thousand metric tons and thousand dollars)

	Mine production (crude ore)		Marketable production			
			Beneficiated			Ending stocks, rock
Period/region	Rock	P2O5 content	Rock	P2O5 content	Value 2/	
1995	165,000	25,300	43,500	12,800	947,000	5,710
1996:						
January-June:						
Florida and North Carolina	84,600	11,900	19,900	5,890	464,000	4,730
Idaho and Utah	4,960	1,130	2,790	733	58,000	2,150
Total	89,500	13,100	22,700	6,630	522,000	6,880
July-December:						
Florida and North Carolina	85,100	9,740	19,300	5,680	464,000	4,700
Idaho and Utah	3,880	997	3,430	997	77,200	1,690
Total	89,000	10,700	22,700	6,680	541,000	6,390
Grand total	179,000	23,800	45,400	13,300	1,060,000	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Average value based on the sold or used values.

TABLE 3
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY GRADE AND REGION 1/

(Thousand metric tons and thousand dollars)

Period and grade (percent BPL 2/ content	U.S. total Rock	U.S. total P2O5 content	U.S. total Value 3/
January-June 1995	22,100	6,530	452,000
July-December 1995	21,600	6,440	498,000
Total	43,700	13,000	950,000
January-June 1996:			
66 to less than 70	13,900	4,200	310,000
60 to less than 66	5,520	1,560	118,000
Other 4/	1,800	559	58,100
Total	21,200	6,320	486,000
July-December 1996:			
66 to less than 70	W	W	W
60 to less than 66	18,600	5,460	439,000
Other 4/	3,780	1,150	92,600
Total	22,400	6,610	532,000
Grand total	43,500	12,900	1,020,000
Florida and North Carolina	38,100	11,300	902,000
Idaho and Utah	5,460	1,620	116,000

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ 1.0% BPL (bone phosphate of lime or tricalcium phosphate) = 0.458% P2O5.

3/ F.o.b. mine.

4/ Includes below 60 and 70 to greater than 74% BPL content.

TABLE 4
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY USE AND REGION 1/

(Thousand metric tons)

Period and use	Region: Florida and North Carolina Rock	Region: Florida and North Carolina P2O5 content	Region: Idaho and Utah Rock	Region: Idaho and Utah P2O5 content	United States: Total Rock	United States: Total P2O5 content
1995	38,100	11,400	5,620	1,600	43,700	13,000
1996:						
January-June:						
Domestic:						
Agricultural	17,600	5,270	1,530	442	19,100	5,720
Industrial	36	12	1,010	287	1,050	299
Subtotal	17,600	5,290	2,530	729	20,200	6,020
Exports: 2/	955	302	--	--	955	302
Total	18,600	5,590	2,530	729	21,200	6,320
July-December:						
Domestic:						
Agricultural	18,900	5,560	1,560	523	20,500	6,080
Industrial	W	W	1,370	368	W	W
Subtotal	W	W	2,930	891	W	W
Exports: 2/	W	W	--	--	W	W
Total	19,400	5,720	2,930	891	22,400	6,610
Grand total	38,100	11,300	5,460	1,620	43,500	12,900

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Exports reported to the U.S. Geological Survey by companies.

TABLE 5
VALUE OF U.S. PHOSPHATE ROCK, BY GRADE

(Dollars per metric ton, f.o.b. mine)

Grade	1995			1996		
(percent BPL 1/ content)	Domestic	Export	Average	Domestic	Export	Average
74 or more	--	--	--	W	--	W
72 to less than 74	30.40	32.97	31.30	W	W	W
70 to less than 72	22.88	29.74	26.64	W	W	W
66 to less than 70	20.90	25.55	21.15	22.29	30.14	22.62
60 to less than 66	22.15	--	22.15	23.00	W	23.14
Less than 60	17.02	--	17.02	W	--	W
Weighted average	21.29	28.35	21.75	22.90	35.82	23.40

W Withheld to avoid disclosing company proprietary data.
1/ 1.0% BPL (bone phosphate of lime or tricalcium phosphate) = 0.458% P2O5.

TABLE 6
U.S. EXPORTS OF GROUND AND
UNGROUND PHOSPHATE ROCK 1/

(Thousand metric tons)

	Quantity	
Country	1995	1996
Australia	211	132
Belgium	268	--
Canada	137	12
India	359	223
Japan	463	269
Korea, Republic of	993	724
Netherlands	270	57
New Zealand	128	71
Other	161	81
Total	2,990	1,570

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 7
U.S. EXPORTS OF SUPERPHOSPHATES
(CONCENTRATED)

(Thousand metric tons)

	Quantity	
Country	1995	1996
Argentina	19	1
Australia	202	267
Bangladesh	21	--
Brazil	34	76
Canada	18	19
Chile	108	141
Japan	58	38
Peru	--	18
Uruguay	15	13
Other	239	109
Total	714	681

Source: Bureau of the Census.

TABLE 8
U.S. EXPORTS
OF DIAMMONIUM PHOSPHATE

(Thousand metric tons)

Country	Quantity	
	1995	1996 2/
Argentina	232	402
Australia	438	599
Belgium	103	--
Brazil	59	29
Canada	80	119
Chile	41	51
China	5,600	3,880
Colombia	130	68
Dominican Republic	47	37
Ecuador	69	32
France	35	--
Germany	53	32
Guatemala	9	24
India	1,110	245
Iran	270	--
Japan	501	421
Kenya	11	54
Mexico	40	149
New Zealand	182	181
Pakistan	194	569
Thailand	160	244
Turkey	157	17
Uruguay	69	107
Other	474	660
Total	10,100	7,920

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Data under review by Bureau of the Census.

Source: Bureau of the Census.

TABLE 9
U.S. EXPORTS OF
MONOAMMONIUM PHOSPHATE 1/

(Thousand metric tons)

Country	Quantity	
	1995	1996
Australia	182	318
Brazil	77	166
Canada	505	542
Chile	44	59
Colombia	74	69
Guatemala	27	24
Japan	131	104
Mexico	52	101
New Zealand	14	--
Thailand	8	44
Other	90	84
Total	1,200	1,510

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 10
U.S. EXPORTS OF
PHOSPHORIC ACID 1/

(Thousand metric tons)

Country	Quantity 1995	Quantity 1996
Australia	1	122
Canada	137	73
India	157	130
Indonesia	36	--
Venezuela	61	60
Other	183	185
Total	575	570

1/ Excludes superphosphoric acid tonnage.

Source: Bureau of the Census as adjusted by the U.S. Geological Survey.

TABLE 11
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS 1/

Country	1995 Quantity (metric tons)	1995 Value 2/ (thousands)	1996 Quantity (metric tons)	1996 Value 2/ (thousands)
Brazil	98	$202	3	$5
Canada	682	1,230	1,250	2,370
Japan	7,310	13,600	4,760	9,570
Korea, Republic of	194	432	30	57
Mexico	5,280	8,130	6,250	12,500
Netherlands	40	99	40	108
Other	149	345	281	948
Total	13,700	24,100	12,600	25,500

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ F.a.s. values.

Source: Bureau of the Census.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND
PHOSPHATIC MATERIALS 1/

(Thousand metric tons and thousand dollars)

Phosphatic materials	1995 Quantity	1995 Value 2/	1996 Quantity	1996 Value 2/
Natural calcium phosphates, unground	618	32,800	575	33,100
Natural calcium phosphates, ground	56	3,140	(3/)	117
Dicalcium phosphate	3	4,660	4	5,530
Phosphorus	2 r/	3,920 r/	1	3,280
Normal superphosphate	(3/)	57	(3/)	33
Triple superphosphate	25	4,720	83	7,650
Diammonium phosphate	21	6,010	77	18,300
Fertilizer containing nitrates and phosphates	51	6,490	69	12,300
Phosphoric acid	1	548	32	7,010

r/ Revised.
1/ Data are rounded to three significant digits.
2/ Declared c.i.f values.
3/ Less than 1/2 unit.

Source: Bureau of the Census as adjusted by the U.S. Geological Survey.

TABLE 13
PHOSPHATE ROCK ANNUAL
WORLD PRODUCTION CAPACITY,
DECEMBER 31, 1996

(Thousand metric tons per year)

Region/country	Capacity	Percent
United States	51,000	31
Africa	45,700	28
Asia	28,800	17
Western Europe and the Former U.S.S.R.	20,900	13
Middle East	12,400	8
Latin America	5,300	3
Oceania	1,300	1
World total 1/	165,000	100

1/ Data may not add to totals shown because of independent rounding.

Sources: International Fertilizer Industry Association and the U.S. Geological Survey.

TABLE 14
PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Commodity and country 3/	Gross weight					P_2O_5 content				
	1992	1993	1994	1995	1996 e/	1992	1993	1994	1995	1996 e/
Phosphate rock:										
Albania e/	2	2	2	2	2	(4/)	(4/)	(4/)	(4/)	(4/)
Algeria	1,136	718	738	757	760	340 e/	220 e/	226	232	230
Australia	2	2	2 e/	2 e/	2	(4/)	(4/)	(4/) e/	(4/) e/	(4/)
Brazil	2,825 r/	3,419 r/	3,937 r/	3,590 r/	3,600	650	700	700	700 e/	700
Chile	18	15	10	10 e/	10	5	4	3	3 e/	3
China e/	21,400	21,200	24,100 r/	19,300 r/	21,000	6,400	6,350	7,430 r/	5,790 r/	6,300
Colombia e/	32 5/	45 5/	48 5/	50	50	7	9	10	11	11
Egypt e/	2,000 5/	1,585 5/	1,500	1,500	1,500	500	390	390	390	390
Finland	555	628	647	671	600	201	227	236	244	216
India e/	488 5/	969 5/	1,176 5/	1,250	1,300	132	262	318	338	351
Indonesia e/	8	7	7	8	8	2	2	2	2	2
Iraq e/ 6/	600	800	1,000	1,000	1,000	180	240	300	300	300
Israel 6/	3,595	3,680	3,961	4,063	3,800	1,130 e/	1,148	1,232	1,264	1,140
Jordan	4,296	4,129	4,217	4,984	5,350	1,410 e/	1,367	1,399	1,655	1,820
Kazakstan e/	7,000	4,000	2,000	2,200	500	1,750	1,000	500	550	125
Korea, North e/	500	510	510	520	520	160	163	163	164	164
Mexico 7/	515	237	533	622 r/	625	160 e/	72	156	180	183
Morocco 8/	19,145	18,193	19,764	20,200	20,800	6,180 e/	5,778	6,274	6,381	6,550
Nauru	747	634	613	496	510 5/	288	244	233	190	194 5/
Netherlands Antilles e/	15	10	15	-- r/	--	5	3	5	-- r/	--
Pakistan e/	20 5/	14 5/	15 5/	10 r/ 5/	10	6	4	3 r/	2 r/	2
Peru	37	37	37	37 e/	37	12	12	12	12 e/	12
Philippines e/	5 5/	92 5/	20	20	20	2	31	7	7	7
Russia e/	11,500	9,400	8,000	8,800	8,500	4,000	3,300	2,800	3,000	2,900
Senegal e/ 9/	2,284 5/	1,667 5/	1,587 r/ 5/	1,500 r/	1,600	830	606	576 r/	545 r/	600
South Africa	3,080	2,466	2,545	2,790	2,700	1,170 e/	962	995	1,087	1,000
Sri Lanka e/	26 5/	36 5/	32 5/	32	32	6	12	11	11	11
Syria	1,266	931	1,203	1,551	2,000	395 e/	286	371	477	615
Tanzania e/	5 r/ 5/	4 r/ 5/	-- r/	-- r/	--	2 r/ e/	1 r/ e/	-- r/	-- r/	--
Thailand	8	11	8 r/	9 r/	9	2	3	2 r/	3	3
Togo e/	2,083 5/	1,794 r/ 5/	2,149 r/ 5/	2,560 r/	2,600	760	540 5/	800	720	720
Tunisia	6,400	5,500	5,699	7,241	7,100	1,890 e/	1,647	1,712	2,182	2,080
Turkey	65	78	-- r/	-- r/	--	20	24	-- r/	-- r/	--
United States	47,000	35,500	41,100	43,500	45,400	14,100	10,700	12,100	12,800	13,300
Venezuela	10	--	99 r/	86 r/	203 p/	3	--	27 r/	23 r/	55 p/
Vietnam e/	290 5/	363 5/	470 5/	480	480	93	116	144	145	145
Zimbabwe, concentrate	142	153	151	154 r/	123 5/	42	45	45	45 e/	39
Total	139,000	119,000	128,000	130,000 r/	133,000	42,800	36,500	39,200 r/	39,400 r/	40,200

See footnotes at end of table.

TABLE 14--Continued
PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Commodity and country 3/	Gross weight					P_2O_5 content				
	1992	1993	1994	1995	1996 e/	1992	1993	1994	1995	1996 e/
Basic (Thomas converter) slag:										
Egypt e/	8	8	8	8	8	2	2	2	2	2
France	356	253	155	140 r/ e/	150	64	46	28	18 r/ e/	27
Germany	120	110	134	125 e/	125	18	16	20	19 e/	19
Luxembourg e/	519 5/	555 5/	472 5/	500	500	93	100	85	75	75
Total	1,000	926	769	773 r/ e/	783	177	164	135	114 r/ e/	123
Guano:										
Chile	(4/)	--	--	--	--	(4/) e/	--	--	--	--
Philippines e/	(4/) 5/	5 5/	5	5	5	(4/)	2	2	2	2
Total e/	1 5/	5 5/	5	5	5	(4/)	2	2	2	2

e/ Estimated. p/ Preliminary. r/ Revised.

1/ Table includes data available through May 8, 1997. Data for major phosphate rock-producing countries derived in part from the International Fertilizer Industry Association; other figures are from official country sources where available.

2/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

3/ In addition to the countries listed, Belgium may have produced small quantities of phosphate rock and Namibia may have produced small quantities of guano, but output is not officially reported; available information is inadequate for formulation of reliable estimates of output levels.

4/ Less than 1/2 unit.

5/ Reported figure.

6/ Beneficiated.

7/ Includes only output used to manufacture fertilizers.

8/ Production from Western Sahara area is included.

9/ Does not include aluminum phosphate production, gross weight estimated at 75,000 metric tons per year.