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2007 Minerals Yearbook

PHOSPHATE ROCK [ADVANCE RELEASE]

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PHOSPHATE ROCK

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Domestic phosphate rock production in 2007 was 29.7 million metric tons (Mt) compared with 30.1 Mt in 2006, and reported use of phosphate rock was 31.1 Mt compared with 30.2 Mt in 2006 (tables 1, 3, 4). World production was 3% higher than that in 2006 (table 11). World consumption of phosphate contained in fertilizers increased by about 4.5% in 2007, driven by growing demand for food, animal feed, and biofuel crops, in order of importance (Heffer and Prud'homme, 2008). Concurrently, the supply of phosphate rock, sulfur, potash, and other raw materials tightened, with major producers operating nearly at full capacity of 34.3 Mt in the second half of the year. This resulted in a fourfold increase in the world price of phosphate rock from June to December and a similar price increase in phosphate fertilizers.

Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers. Phosphate rock minerals are the only significant global resources of phosphorus. In this report (unless noted otherwise), mine production is reported in terms of marketable production, which refers to beneficiated phosphate rock with a suitable phosphorus pentoxide (P_2O_5) content for wet-process phosphoric acid or elemental phosphorus manufacturing. Quantities are reported in metric units and percentages have been calculated using unrounded data.

In 2007, phosphate rock was produced at seven mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2).

Domestic production of all types of phosphoric acid in 2007 increased to 10.96 Mt P_2O_5 from 10.70 Mt P_2O_5 in 2006. Combined production of all types of phosphate fertilizers was 2% higher than in 2006 (U.S. Census Bureau, 2008). The major fertilizer products manufactured from phosphoric acid were diammonium phosphate (DAP) and monoammonium phosphate (MAP).

Production

U.S. Geological Survey domestic phosphate rock production data were obtained from monthly and semiannual voluntary canvasses of all companies that owned phosphate rock mines. All companies responded to the canvass in 2007. There were 12 active phosphate rock mines during the year (table 2).

The U.S. phosphate industry is concentrated in Florida in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. In 2007, seven mines, representing 65% of domestic annual production capacity, were active in Florida. The Mosaic Company, operated five mines, and CF Industries, Inc. and PCS Phosphate Co., Inc. each operated one (table 2).

In Beaufort County, NC, PCS operated a large integrated production facility that included a mine, and animal feed, fertilizer, and phosphoric acid plants.

In the Western Phosphate Field in Idaho, Montana, Utah, and Wyoming, four mines were active in 2007; three in Idaho, and one in Utah (table 2). In Idaho, phosphate rock was mined in Caribou County by Nu-West Industries, Inc. (a subsidiary of Agrium Inc., Calgary, Alberta, Canada), P4 Production, LLC (a subsidiary of Monsanto Co.), and J.R. Simplot Co. Simplot also operated the Vernal Mine in Uintah County, UT.

Consumption

Phosphate rock was used primarily for production of wet-process phosphoric acid for fertilizer applications, which accounted for more than 93% of domestic consumption. The remainder was used in the manufacturing of animal feed supplements, for direct application to soil, and for elemental phosphorus production. Domestic consumption of phosphate rock increased to 33.5 Mt compared with 32.6 Mt in 2006 (table 1), owing to higher phosphoric acid production. There were no sales of domestic rock reported by producers. Consumption by grade and by region was withheld to avoid disclosing company proprietary data.

All phosphate rock mining companies are vertically integrated with one or more fertilizer plants, usually located near the mine. Mosaic is the leading company with about 46% of domestic phosphoric acid production capacity (Mosaic Company, The, 2007, p. 6). In 2007, the company operated four wet process phosphoric acid and fertilizer plants in Florida and one of each in Louisiana.

PCS had phosphoric acid and fertilizer production facilities near its mines in Florida and North Carolina. Simplot sent phosphate concentrate by a slurry pipeline; ore from its Smoky Canyon Mine went to Pocatello, ID, and ore from the Vernal Mine went to Rock Springs, WY.

Three companies—Agrifos Fertilizer Inc., Pasadena, TX; Mississippi Phosphates Corp., Pascagoula, MS; and PCS Nitrogen, Inc., Geismar, LA—manufactured wet-process phosphoric acid using imported phosphate rock from Morocco. Agrifos and Mississippi Phosphates produced phosphate fertilizer products for domestic and export markets. PCS sold some merchant-grade phosphoric acid to Innophos, Inc., which has a nearby facility, for upgrading into high-purity acid for technical- and food-grade applications (Innophos Holdings, Inc., 2008, p. 6).

Monsanto operated the only elemental phosphorus plant in the United States in Soda Springs, ID. The company used elemental phosphorus primarily to manufacture phosphorus trichloride, which was used as a chemical intermediary for the production of glyphosate-base herbicides (Monsanto Company, 2007, p. 9). In other countries, elemental phosphorus is used

chiefly to manufacture high-purity phosphoric acid by burning the phosphorus in water, which is known as thermal acid. Worldwide, there has been a gradual shift to manufacturing high-purity phosphoric acid from wet-process acid, which has lower operating costs and no hazardous waste disposal issues that are associated with elemental phosphorus. However, thermal acid still accounts for 65% of annual world production capacity of high-purity phosphoric acid. China is the leading producer of elemental phosphorus in the world with about 45 companies, most producing less than 10,000 metric tons per year of P_2O_5 (Jiang, 2006). The only other operating elemental phosphorus facilities in the world are located in Kazakhstan and the Netherlands (Duley, undated, p. 7).

The United States is considered a mature market for phosphate fertilizers, with average annual consumption of slightly more than 4 Mt during the past decade. For the period July 1, 2006, to June 30, 2007, domestic consumption of P_2O_5 contained in fertilizers was estimated to have increased by more than 5% compared with the period July 1, 2005, to June 30, 2006, according to industry sources. The large increase was driven by high corn planting for agriculture and ethanol production.

Stocks

Producers stocks of phosphate rock in 2007 dropped by 30% from those of 2006, owing to lower production and increased consumption. Regional data were consolidated to avoid disclosing company proprietary information (table 3).

Transportation

In Florida and North Carolina, crude phosphate rock ore was sent by slurry pipeline from the mines to the processing plants. All beneficiated phosphate rock was used internally to manufacture wet-process phosphoric acid; the beneficiated phosphate rock was sent by conveyers to acid plants. Mosaic sent beneficiated phosphate rock by rail to the Port of Tampa and ore by barge across the Gulf of Mexico to its facilities in Louisiana. In central Florida, animal feed products, fertilizers, and phosphoric acid were sent by rail to domestic customers or to the Port of Tampa for export. The Port of Tampa handles the largest volume of fertilizer materials in the United States (Wainio, 2007).

In northern Florida, PCS transported its fertilizer products by rail to consumers; some materials, however, were sent by rail to the PCS port facility at Morehead City, NC, for export. PCS used barges and tugboats to move products from its Aurora, NC, complex to the Port of Morehead City for export or delivery by rail to domestic consumers (Potash Corporation of Saskatchewan Inc., 2008, p. 15). Phosphoric acid producers along the Gulf of Mexico received phosphate rock by ship from Morocco and transported their products by barge on the Mississippi River and its tributaries or by rail to domestic consumers. In Idaho and Utah, phosphate rock was sent from the mine to the processing facility via truck, rail, and slurry pipelines.

Prices

Price data were collected through the semiannual canvass of producers and reflected the value of phosphate rock used for production of phosphoric acid and elemental phosphorus. The average price increased to $51.36 per metric ton in 2007 from $30.52 per ton in 2006 (table 1). The substantial rise in value was the result of higher production costs. Unlike many other mineral commodities, no standard domestic or world price for phosphate rock exists. Average ranges of world prices were published in various industry trade journals based on a sample of transactions. In 2007, the average price from Morocco, the world's largest exporter of phosphate rock, was $40 to $51 per ton in January, and ended the year in range of $170 to $210 per ton (Fertilizer Week, 2007b). The huge increase in price resulted from the combination of increased world consumption, tighter supply of phosphate rock, high freight rates, rising energy costs, and a weaker dollar (Heffer and Prud'homme, 2008). Morocco accounted for almost 50% of world phosphate rock exports and had the most influence on the price increase. The import price of $57.54 per ton was determined based on the U.S. Census Bureau customs value and included cost, insurance, and freight (table 1).

Foreign Trade

U.S. producers reported no exports of phosphate rock in 2007 (table 1). The United States is the leading importer of phosphate rock in the world. Most of the shipments from Morocco were consumed by the three phosphoric acid producers located along the Gulf of Mexico. The remainder of Moroccan imports was consumed by Mosaic at its plants in Florida and Louisiana (Mosaic Company, The, 2007, p. 6). In 2007, U.S. imports were estimated to be 2.67 Mt, based on U.S. Census Bureau data and export information received from Office Chérifien des Phosphates (OCP), the Moroccan phosphate producer (Benzekri, Mohammed, OCP, written commun., January 18, 2008). The U.S. Census Bureau withholds tonnage and value information for some phosphate rock and fertilizer product shipments, which necessitates the use of other sources. U.S. import tonnage of other phosphate fertilizers were insignificant when compared with exports of the same materials (tables 5-8, 10)

Exports of elemental phosphorus increased to 9,540 t in 2007 from 8,570 t in 2006. The average unit value decreased from $2,197 per ton in 2006 to $2,106 per ton in 2007 (table 9).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 37% of world P_2O_5 exports in 2006 (the most recent data available) (International Fertilizer Industry Association, 2007).

World Review

World production of phosphate rock was 156 Mt, a 3.3% increase compared with that of 2006. China (45.4 Mt), the United States (29.7 Mt), and Morocco (27.0 Mt) were the leading producing countries, accounting for 65% of the world total (table 11). Phosphate rock production in China was likely higher than the official figure of 45.4 Mt, which did not

include production from numerous, small independent mines (International Fertilizer Industry Association, 2007).

Canada.—Agrium Inc. corrected problems with ore quality at its phosphate rock mine near Kapuskasing, Ontario, that had lowered production and increased costs in 2006. The company upgraded the flotation system to remove excess iron from the ore and began to shift the mining operations to a new section of the mine with lower iron content, which will be opened in mid-2007. Agrium imported two shipments of phosphate rock from Morocco, via the United States, for consumption at its phosphate fertilizer plant in Alberta to compensate for the reduced output from Kapuskasing (Agrium, Inc., 2008, p. 37).

China.—The Chinese Government increased the export tariff on phosphate rock from 10% to 20% on June 1, 2007. The tariff was imposed in 2006 to reduce exports of resources needed for fertilizer production. The Government also imposed an export tariff on DAP, which was set at 20% from June 1 to September 30 and 10% from October 1 to December 31 (Fertilizer Week America, 2007b).

Finland. – Yara International ASA of Norway purchased Kemira GrowHow Oyj of Finland in June. The acquisition included the Siilinjarvi phosphate rock mine, the Sokli phosphate rock deposit, and associated phosphate processing facilities (Fertilizer Week, 2007c).

The Finnish Ministry of Trade and Industry gave Yara 2 years to begin mining at the Sokli phosphate deposit, the Eastern Lapland region of Finland. Previously, the Ministry had granted the former owner, Kemira, a series of 5-year extensions for more than 20 years. Yara expected to mine about 1.5 million metric tons per year of phosphate rock, with a projected grade of 37% to 38% P_2O_5 (Fertilizer Week, 2007a).

Mexico.—Grupo Fertinal S.A. de C.V. restarted its phosphate rock mine and fertilizer plant in Baja California Sur in November. The complex had been closed since September 2001 when the phosphate rock loading facility and part of the phosphate rock processing plant were destroyed by a hurricane. Grupo Fertinal received a $94 million settlement from its insurance company in June for damages from the hurricane (Fertilizer Week America, 2007a). The company operated on a test basis in 2007 and expected to gradually increase production of phosphate rock and DAP in 2008 (Green Markets, 2007).

Outlook

The world market condition of tight supplies of phosphate rock and increasing consumption of phosphate fertilizers that began in the second half of 2007 was expected to continue into 2011, according to the International Fertilizer Industry Association. World consumption of P_2O_5 contained in fertilizer was projected to increase at average annual rate of 2.7% from 2008 to 2012; however, capacity increases for phosphate rock and processed phosphates were expected to increase at a slower rate and were not scheduled for completion until 2012. World phosphate rock production was projected to increase by 28% from 2007 to 2012, with 80% of the increase in countries other than China, the world's leading producer of phosphate rock. By 2012, new mines were projected to open in Australia, Brazil, Peru, and Saudi Arabia. Expansions to current mines have been announced in Africa, Brazil, China, Israel, Jordan, and Venezuela (Heffer and Prud'homme, 2008).

Production and consumption of phosphate rock in the United States will likely remain about the same as in 2008. Domestic consumption of phosphate fertilizers was projected to fall in 2008, as less corn was expected to be planted, owing to high stocks and poor weather. Export tonnage of DAP and MAP, combined will likely increase in 2008, owing to producers operating at near capacity, less domestic consumption, and growing world demand for fertilizers. The amount of export tonnage increase depends primarily on sales of DAP to India and MAP to Latin America.

Domestic phosphate rock production was expected to remain almost 30 Mt/yr during the next several years, provided that exports sales remain at or above current levels. U.S. mines operated below the rated capacity of 34.3 Mt in 2007, but it is unlikely that mines in Florida would operate at full capacity because of the need to conserve resources. There are several new mines planned in Florida as replacements for existing mines, but public and government opposition to new mining in Florida has slowed the permitting process. Production in Florida could begin to drop in about 5 years or imports will be needed if the new mines are not opened. The combined phosphate rock reserves in other States are sufficient, at current production rates, for more than 75 years.

References Cited

Agrium Inc., 2008, Annual report—2007: Calgary, Alberta, Canada, Agrium Inc., 137 p.

Duley, Bill, [undated], Recycling phosphorus by recovery from sewage: London, United Kingdom, undated. (Accessed June 13, 2005, at http://www.nhm.ac.uk/research-curation/departments/mineralogy/research-groups/phosphate-recovery/duley.doc.)

Fertilizer Week America, 2007a, Court backs Fertinal claim for destroyed phosphate mine: Fertilizer Week America, v. 17, no. 44, June 8, p. 2.

Fertilizer Week America, 2007b, DAP/MAP/TSP: Fertilizer Week America, v. 17, no. 40, p. 7-8.

Fertilizer Week, 2007a, Friday news bulletin: Fertilizer Week, v. 21, no. 11, June 29, p. 7-8.

Fertilizer Week, 2007b, Thursday markets report: Fertilizer Week, v. 21, no. 36, December 20, p. 25.

Fertilizer Week, 2007c, Yara poised to absorb Europe's second largest fertilizer producer: Fertilizer Week, v. 21, no. 7, June 1, p. 1-3.

Green Markets, 2007, Fertinal phosphate plant coming back online: Green Markets, v. 31, no. 36, p. 9-10.

Heffer, Patrick, and Prud'homme, Michel, 2008, Medium-term outlook for global fertilizer demand, supply and trade, 2008 – 2012 *in* IFA Annual Conference, 76th, Vienna, Austria, May 19-21, 2008, Proceedings: Paris, France, International Fertilizer Industry Association, 11 p.

Innophos Holdings, Inc., 2008, 10-K—2007: Securities and Exchange Commission, 93 p.

International Fertilizer Industry Association, 2007, Production and international trade statistics: International Fertilizer Industry Association (Accessed December 10, 2007, at http://www.fertilizer.org/ifa/statistics/pit_public/pit_public_statistics.asp.)

Jiang, David, 2006, Competence of thermal acid in the China context, *in* Phosphates 2006, Brussels, Belgium, April 23-25, 2006, Proceedings: London, United Kingdom, British Sulphur Events, p. 81-84.

Monsanto Company, 2007, 10-K—2007: Securities and Exchange Commission, 198 p.

Mosaic Company, The, 2007, Form 10-K—Fiscal year 2007: Securities and Exchange Commission, 244 p.

Potash Corporation of Saskatchewan, 2008, 10-K—2007: Securities and Exchange Commission, 299 p.

U.S. Census Bureau, 2008, Fertilizer materials and related chemicals—2007: U.S. Census Bureau MQ325B(07)-5, June, 7 p. (Accessed June 16, 2008, at http://www.census.gov/cir/www/325/mq325b.html.)
Wainio, Richard, 2007, 2007 state of the port address: Tampa, FL, Tampa Port Authority, December 12 (Accessed March 15, 2008, at http://www.tampaport.com/subpage.asp?navid=&id=58.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Fertilizers—Sustaining Global Food Supplies. Fact Sheet 155-99, 1999.
Marketable Phosphate Rock. Mineral Industry Surveys, crop year.
Phosphate. International Strategic Minerals Inventory Summary Report, Circular 930-C, 1984.
Phosphate Deposits. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Phosphate Rock. Ch. in Mineral Commodity Summaries, annual.
Phosphate Rock. Mineral Industry Surveys, monthly.
Phosphate Rock Resources of the United States. Circular 888, 1984.
Sedimentary Phosphate Resource Classification System of the U.S. Bureau of Mines and the U.S. Geological Survey. Circular 882, 1982.

Other

Phosphate Availability and Supply—A Minerals Availability Appraisal: U.S. Bureau of Mines Information Circular 9187, 1988.
Fertilizer Institute, The.
Fertilizer International, bimonthly.
Fertilizer Week, weekly.
Green Markets, weekly.
International Fertilizer Development Center.
International Fertilizer Industry Association.
International Plant Nutrition Institute.
OCP Group.
U.S. Department of Agriculture, Economic Research Service.

TABLE 1
SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2003	2004	2005	2006	2007
United States:						
Mine production (crude ore)		153,000	146,000	151,000	111,000	126,000
Marketable production:						
Quantity:						
Gross weight		35,000	35,800	36,100	30,100	29,700
P_2O_5 content		10,300	10,400	10,300	8,680	8,480
Value		946,000	995,000	1,070,000	919,000	1,520,000
Value, average[2]	dollars per metric ton	27.01	27.79	29.61	30.49	51.10
Sold or used by producers:[3]						
Quantity:						
Gross weight		36,400	36,500	35,200	30,200	31,100
P_2O_5 content		10,600	10,500	10,200	8,710	8,890
Value[4]		981,000	1,010,000	1,040,000	922,000	1,600,000
Value, average	dollars per metric ton	26.95	27.76	29.60	30.52	51.36
Exports:						
Quantity, gross weight		64 [5]	-- [6]	-- [6]	-- [6]	-- [6]
Value[6]		W	--	--	--	--
Value, average	dollars per metric ton	W	XX	XX	XX	XX
Imports for consumption[e, 5, 7]						
Quantity, gross weight		2,400	2,500	2,630	2,420	2,670
Value, cost, insurance, and freight[e]		84,000	91,300	107,000	115,000	154,000
Value, average	dollars per metric ton	35.55	36.50	40.91	47.52	57.54
Consumption, gross weight[e, 8]		38,800	39,000	37,800	32,600	33,500
Stocks, December 31, producers		7,540	7,220	6,970	7,070	4,970
World, production, gross weight		138,000 [r]	143,000	150,000 [r]	151,000 [r]	156,000

[r]Revised. [e]Estimated. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits, except average values per metric ton.

[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]Source: U.S. Census Bureau.

[6]Reported by producers.

[7]Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau.

[8]Expressed as sold or used plus imports minus exports.

TABLE 2
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2007

Owner	Mine	County and State
CF Industries, Inc.	South Pasture	Hardee, FL.
Mosaic Co, The	Four Corners	Hillsborough/Manatee/Polk, FL.
Do.	Hookers Prairie	Polk, FL.
Do.	Hopewell	Hillsborough, FL.
Do.	South Fort Meade	Polk, FL.
Do.	Wingate Creek	Manatee, FL.
Nu-West Industries, Inc. (Agrium Inc.)	Dry Valley	Caribou, ID.
P4 Production, LLC. (Monsanto Co.)	South Rasmussen	Do.
PCS Phosphate Co., Inc.	Aurora	Beaufort, NC.
Do.	Swift Creek	Hamilton, FL.
Simplot, J.R., Co.	Smoky Canyon	Caribou, ID.
Do.	Vernal	Uintah, UT.

Do. Ditto.

TABLE 3
PRODUCTION OF PHOSPHATE ROCK IN THE UNITED STATES, BY PERIOD[1]

(Thousand metric tons and thousand dollars)

	Mine production, crude ore		Marketable production, beneficiated			
Period	Rock	P_2O_5 content	Rock	P_2O_5 content	Value[2]	Ending stocks, rock
2006:						
January-June	57,300	5,900	15,200	4,370	456,000	7,450
July-December	53,300	5,680	14,900	4,300	462,000	7,070
Total	111,000	11,600	30,100	8,680	919,000	XX
2007:						
January-June	61,400	6,230	14,700	4,160	704,000	6,100
July-December	64,900	6,680	15,000	4,320	813,000	4,970
Total	126,000	12,900	29,700	8,480	1,520,000	XX

XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Based on the per ton sold or used values.

TABLE 4
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY PERIOD[1]

(Thousand metric tons and thousand dollars)

Period	Rock	P_2O_5 content	Value[2]
2006:			
January-June	14,900	4,300	443,000
July-December	15,300	4,400	479,000
Total	30,200	8,710	922,000
2007:			
January-June	15,000	4,270	722,000
July-December	16,100	4,620	877,000
Total	31,100	8,890	1,600,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Free on board mine.

TABLE 5
U.S. EXPORTS OF SUPERPHOSPHATES (CONCENTRATED)

(Thousand metric tons)

Country	2006	2007
Australia	26	--
Canada	--	1
Japan	25	(1)
Other	14 r	(1)
Total	65 r	1

rRevised. -- Zero.
[1]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF DIAMMONIUM PHOSPHATE[1]

(Thousand metric tons)

Country	2006	2007
Argentina	209	190
Australia	130	101
Brazil	174	286
Canada	103	91
Chile	95	134
China	910	265
Colombia	126	141
India	1,960	1,650
Japan	324	223
Mexico	422	385
Pakistan	336	--
Peru	184	89
Thailand	111	74
Other	570 r	559
Total	5,660	4,190

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF MONOAMMONIUM PHOSPHATE[1]

(Thousand metric tons)

Country	2006	2007
Argentina	241	184
Australia	342	517
Brazil	281	340
Canada	628	910
Colombia	131	136
Japan	117	98
Mexico	249	138
Other	321 r	129
Total	2,310	2,450

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF PHOSPHORIC ACID[1]

(Thousand metric tons)

Country	2006	2007
Canada	25	10
India	356	219
Other	102 r	43
Total	483	272

rRevised.
[1]Excludes superphosphoric acid tonnage.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

	2006		2007	
Country	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Brazil	7,720	$16,400	8,570	$17,500
Canada	696	2,020	596	1,740
Mexico	1	3	13	29
Other	152 r	352 r	361	770
Total	8,570	18,800	9,540	20,100

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 10

U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND PHOSPHATIC MATERIALS[1]

(Thousand metric tons and thousand dollars)

Phosphatic materials	2006		2007	
	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground[3]	1,260	51,400	1,260	65,500
Ground[3]	511	32,900	534	37,400
Total[4]	2,420	115,000	2,670	154,000
Dicalcium phosphate	8	11,200	9	13,400
Elemental phosphorus	13	30,600	12	25,800
Normal superphosphate	28	5,870	85	27,200
Triple superphosphate	17	3,580	82	33,400
Diammonium phosphate	54	32,000	15	10,100
Fertilizer containing nitrates and phosphates	(5)	105	(5)	213
Phosphoric acid	75	30,500	555	26,500

[1]Data are rounded to no more than three significant digits.

[2]Declared cost, insurance, freight values.

[3]Some phosphate rock tonnages and values were suppressed by the U.S. Census Bureau.

[4]Includes an estimate for data suppressed by U.S. Census Bureau based on reported Moroccan exports to the United States.

[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 11

PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

	Gross weight					P_2O_5 content				
Commodity and country[3]	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Phosphate rock:										
Algeria	905	1,017	878	1,510 r	1,500	267 e	300 e	260 r, e	450 e	450 e
Australia	2,100 r	2,200 r	2,080 r	2,145 r	2,200	483 r	506 r	478 r	493 r	506
Brazil, concentrate	5,584	5,690	5,450 r	5,930 r	6,000 e	2,005	2,181	2,044	2,224 r	2,300 e
Burkina Faso[e]	2	2	2	2	2	1	1	1	1	1
Canada[e]	1,000	1,000	900	550	700	380	380	325	200	250
Chile	21	21	20	14 r	14 e	5	5	5	4 r	4 e
China	25,200	25,500	30,400	38,600 r	45,400	7,550	7,650	9,130	11,600 r	15,100
Christmas Island	500 e	655 [4]	685 [4]	685 [4]	650 e	167 e	210 [4]	220 [4]	220 [4]	210 e
Colombia[e]	43	43	43	43	43	8	8	8	8	8
Egypt, beneficiated	2,183	2,219	2,144	2,200	2,200 e	630	650 e	622 e	650 e	650 e
Finland[e]	800	840	825	825	825	290	306	301	300	300
India[e]	1,175	1,180	1,200	1,200	1,210	345	349	355	355	358
Indonesia[e]	1	1	1	1	1	(5)	(5)	(5)	(5)	(5)
Iran[e]	194 [6]	230 [6]	324 r, [6]	325 r	330	23	28	40 r	40 r	41
Iraq, beneficiated[e]	3	30	-- r	-- r	10	1	10	-- r	-- r	3
Israel	3,708	3,290	3,236	2,949	3,069	1,020 e	900 e	890 e	810 e	840 e
Jordan	6,650 r	6,188 r	6,375 r	5,805 r	5,541	2,130 r	1,980 r	2,040 r	1,860 r	1,770 e
Kazakhstan	169	230	263 r	270 e	300	38	52 e	55 e	55 e	60 e
Korea, North[e]	300	300	300	300	300	95	95	95	95	95
Mexico	6	(5)	(5)	8 e	40 e	2	(5)	(5)	2 r	10 e
Morocco[7]	23,338	26,675	28,788	27,000 e	27,000 e	7,424	8,507	9,195	8,660 e	8,660 e
Nauru[e]	84	22	8	45	45	26	7	3	17	17
Pakistan	3	5	3	3	3 e	(5)	1	(5)	1 r	1 e
Peru	32	38	-- r	-- r	--	12	14	-- r	-- r	--
Philippines[e]	400	400	400	400	400	135	135	135	135	135
Russia[e]	11,000	11,000	11,000	11,000	11,000	4,000	4,000	4,000	4,000	4,000
Senegal	1,765	1,580	1,455	584 r	600 e	630	569	504	180 r	180 e
South Africa	2,643	2,735	2,577 r	2,629 r	2,556	1,030 e	1,067	1,000 e	1,020 e	1,000 e
Sri Lanka[e]	41 [6]	42	43	44	45	14 [6]	14	15	15	15
Syria	2,414	2,883	3,500	3,664 e	3,700	750 e	890 e	1,080 e	1,130 e	1,140
Tanzania	4	7	2 r	3 r	3 e	1	2 r	1 r	1 r	1 e
Thailand	14	3	3 r	1 r	1 e	4 e	1 e	1 r, e	(5) r, e	(5) e
Togo[4]	1,471	1,115	1,350 r	1,650 r	800 e	530 e	418 e	481 r, e	590 r, e	300 e
Tunisia, washed[e]	7,890	8,051 [6]	8,220 [6]	7,801 r, [6]	7,800	2,300	2,400	2,400	2,300 r	2,300
United States	35,000	35,800	36,100	30,100	29,700	10,300	10,400	10,300	8,680	8,480
Uzbekistan[e]	430	430	430	600	600	102	102	102	140	140
Venezuela[e]	260 [6]	300 [6]	392 [6]	400	400	75	85	110	115	100
Vietnam	821	905 r	1,066 r	1,215 r	1,360 e	246	272 r	320 r	365 r	408 e
Zimbabwe, concentrate	95	83	46	66 r	30 e	31	27	15 e	21 r, e	10 e
Total	138,000 r	143,000	150,000 r	151,000 r	156,000	43,000 r	44,500 r	46,500 r	46,700 r	49,800

See footnotes at end of table.

TABLE 11—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				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Basic (Thomas converter) slag:[e]										
Egypt	7	7	8	8	8	2	2	2	2	2
France	50	50	50	50	50	8	8	8	8	8
Luxembourg	475	450	475	475	475	70	70	70	70	70
Total	532	507	533	533	533	80	80	80	80	80

[e]Estimated. [r]Revised. -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through April 27, 2008. Figures are from official country sources where available.

[3]Phosphate rock may be produced in Nigeria, but information is inadequate to estimate output.

[4]Source: International Fertilizer Industry Association.

[5]Less than ½ unit.

[6]Reported figure.

[7]Includes production from Western Sahara.